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GOEWERMENSKENNISGEWING.

Onderstaande Goewermentskennisgewing word vir algemene inligting gepubliseer:—

DEPARTEMENT VAN DOEANE EN AKSYNS.

No. 340.] [8 Maart 1957.

MARINE-AFDELING.

Onderstaande ontwerp-regulasies voorgestel om kragtens die bepalings van artikel *driehonderd ses-en-vyftig* (1) van die Handelskeepvaartwet, 1951 (Wet No. 57 van 1951), uitgevaardig te word, word hierby vir algemene inligting gepubliseer. Persone wat begeer om kommentaar te lewer of aanbevelings te maak kan hulle aan die Kommissaris van Doeane en Aksyns, Marine-afdeling, Posbus 376, Pretoria, op of voor 30 Junie 1957, deurstuur.

Hierdie regulasies dek—

- (a) die veld en afneem van eksamens waarin 'n persoon moet slaag wat die toekenning kragtens die Handelskeepvaartwet, 1951 (Wet No. 57 van 1951), van 'n bekwaamheidsertifikaat verlang, as—
 - (i) hoof-ingenieuroffisier; of
 - (ii) tweede ingenieuroffisier;
- (b) die ouderdom en kwalifikasies van die kandidate, asook hul diens ter see en ander diens wat hulle moet verrig het en die opleiding wat hulle moet ondergaan het;
- (c) die eksamengelde wat deur kandidate betaal moet word; en
- (d) die vorms en ander dokumente met betrekking tot sodanige eksamens en sertifikate en die besonderhede wat daarin vervat moet word.

GOVERNMENT NOTICE.

The following Government Notice is published for general information:—

DEPARTMENT OF CUSTOMS AND EXCISE.

No. 340.] [8 March 1957.

MARINE SECTION.

The following draft regulations proposed to be made under the provisions of section *three hundred and fifty-six* (1) of the Merchant Shipping Act, 1951 (Act No. 57 of 1951), are hereby published for general information. Any person who wishes to make any comments or suggestions may submit them to the Commissioner of Customs and Excise, Marine Section, P.O. Box 376, Pretoria, on or before the 30th June, 1957.

These regulations cover—

- (a) the scope and conduct of examinations to be passed by a person desiring the grant under the Merchant Shipping Act, 1951 (Act No. 57 of 1951), of a certificate of competency as—
 - (i) Chief Engineer-Officer; or
 - (ii) Second Engineer-Officer;
- (b) the age and qualifications of the candidates, including the service at sea and other service which they must have performed and the training which they must have undergone;
- (c) the fees to be paid by the candidates for examination; and
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HOOFSTUK I.

[LET WEL.—

(1) Onderstaande regulasies handel oor bekwaamheid-sertifikaat as hoof-ingenieuroffisier en tweede ingenieur-offisier. Hierdie sertifikate kan soos volg wees:—

Stoom-sertifikaat waardeur die houers die reg verleen word om diens te doen as ingenieuroffisiere in stoomskepe.

Motor-sertifikaat waardeur die houers die reg verleen word om diens te doen as ingenieuroffisiere in motorskepe.

Gekombineerde sertifikaat waardeur die houers die reg verleen word om diens te doen as ingenieur-offisiere in sowel stoom- as motorskepe.

(2) Hangende die uitvaardiging van regulasies kragtens artikel vyf-en-sewentig (3) van die Wet om voorsiening te maak vir die uitreiking van bekwaamheidsertifikate van 'n hoër graad as dié van hoof-ingenieuroffisier, is reëlings met die Ministerie van Vervoer en Burgerlike Lugvaart van die Verenigde Koninkryk getref om, in Suid-Afrika, kandidate vir sodanige sertifikate, bekend as „Ekstra-ersteklas” te eksamineer. Hierdie sertifikate is vereiste kwalifikasies vir party staats- en professionele aanstellings.]

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CHAPTER I.

[NOTE.—

(1) These regulations deal with certificates of competency as Chief Engineer-Officer and Second Engineer-Officer. These certificates may be:—

Steam Certificates entitling the holders to serve as Engineer-Officers in steam ships.

Motor Certificates entitling the holders to serve as Engineer-Officers in motor ships.

Combined Certificates entitling the holders to serve as Engineer-Officers in both steam and motor ships.

(2) Pending the making of regulations under section seventy-five (3) of the Act to provide for the grant of certificates of competency of a higher grade than Chief Engineer-Officer arrangements have been made with the Minister of Transport and Civil Aviation of the United Kingdom to examine, in South Africa, candidates for such certificates known as “Extra First Class”. These certificates are necessary qualifications for some Government and professional appointment.]

ALGEMEEN.

Opskrif van hierdie regulasies.

1. Hierdie regulasies word genoem die Regulasies in Verband met Eksamens vir Ingenieursoffisiere.

Woordbetekenis.

2. In hierdie regulasies, tensy uit die samehang anders blyk, beteken—

- (1) „goedgekeur”, deur die Direkteur goedgekeur;
- (2) „eksaminator”, die persoon wat kragtens artikel *sewe-en-sewentig* (4) van die Handelskeepvaartwet, 1951, as sodanig aangestel is;
- (3) sluit „perdekrag” in—
 - (a) aangegewe perdekrag, waar suierstoommasjiene gebruik word;
 - (b) remperdekrag, waar binnebrandmotors gebruik word;
 - (c) as-perdekrag, waar stoomturbines gebruik word;
- (4) „lang seereis”, ’n seereis waarin die afstand tussen die uiterste hawens wat deur die skip besoek is in die loop van die seereis minstens 500 myl is; en
- (5) „kort seereis”, ’n seereis waarin die afstand tussen die uiterste hawens wat deur die skip besoek is, in die loop van die seereis minder as 500 myl is,

en enige verwysing na uitdrukkings of woorde wat in die Handel-skeepvaartwet, 1951, voorkom, moet uitgê word volgens die betekenis by die Wet daaraan gegee.

[LET WEL.—

(1) In artikel *twee* van die Wet verskyn onderstaande woordbepalings:—

„kusvaarder”, ’n skip van hoogstens eenduisend bruto-registerton wat gebruik word op reise tussen hawens in dieselfde land, maar dit omvat nie ’n visserboot of ’n robbe- of walvisvaarder nie;

„Direkteur”, die Direkteur van Handelskeepvaart wat kragtens artikel vyf van die Wet aangestel is;

„skip op vreemde vaart”—

- (a) ’n skip wat gebruik word op reise tussen ’n hawe in een land en ’n hawe in ’n ander land; of
- (b) ’n skip van meer as eenduisend bruto-registerton wat gebruik word op reise tussen hawens in dieselfde land; of
- (c) ’n skip van meer as eenduisend bruto-registerton wat uitsluitend gebruik word vir visvangs ter see of robbevangs; of
- (d) ’n walvisvaarder uitgesonderd ’n walvisvaarder met landbasis;

„Minister”, die Minister van Finansies;

* „bevoegde beampte”, die beampte wat deur die Minister aangewys is as die bevoegde beampte by die plek en ten opsigte van die saak waarna verwys word in die bepaling in hierdie Wet waarin die uitdrukking voorkom.

* Die voorneme bestaan om die Minister se magtiging te verkry om die volgende beamptes as „bevoegde beamptes” aan te wys:—

Te Kaapstad, Durban: Die Hoofbeampte van die Marine-opnemingskantoor;

te Port Elizabeth en Oos-Londen: Die Koopvaardymeester;

te Mosselbaai, Port Nolloth, Lüderitz en Walvisbaai: Die Ontvanger van Docane.

GENERAL.

Title of these Regulations.

1. These regulations are called the Examination Regulations for Engineer-Officers.

Interpretation.

2. In these regulations, unless the context indicates otherwise—

- (1) “approved” means approved by the Director;
- (2) “examiner” means the person appointed as such in terms of section *seventy-seven* (4) of the Merchant Shipping Act, 1951;
- (3) “horse-power” includes—
 - (a) where reciprocating steam engines are employed, indicated horse-power;
 - (b) where motor engines are employed, brake horse-power; and
 - (c) where steam turbines are employed, shaft horse-power;
- (4) “long voyage” means a voyage in which the distance between the extreme ports visited by the ship in the course of the voyage is not less than 500 miles; and
- (5) “short voyage” means a voyage in which the distance between the extreme ports visited by the ship in the course of the voyage is less than 500 miles,

and any reference to phrases or words which occur in the Merchant Shipping Act, 1951, shall be construed as having the same meaning assigned to them in that Act.

[NOTE.—

(1) Section *two* of the Act contains the following definitions:—

“coasting ship” means a ship of not more than one thousand gross register tons employed in plying between ports in the same country, but does not include any fishing, sealing or whaling boat;

“Director” means the Director of Merchant Shipping appointed under section *five* of the Act;

“foreign-going ship” means—

- (a) a ship plying between a port in one country and a port in another country; or
- (b) a ship of more than one thousand gross register tons plying between ports in the same country; or
- (c) a ship of more than one thousand gross register tons exclusively employed in sea fishing or seal catching; or
- (d) a whaling boat other than a shore-based whaling boat;

“Minister” means the Minister of Finance;

* “proper officer” means the officer designated by the Minister to be the proper officer at the place and in respect of the matter to which reference is made in the provision of this Act in which the expression occurs;

* It is proposed to seek the Minister’s authority to designate the following officers as “proper officers”:—

At Cape Town, Durban: The Principal Officer of the Marine Survey Office;

at Port Elizabeth and East London: The Shipping Master;

at Mossel Bay, Port Nolloth, Lüderitz and Walvis Bay: The Collector of Customs.

(2) Die aandag word gevestig op onderstaande bepalings van die Handelskeepvaartwet, 1951:—

- (a) Artikel drie-en-sewentig bepaal dat sekere gediplomeerde offisiere aan boord van sekere skepe werk-saam moet wees;
- (b) artikel vier-en-sewentig bepaal wanneer skeeps-offisiere as behoorlik gediplomeerd beskou word;
- (c) artikel sewe-en-sewentig en agt-en-sewentig maak voorsiening vir die hou van eksamens vir die toe-kenning van bekwaamheidsertifikate; en
- (d) artikel driehonderd vier-en-vyftig maak voorsiening vir die erkenning van bekwaamheidsertifikate of bevoegdheidsertifikate wat in ander lande van die Statebond toegeken word.

Artikel drie-en-sewentig van die Wet lees soos volg:—

„(1) Behoudens die bepalings van hierdie artikel, moet die eienaar en die gesagvoerder van elke—

- (a) Suid-Afrikaanse skip wat van enige hawe waar ook al, uitvaar; of
- (b) skip (wat nie 'n Suid-Afrikaanse skip is nie) wat passasiers by 'n Unie-hawe aanboord neem en van 'n Unie-hawe uitvaar,

indien die skip van vyf-en-twintig of meer bruto-registerton is, en tot die kategorie behoort wat in kolom 2 van 'n item in die tabel hieronder aangedui word, en van die tonnemaat of perdekrags is wat in kolom 3 van daardie item aangedui word, sorg dat aan boord van daardie skip in hul toepaslike werk-kringe die aantal offisiere of ander persone, behoor-lik kragtens hierdie Wet gediplomeerd of geag gediplomeerd te wees soos in kolomme 4 en 5 van daardie item aangedui word, werk-saam is:—

(2) Attention is invited to the following provisions of the Merchant Shipping Act, 1951:—

- (a) Section seventy-three, which lays down that certain certificated officers are to be employed on certain ships;
- (b) section seventy-four, which states when the ships' officers are deemed to be duly certificated;
- (c) sections seventy-seven and seventy-eight, which make provision for the holding of examinations for the granting of certificates of competency; and
- (d) section three hundred and fifty-four, which makes provision for the recognition of certificates of com-petency or qualification granted in other Common-wealth countries.

Section seventy-three of the Act reads as follows:—

“(1) Subject to the provisions of this section, the owner and the master of every—

- (a) South African ship going to sea from any port whatsoever; or
- (b) ship (other than a South African ship) embark-ing passengers at, and going to sea from, any port in the Union,

shall, if the ship is of twenty-five or more gross regis-ter tons, and is of the class shown in column 2 of any item in the table hereunder and of the tonnage or horse-power shown in column 3 of that item, ensure that there are employed on board that ship in their appropriate capacities the number of officers or other persons, duly certificated or deemed to be certificated under this Act, as shown in columns 4 and 5 of that item:—

Kolom 1.	Kolom 2.	Kolom 3.	Kolom 4.	Kolom 5.
Item No.	Kategorie van skip.	Bruto-registerton-nemaat of nominale perdekrags.	Aantalle offisiere of ander persone wat in diens moet wees.	Sertifikate waarvan die persone wat in Kolom 4 aangedui word, in besit moet wees, en paragrawe van sub-artikel (1) van artikel vyf-en-sewentig waarby toe-kenning van sertifikate goedgekeur word.
1	Skip op vreemde vaart.....	Meer as 1,000 ton.....	Een Een Twee	Gesagvoerder: paragraaf (a). Hoof-navigasie-offisier: paragraaf (b). Tweede navigasie-offisier: paragraaf (c).
2	Skip op vreemde vaart.....	Nie meer as 1,000 ton nie	Een Een Een	Gesagvoerder: paragraaf (a). Hoof-navigasie-offisier: paragraaf (b). Tweede-navigasie-offisier: paragraaf (c).
3	Kusvaarder.....	100 of meer ton.....	Een Twee	Gesagvoerder: paragraaf (d). Navigasie-offisier: paragraaf (e).
4	Vissersboot of robbevaarder of walvis-vaarder met landbasis	100 of meer ton.....	Een Een Een	Skipper: paragraaf (f). Stuurman: paragraaf (g). Bootsman: paragraaf (h).
5	Kusvaarder, vissersboot of robbe-vaarder of walvisvaarder met land-basis.	Minder as 100 ton.....	Een Een	Skipper: paragraaf (i). Stuurman: paragraaf (j).
6	Skip op vreemde vaart (behalwe 'n walvisvaarder)	100 of meer perdekrags...	Een Een	Hoof-ingenieur-offisier: paragraaf (k). Tweede ingenieur-offisier: paragraaf (l).
7	Kusvaarder.....	150 of meer perdekrags...	Een	Hoof-ingenieur-offisier: paragraaf (k).
8	Walvisvaarder (behalwe 'n walvis-vaarder met landbasis)	100 of meer perdekrags...	Een	Hoof-ingenieur-offisier: paragraaf (k).
9	Kusvaarder.....	Minder as 150 perdekrags..	Een	Tweede ingenieur-offisier: paragraaf (l).
10	Skip op vreemde vaart (behalwe 'n walvisvaarder)	Minder as 100 perdekrags..	Een	Tweede ingenieur-offisier: paragraaf (l).
11	Walvisvaarder (behalwe 'n walvis-vaarder met landbasis)	Minder as 100 perdekrags..	Een	Tweede ingenieur-offisier: paragraaf (l).
12	Vissersboot of robbevaarder of walvis-vaarder met landbasis wat meganies voortbeweeg word	100 of meer ton.....	Een Een	See-masjins: paragraaf (m). Assistent-seemasjins: paragraaf (n).
13	Vissersboot of robbevaarder of walvis-vaarder met landbasis wat meganies voortbeweeg word	Minder as 100 ton.....	Een	Assistent-seemasjins: paragraaf (n).

Column 1.	Column 2.	Column 3.	Column 4.	Column 5.
Item No.	Class of Ship.	Gross Register-tonnage or Nominal Horse-power.	Numbers of Officers or Other Persons to be employed.	Certificates to be held by persons shown in Column 4, and paragraphs of sub-section (1) of section seventy-five by which grant of certificates is authorized.
1	Foreign-going ship.....	More than 1,000 tons....	One One Two	Master: paragraph (a). Chief Navigating Officer: paragraph (b). Second Navigating Officer: paragraph (c).
2	Foreign-going ship.....	Not more than 1,000 tons..	One One One	Master: paragraph (a). Chief Navigating Officer: paragraph (b). Second Navigating Officer: paragraph (c).
3	Coasting ship.....	100 or more tons.....	One Two	Master: paragraph (d). Navigating Officer: paragraph (e).
4	Fishing, sealing or shore-based whaling boat	100 or more tons.....	One One One	Skipper: paragraph (f). Mate: paragraph (g). Boatswain: paragraph (h).
5	Coasting ship or fishing, sealing or shore-based whaling boat	Less than 100 tons.....	One One	Skipper: paragraph (i). Mate: paragraph (j).
6	Foreign-going ship, other than a whaling boat	100 or more horse-power..	One One	Chief Engineer-Officer: paragraph (k). Second Engineer-Officer: paragraph (l).
7	Coasting ship.....	150 or more horse-power..	One	Chief Engineer-Officer: paragraph (k).
8	Whaling boat, other than a shore-based whaling boat	100 or more horse-power..	One	Chief Engineer-Officer: paragraph (k).
9	Coasting ship.....	Less than 150 horse-power.	One	Second Engineer-Officer: paragraph (l)..
10	Foreign-going ship, other than a whaling boat	Less than 100 horse-power.	One	Second Engineer-Officer: paragraph (l).
11	Whaling boat, other than a shore-based whaling boat	Less than 100 horse-power.	One	Second Engineer-Officer: paragraph (l).
12	Power-driven fishing, sealing or shore-based whaling boat	100 or more tons.....	One One	Marine Engineman: paragraph (m). Assistant Marine Engineman: paragraph (n).
13	Power-driven fishing, sealing or shore-based whaling boat	Less than 100 tons.....	One	Assistant Marine Engineman: paragraph (n).

(2) Die Minister kan by kennisgewing in die *Staatskoerant* vereis dat meer of hoër gediplomeerde offisiere of ander persone as wat deur subartikel (1) voorgeskryf word, aan boord van 'n kategorie van skepe van 'n tonnemaat of perdekrag wat in daardie kennisgewing gemeld word, in diens moet wees; en na publikasie van so 'n kennisgewing sorg die eienaar van 'n skip waarvoor dit geld, dat aan boord van daardie skip die aantal offisiere of ander persone wat by daardie kennisgewing voorgeskryf word, behoorlik kragtens hierdie Wet gediplomeerd of geag gediplomeerd te wees, in diens is.

(3) Wanneer die Minister uit 'n verslag deur 'n opnemer daarvan oortuig is dat dit onredelik sou wees om van die eienaar van 'n skip wat voor die inwerkingtreding van hierdie artikel gebou was, te verlang dat hy aan boord van daardie skip die akkommodasie sou moet verskaf wat nodig sou wees om die aantal offisiere of ander persone wat ingevolge subartikel (1) of ingevolge 'n kragtens subartikel (2) uitgereikte kennisgewing in diens moet wees, te akkommodeer, kan hy ten opsigte van daardie skip die vereistes van subartikel (1) of van daardie kennisgewing na goeddunke wysig.

(4) Die eienaar van elke Statebond-skip (behalwe 'n skip wat passasiers by 'n Unie-hawe aan boord neem) wat uit 'n Unie-hawe uitvaar, sorg dat aan boord van die skip in hul toepaslike werkkring werk-saam is 'n gesagvoerder en soveel skeepsoffisiere wat die houters is van sertifikate van sulke grade as wat, volgens die betrokke wette wat in daardie deel van die Statebond waarin die skip geregistreer is, van krag is, die skip verplig is om aan boord te hê wanneer dit uit 'n hawe in daardie deel van die Statebond uitvaar.

(2) The Minister may by notice in the *Gazette* require that more or more highly certificated officers or other persons than are prescribed by sub-section (1) shall be employed on board any class of ships of any tonnage or horse-power specified in that notice; and after the publication of any such notice the owner of any ship to which it applies shall ensure that there are employed on board that ship the number of officers or other persons prescribed by that notice, duly certificated or deemed to be certificated under this Act.

(3) Whenever the Minister is satisfied from a report by a surveyor that it would be unreasonable to require the owner of a ship built before the coming into operation of this section to provide the accommodation on board that ship necessary to accommodate the numbers of officers or other persons required to be employed in terms of sub-section (1), or in terms of a notice issued under sub-section (2), he may vary the requirements of sub-section (1) or of that notice in respect of that ship as he deems fit.

(4) The owner of every Commonwealth ship (other than a ship embarking passengers at a port in the Union) going to sea from any port in the Union shall ensure that there are employed on board that ship in their appropriate capacities a master and so many ships' officers holding certificates of such grades as, by the relative laws in force in that part of the Commonwealth in which the ship is registered, she is required to carry when going to sea from a port in that part of the Commonwealth.

(5) Niemand wat ter voldoening van subartikel (1) of (2) as gesagvoerder of skeepsoffisier in diens geneem is, vaar uit ter see nie tensy hy kragtens hierdie Wet behoorlik gediplomeerd is of geag word aldus gediplomeerd te wees.

(6) By toepassing van subartikel (1) of (2) neem niemand 'n gesagvoerder of skeepsoffisier as sodanig in diens nie sonder vooraf vas te stel dat hy kragtens hierdie Wet behoorlik gediplomeerd is, of geag word aldus gediplomeerd te wees.

(7) In hierdie artikel beteken 'nominale perdekrags' ten opsigte van 'n skip die perdekrags van die masjiene van die skip bereken volgens die regulasies, wat ten aansien van verskillende soorte masjiene verskillende metodes van berekening kan voorskryf.

(8) Hierdie artikel is nie ten aansien van enige vaartuig wat aan die Spoorwegadministrasie behoort en wat deur daardie Administrasie in verband met sy hawebedryf gebruik word, as daardie vaartuig in geval van nood ter see uitvaar, van toepassing nie."]

[LET WEL.—Die aandag word ook gevestig op die feit dat die voorneme bestaan om magtiging te verkry om artikel drie-en-sewentig van die Wet as volg te wysig:—

(1) deur die tabel wat in subartikel (1) voorkom, deur die volgende tabel te vervang:—

(5) No person who has been engaged for the purpose of sub-section (1) or (2) as master or ship's officer shall go to sea as such unless he is duly certificated or deemed to be so certificated, in terms of this Act.

(6) No person shall for the purpose of sub-section (1) or (2) employ a master or ship's officer as such without first ascertaining that he is duly certificated, or deemed to be so certificated, in terms of this Act.

(7) In this section 'nominal horse-power' in relation to any ship means the horse-power of the engines of the ship, calculated according to the regulations, which may provide for different methods of calculation in respect of different types of engines.

(8) This section shall not apply in respect of any vessel belonging to the Railway Administration and used by that Administration in connection with the working of its harbours, if that vessel goes to sea in an emergency."]

[NOTE.—Attention is also invited to the fact that it is proposed to seek authority to amend section seventy-three of the Act as follows:—

(1) By the substitution for the table set forth in sub-section (1) of the following new table:—

Kolom 1.	Kolom 2.	Kolom 3.	Kolom 4.	Kolom 5.
Item No.	Kategorie van skip.	Bruto-registertonnelmaat of perdekrags.	Aantalle offisiere of ander persone wat in diens moet wees.	Sertifikate waarvan die persone wat in Kolom 4 aangedui word, in besit moet wees, en paragrawe van sub-artikel (1) van artikel vyf-en-sewentig waarby toekenning van sertifikate goedgekeur word.
1	Skip op vreemde vaart.....	Enige.....	Een Een Een	Gesagvoerder: paragraaf (a). Hoof-navigasie-offisier: paragraaf (b). Tweede navigasie-offisier: paragraaf (c).
2	Kusvaarder.....	100 of meer ton.....	Een Een	Gesagvoerder: paragraaf (d). Navigasie-offisier: paragraaf (e).
3	Vissersboot of robbevaarder of walvisvaarder met landbasis	100 of meer ton.....	Een Een Een	Skipper: paragraaf (f). Stuurman: paragraaf (g). Bootsman: paragraaf (h).
4	Kusvaarder of vissersboot, robbevaarder of walvisvaarder met landbasis	50 of meer maar minder as 100 ton	Een Een	Skipper: paragraaf (i). Stuurman: paragraaf (j).
5	Kusvaarder of robbevaarder of walvisvaarder met landbasis	Minder as 50 ton.....	Een Een	Skipper: paragraaf (i). Stuurman: paragraaf (j).
6	Vissersboot.....	Minder as 50 ton.....	Een	Stuurman: paragraaf (j).
7	Skip op vreemde vaart (behalwe 'n walvisvaarder)	560 of meer perdekrags...	Een Een	Hoof-ingenieur-offisier: paragraaf (k). Tweede ingenieur-offisier: paragraaf (l).
8	Kusvaarder.....	850 of meer perdekrags...	Een	Hoof-ingenieur-offisier: paragraaf (k).
9	Walvisvaarder (behalwe 'n walvisvaarder met landbasis)	560 of meer perdekrags...	Een	Hoof-ingenieur-offisier: paragraaf (k).
10	Kusvaarder.....	Minder as 850 perdekrags..	Een	Tweede ingenieur-offisier: paragraaf (l).
11	Skip op vreemde vaart (behalwe 'n walvisvaarder)	Minder as 560 perdekrags..	Een	Tweede ingenieur-offisier: paragraaf (l).
12	Walvisvaarder (behalwe 'n walvisvaarder met landbasis)	Minder as 560 perdekrags..	Een	Tweede ingenieur-offisier: paragraaf (l).
13	Vissersboot of robbevaarder of walvisvaarder met landbasis wat meganiese voortbeweeg word	Meer as 300 perdekrags...	Een Een	See-masjini: paragraaf (m). Assistent-seemasjini: paragraaf (n).
14	Vissersboot of robbevaarder of walvisvaarder met landbasis wat meganiese voortbeweeg word	300 of minder perdekrags...	Een	Assistent-seemasjini: paragraaf (n).

Column 1.	Column 2.	Column 3.	Column 4.	Column 5.
Item No.	Class of Ship.	Gross Register-tonnage or Horse-power.	Numbers of Officers or Other Persons to be employed.	Certificates to be held by Persons shown in Column 4, and paragraphs of sub-section (1) of section seventy-five by which grant of certificates is authorized.
1	Foreign-going ship.....	Any.....	One One One	Master: paragraph (a). Chief Navigating Officer: paragraph (b). Second Navigating Officer: paragraph (c).
2	Coasting ship.....	100 or more tons.....	One One	Master: paragraph (d). Navigating Officer: paragraph (e).
3	Fishing, sealing or shore-based whaling boat	100 or more tons.....	One One One	Skipper: paragraph (f). Mate: paragraph (g). Boatswain: paragraph (h).
4	Coasting ship or fishing, sealing or shore-based whaling boat	50 or more but less than 100 tons	One One	Skipper: paragraph (i). Mate: paragraph (j).
5	Coasting ship or sealing or shore-based whaling boat	Less than 50 tons.....	One One	Skipper: paragraph (i). Mate: paragraph (j).
6	Fishing boat.....	Less than 50 tons.....	One	Mate: paragraph (j).
7	Foreign-going ship, other than a whaling boat	560 or more horse-power..	One One	Chief Engineer-Officer: paragraph (k). Second Engineer-Officer: paragraph (l).
8	Coasting ship.....	850 or more horse-power..	One	Chief Engineer-Officer: paragraph (k).
9	Whaling boat, other than a shore-based whaling boat	560 or more horse-power..	One	Chief Engineer-Officer: paragraph (k).
10	Coasting ship.....	Less than 850 horse-power	One	Second Engineer-Officer: paragraph (l).
11	Foreign-going ship, other than a whaling boat	Less than 560 horse-power	One	Second Engineer-Officer: paragraph (l).
12	Whaling boat other than a shore-based whaling boat	Less than 560 horse-power	One	Second Engineer-Officer: paragraph (l).
13	Power-driven fishing, sealing or shore-based whaling boat	More than 300 horse-power	One One	Marine Engineman: paragraph (m). Assistant Marine Engineman: paragraph (n).
14	Power-driven fishing, sealing or shore-based whaling boat	300 or less horse-power...	One	Assistant Marine Engineman: paragraph (n).

(2) deur subartikel (7) te skrap.]

Direkteur moet benoembaarheid van kandidate vasstel.

3. (1) As daar twyfel ontstaan omtrent die benoembaarheid van 'n kandidaat tot 'n eksamen, word die saak, ongeag die bepalings van hierdie regulasies, na die Direkteur verwys, wie se beslissing dienaangaande finaal is.

(2) As die vraag ontstaan of een of ander sertifikaat nie laer as 'n ander sertifikaat is nie, word dit deur die Direkteur beslis.

Bewys van nasionaliteit.

4. Geen kandidaat vir 'n bekwaamheidsertifikaat word geëksamineer nie tensy hy bewys lewer dat hy 'n Suid-Afrikaanse burger of 'n burger is van 'n land (behalwe die Unie) wat lid is van die Statebond.

(LET WEL.—Onder gewone omstandighede gaan bewys van nasionaliteit gepaard met die voorlegging van 'n geboortesertifikaat, 'n registrasie- of naturalisasiesertifikaat, of een of ander aanneemlike dokumentêre bewys van nasionaliteit.)

Plekke waar eksamens gehou word.

5. Eksamens word op plekke en tye gehou soos deur die Minister bepaal word.

(LET WEL.—Die voorneme bestaan om magtiging van die Minister te verkry om eksamens by Kaapstad en Durban te hou. Spesiale reëlings sal van tyd tot tyd getref word om eksamens op ander plekke as Kaapstad en Durban te hou.)

(2) Delete sub-section (7).]

Director to Determine Eligibility.

3. (1) If any doubt arises as to the eligibility of any candidate to be admitted to any examination, the matter shall, notwithstanding the provisions of these regulations, be referred to the Director, whose decision shall be final.

(2) Whenever the question arises whether any certificate is not lower than any other certificate, that question shall be determined by the Director.

Proof of Nationality.

4. No candidate shall be examined for a certificate of competency unless he produces proof to the satisfaction of the examiner that he is a South African citizen or a citizen of a country (other than the Union) which is a member of the Commonwealth.

(NOTE.—Proof of citizenship will, in ordinary circumstances, involve the production of a birth certificate, a certificate of registration or of naturalisation, or some other acceptable documentary evidence of nationality.)

Places of Examination.

5. Examinations shall be held at places and on days to be determined by the Minister.

(NOTE.—It is proposed to seek the Minister's authority to hold examinations at Cape Town and Durban. Special arrangements may be made from time to time for examinations to be held at places other than Cape Town and Durban.)

Aansoekvorm.

6. 'n Kandidaat vir 'n bekwaamheidsertifikaat moet die vorm M. 2, soos in Aanhangsel A uiteengesit, voltooi.

Ander dokumente wat voorgelê moet word.

7. (1) Aansoekvorm M. 2, behoorlik voltooi, tesame met die kandidaat se—

- (a) geboortesertifikaat;
- (b) leerlingskapsertifikaat;
- (c) ontslagsertifikate (indien enige); en
- (d) getuigskrifte (sien regulasie 10),

moet by die kantoor van die eksaminator ingedien word, of gepos word sodat dit hom by die hawe waar die kandidaat geëksamineer wil word, minstens veertien dae voor die datum waarop hy geëksamineer wil word, bereik, of by die kantoor van die bevoegde beampte by enige ander hawe ingedien word of gepos word, sodat dit hom minstens veertien dae voor die hou van die eksamen bereik; met dien verstande dat die eksaminator die kandidaat kan toelaat om die eksamen af te lê selfs indien die genoemde dokumente later ingedien of gepos word as wat by daardie regulasie voorgeskryf of verlang word.

(2) As 'n kandidaat in besit is van 'n geldige bekwaamheid- of dienssertifikaat, moet hy, alvorens hy tot die aflê van die eksamen toegelaat word, sodanige sertifikaat by die eksaminator indien.

[LET WEL.—As die kandidaat nie die sertifikaat in (1) (a) hierbo genoem kan voorlê nie, kan ander bevredigende bewys van ouderdom aanvaar word.]

Oorweging van twyfelagtige gevalle.

8. 'n Kandidaat by wie daar twyfel bestaan of hy tot die aflê van 'n eksamen vir 'n bekwaamheidsertifikaat in aanmerking kan kom, kan die dokumente soos in regulasies 6 en 7 uiteengesit en behoorlik voltooi, aan die eksaminator of bevoegde beampte stuur, wat dit dan aan die Direkteur vir oorweging kan deurstuur.

Inligting.

9. Alle ander inligting aangaande eksamens moet op dieselfde wyse soos in regulasie 8 uiteengesit, gedoen word, en word op dieselfde wyse behandel. Kandidate moet die punt waarvoor inligting verlang word, duidelik uiteensit en alle relevante sertifikate en getuigskrifte moet die aansoek om inligting vergesel. Buitelandse aansoeke om inligting kan aan die Direkteur van Handelskeepvaart, Pretoria, geadresseer word.

Getuigskrifte.

10. (1) Behoudens die bepalinge van regulasie 14, moet 'n kandidaat vir 'n bekwaamheidsertifikaat getuigskrifte in verband met sy werkswinkeldiens en sy seediens voorlê.

(2) In die getuigskrifte in verband met sy werkswinkeldiens moet daar getuig word van die kandidaat se gedrag en bekwaamheid, en moet die soort werk waarmee hy besig gehou was en die tydperk wat hy by elke vertakking deurgebring het, bv. montering, oprigting, draaiwerk, masjienwerk, ens., vermeld word. Dergelike getuigskrifte moet deur die werkgever of sy verteenwoordiger geteken wees.

(3) In die getuigskrifte in verband met sy kwalifiserende seediens moet daar getuig word van die kandidaat se soberheid, ondervinding, bekwaamheid en algemene goeie gedrag, en sy werklike rang op waghoudiens, die aantal ingenieuroffisiere wat gelyktydig op wag was by die stoomketels en/of die hoofaandryfmasjinerie en die aard van die dienste wat hy verrig het, moet daarin vermeld word. Dergelike getuigskrifte moet geteken wees deur die hoofingenieuroffisier onder wie die seediens verrig was en, indien moontlik, moet hulle ook geëndosseer wees deur die ingenieursuperintendent of, as daar nie so 'n superintendent is nie, deur die gesagvoerder of verteenwoordiger van die eienaar. As die kandidaat 'n hoofingenieuroffisier

Form of Application.

6. A candidate for a certificate of competency shall complete the form M. 2 set forth in Annexure A.

Other Documents to be Submitted.

7. (1) Form M. 2 properly completed and accompanied by the candidate's—

- (a) birth certificate;
- (b) certificate of apprenticeship;
- (c) discharges (if any); and
- (d) testimonials (see regulation 10),

shall be handed in at the office of, or posted so as to reach, the examiner at the port at which the candidate wishes to be examined at least fourteen days before the date on which he wishes to be examined, or handed in at the office of, or posted so as to reach, the proper officer at any other port at least twenty-one days before the date of the examination: Provided that the examiner may allow the candidate to sit even if the said documents were handed in or posted later than is required by this regulation.

(2) If a candidate is in possession of a valid certificate of competency or service, he shall, before being admitted to the examination for which he wishes to sit, hand in such certificate to the examiner.

[NOTE.—If the candidate is not able to produce the certificate mentioned under (1) (a), other satisfactory proof of age may be accepted.]

Consideration of Doubtful Cases.

8. A candidate who has any doubt whether he is eligible to be examined for a certificate of competency may forward the documents enumerated in regulations 6 and 7, duly completed, to the examiner or proper officer, who may refer them to the Director for consideration.

9. Enquiries.

9. All other enquiries regarding examinations shall be made and dealt with in the same way as detailed in regulation 8. Candidates shall clearly state the point on which information is sought and all relevant certificates and testimonials shall accompany the enquiry. Enquiries from abroad may be addressed to the Director of Merchant Shipping, Pretoria.

Testimonials.

10. (1) Subject to the provisions of regulation 14, a candidate for a certificate of competency shall produce testimonials covering his workshop service and his sea service.

(2) The testimonials covering his workshop service shall testify to the candidate's conduct and ability, and state the kind of work on which he was engaged and the period of time spent in each branch, e.g. fitting, erecting, turning, machine work, etc. These testimonials shall be signed by the employer or his representative.

(3) The testimonials covering his qualifying sea service shall testify to the candidate's sobriety, experience, ability and general good conduct and state his actual rank on watch, the number of engineer-officers simultaneously on watch on the boilers and/or the main propelling machinery and the nature of the duties performed by him. These testimonials shall be signed by the Chief Engineer-Officer under whom the service has been performed and, if possible, they shall also be endorsed by the Engineer Superintendent or where there is no such Superintendent by the Master or representative of the owner. Where the

is, moet die getuigskrifte geteken word deur die ingenieur-superintendent of die besturende eienaar of die sekretaris van die redery.

[LET WEL.—

(1) As die kandidaat ietwat hardhorig is of aan 'n ander liggaamsgebrek ly, wat van so 'n aard is dat dit hom by die behoorlike uitvoering van sy pligte as ingenieuroffisier op waghoudiens sou kan belemmer, moet daar in sy getuigskrifte vermeld word of die gebrek hom werklik enigsins by die behoorlike uitvoering van sy pligte belemmer het.

(2) Behalwe in gevalle waar die kandidaat 'n hoof-ingenieuroffisier is, sal daar in die reël nie beskou word dat getuigskrifte wat slegs deur die superintendent van die redery of ander beamptes geteken word, voldoende is nie.

(3) Dit is wenslik dat die kandidaat se totale seediens gedek moet word deur getuigskrifte waarin daar getuig word van sy soberheid, ondervinding, bekwaamheid en algemene goeie gedrag.

(4) Voorbeelde van die getuigskrifvorms wat aanbeveel word, word in Aanhangsel B uiteengesit.]

Doofheid of ander liggaams- of geestesgebreke.

11. (1) As die eksaminator gedurende die loop van 'n eksamen vind dat 'n kandidaat doof is, of 'n spraakgebrek het, of aan een of ander liggaams- of geestesgebrek ly, en oortuig is dat die mate van doofheid of gebrek of swakte sodanig is dat dit die kandidaat onbekwaam sou maak om die gewone pligte van die rang waartoe die sertifikaat waarvoor hy geëksamineer word hom die reg sou verleen om te hou, in 'n skip te verrig, moet hy nie toelaat dat die kandidaat die eksamen voltooi nie.

(2) Die eksaminator moet aan die Direkteur van alle gevalle waar sodanig opgetree is, verslag doen.

(3) 'n Kandidaat teen wie ingevolge paragraaf (1) opgetree is, kan na die Direkteur appelleer om die omstandighede van sy geval in hersiening te neem.

(4) Die Direkteur kan by beoordeling of so 'n kandidaat weer tot die afle van 'n eksamen toegelaat mag word, enige doktersertifikaat wat daarna voorgelê word en waarin verklaar word dat die gehoor, spraak of liggaams- of geestestoestand van die kandidaat verbeter het, of normaal is, in oorweging neem.

[LET WEL.—Die aandag word gevestig op die bepalings van artikel sewe-en-tagtig van die Wet wat die bevoegde beampte magtig om, as dit te eniger tyd vir hom voorkom dat die houer van 'n bekwaamheid- of dienssertifikaat weens slegte gesondheid of geestes- of liggaamsgebrek ongeskik is om die pligte wat van hom geverg word, te verrig, te beveel dat hy hom aan ondersoek deur 'n geneesheer moet onderwerp. As die Minister na oorweging van die verslag oor die mediese ondersoek oortuig is dat die betrokke persoon onbekwaam is om die pligte waarop sy bekwaamheid- of dienssertifikaat betrekking het op bevredigende wyse te verrig, kan hy opdrag gee dat die houer nie in die hoedanigheid waarna in die sertifikaat verwys word of in enige ander deur die Minister bepaalde hoedanigheid indiens geneem word of ter see uitvaar nie.)

Onvoldoende diens.

12. (1) As daar bevind word dat 'n kandidaat nadat hy in die eksamen geslaag het, onvoldoende diens het vir die toekenning aan hom van 'n sertifikaat van die graad waarin hy geslaag het, word die sertifikaat waarop hy geregtig is, behoudens die bepalings van hierdie regulasie, nie aan hom toegeken nie.

(2) As die Direkteur nie oortuig is dat die fout in die berekening van die kandidaat se diens tyd weens die skuld of opsetlike vanwoorstelling van die kandidaat

candidate is a Chief Engineer-Officer, the testimonials shall be signed by the Engineer Superintendent or managing owner or the secretary of the company.

[NOTE.—

(1) If a candidate is somewhat hard of hearing or suffers from any other physical defect of such a nature that it might interfere with the proper performance of his duties as an engineer-officer on watch, it should be stated in his testimonials whether the defect did in fact interfere in any way with the proper performance of the candidate's duties.

(2) Except in cases where the candidate is a Chief Engineer-Officer testimonials signed only by the company's Superintendent or other officials will not, as a rule, be regarded as sufficient.

(3) It is desirable that the whole of the candidate's sea service should be covered by testimonials certifying to his sobriety, experience, ability and general good conduct.

(4) Specimen copies of the form of testimonials recommended are shown in Annexure B.]

Deafness and Other Physical and Mental Disabilities.

11. (1) If during the progress of an examination the examiner finds that a candidate is deaf, or has an impediment in his speech, or suffers from some other physical or mental infirmity, and is satisfied that the degree of deafness or the impediment or other infirmity is such as to render the candidate incompetent to discharge the ordinary duties of the station on a ship which the certificate for which the candidate is being examined would entitle him to hold, he shall not allow the candidate to complete the examination.

(2) The examiner shall report to the Director all cases in which action of this nature is taken.

(3) A candidate against whom action has been taken in terms of paragraph (1) may appeal to the Director for a review of the circumstances of his case.

(4) The Director may, in deciding whether such a candidate may be allowed to sit again for an examination, take into consideration any medical certificate subsequently produced stating that the candidate's hearing, speech or physical or mental condition has improved or is normal.

[NOTE.—Attention is invited to the provisions of section eighty-seven of the Act which empowers the proper officer to require the holder of a certificate of competency or service to submit himself to a medical examination, if at any time it appears that owing to ill-health or mental or physical defect he is unfit to perform the duties required of him. If after consideration of the medical report the Minister is satisfied that the person concerned is incapable of performing satisfactorily the duties appertaining to his certificate of competency or service he may direct that the holder shall not be engaged or go to sea in the capacity referred to in the certificate or in any other capacity specified by the Minister.)

Service Found to be Insufficient.

12. (1) If after a candidate has passed the examination it is discovered that his service is insufficient to entitle him to receive a certificate of the grade for which he has passed, the certificate shall not, subject to the provisions of this regulation, be granted to him.

(2) If the Director is not satisfied that the error in the calculation of the candidate's service occurred through the fault of or through wilful misrepresentation by the

ontstaan het nie, word die sertifikaat agterweë gehou hangende die voorlegging van bevredigende bewys dat die vereiste diens volledig voltooi is, waarop die sertifikaat, behoudens die bepalinge van hierdie regulasies, aan hom uitgereik word.

(3) As die Direkteur oortuig is dat die fout opsetlik gedoen is, word die sertifikaat agterweë gehou totdat die kandidaat die vereiste kwalifiserende diens volledig voltooi het en sodanige verdere dienstryd voltooi het as wat die Direkteur mag bepaal, en die toepaslike gelde weer betaal het en opnuut in die eksamen geslaag het.

(4) Addisionele diens wat deur 'n kandidaat ingevolge paragraaf (3) verrig word, kom nie as kwalifiserende diens vir enige ander sertifikaat in aanmerking nie.

[LET WEL.—Die aandag word gevestig op subartikel (2) van artikel *agt-en-sewentig* van die Wet, wat bepaal dat die Minister te eniger tyd voor die aflewering van 'n sertifikaat kan gelas dat die applikant opnuut geëksamineer word deur die eksaminatore wat die eksamen afgeneem het of deur enige ander eksaminatore, en dat nadere ondersoek na sy getuigskrifte of inbors of albei ingestel word, en as hy nie met die uitslag tevrede is nie, kan gelas dat geen sertifikaat aan hom uitgereik word nie.]

Afskrifte van verlore sertifikate.

13. 'n Applikant vir 'n verlore sertifikaat, ditsy van bekwaamheid of diens, moet die voorgeskrewe aansoekvorm M. 3 soos in Aanhangsel A uiteengesit, voltooi, met na vermelding van alle besonderhede en dit aan die bevoegde beampte oorhandig en terselfdertyd 5s. betaal. 'n Verklaring aangaande die omstandighede waaronder die sertifikaat verlore geraak het, moet voor die bevoegde beampte gedoen word, wat die aansoekvorm aan die Direkteur moet deurstuur.

As die applikant kan aantoon dat die sertifikaat weens skipbreuk of brand aan boord verlore geraak het, is geen gelde betaalbaar nie.

Wangedrag van kandidate.

14. (1) In die geval van 'n kandidaat wat—

- (a) na ondertekening van die ooreenkoms met die bemanning versuim het om by sy skip aan te sluit; of
- (b) van sy skip gedros het nadat hy aangesluit het; of
- (c) deur 'n wetlike geregshof skuldig bevind is aan 'n misdryf waarvoor hy tot gevangenisstraf sonder die keuse van 'n boete veroordeel is, of wat na die mening van die eksaminator 'n ernstige misdryf is; of
- (d) skuldig bevind is aan 'n misdryf ten opsigte waarvan 'n inskrywing in die amptelike skeepsjoernaal gemaak is kragtens paragraaf (b) van artikel *eenhonderd drie-en-tig* van die Wet, en wat na die mening van die eksaminator 'n ernstige misdryf is,

dek die getuigskrifte wat ingevolge regulasie 10 (3) vereis word die tydperk van twee jaar volgende op sodanige wangedrag; met dien verstande dat op aansoek van die kandidaat die Direkteur, nadat hy die saak ondersoek het, die tydperk na goeddunke kan verminder.

(2) As dit te eniger tyd aan die Direkteur gerapporteer word dat 'n kandidaat aan 'n eksaminator of enige ander persoon wat ingevolge hierdie Wet in diens is, geld of iets anders aangebied het met die doel om hom enigerwyse in verband met die eksaminering te beïnvloed, doen die Direkteur ondersoek en as hy oortuig is dat die kandidaat met dié doel so 'n aanbod gemaak het, kan hy weier dat die kandidaat geëksamineer word, of as daar reeds met die eksamen 'n aanvang gemaak is, kan hy die eksaminator gelas om die eksaminering te staak, of as dit reeds voltooi is, kan hy die uitslag daarvan kanselleer en gelas dat die gelde wat deur die kandidaat betaal is, verbeurd verklaar word, en weier dat hy weer in die Unie gedurende 'n tydperk van hoogstens twaalf maande, gereken vanaf die datum van sodanige aanbod, tot die aflê van 'n eksamen toegelaat mag word.

candidate, the certificate shall be withheld pending the production of satisfactory proof that the necessary service has been completed in full, upon which the certificate shall, subject to the provisions of these regulations, be issued to him.

(3) If the Director is satisfied that the error was deliberately made, the certificate shall be withheld until the candidate has completed the necessary qualifying service in full and has performed such further period of service as may be decided by the Director, has again paid the appropriate fee and has again passed the examination.

(4) Any additional service performed by a candidate in terms of paragraph (3) shall not count as qualifying service for any other certificate.

[NOTE.—Attention is invited to sub-section (2) of section *seventy-eight* of the Act, which provides that the Minister may, at any time before the delivery of a certificate, require a re-examination of the applicant by the examiners who made the examination or by other examiners, and order a further enquiry into his testimonials or character or both, and if not satisfied with the result may order that the certificate be not granted to him.]

Copies of Lost Certificates.

13. An applicant for a certified copy of a lost certificate, whether of competency or service, shall complete the prescribed form of application M. 3 set forth in Annexure A, giving the necessary particulars, and shall hand it to the proper officer, paying at the same time the fee of 5s. A declaration as to the circumstances in which the certificate was lost shall be made by the applicant before the proper officer, who shall transmit the form of application to the Director.

No fee is chargeable if the applicant shows that the certificate was lost through shipwreck or fire on board ship.

Misconduct by Candidates.

14. (1) In the case of a candidate who—

- (a) after having signed the agreement with the crew has neglected to join his ship; or
- (b) after having joined has deserted his ship; or
- (c) has been convicted by a legal tribunal of an offence for which he has been sentenced to imprisonment without the option of a fine or which the examiner considers to be of a serious nature; or
- (d) has been found guilty of an offence in respect of which an entry has been made in the official log-book in terms of paragraph (b) of section *one hundred and eighty-three* of the Act and which the examiner considers to be of a serious nature,

the testimonials required in terms of regulation 10 (3) shall cover the period of two years subsequent to such misconduct; provided that upon the application of the candidate the Director, after having investigated the matter, may in his discretion reduce the period.

(2) If at any time it is reported to the Director that a candidate has offered any sum of money or other thing whatsoever to any examiner or any other person employed under the Act for the purpose of influencing him in any manner in relation to an examination, the Director shall enquire into the matter, and if he is satisfied that the candidate has made such an offer for the said purpose, he may refuse to permit the candidate to be examined or, if the examination has already commenced, may direct the examiner not to proceed with the examination, or, if the examination has already been completed, may cancel the result thereof, and may order the forfeiture of any fee paid by the candidate, and may refuse to allow him to present himself at any future examination in the Union for a period not exceeding twelve months from the date of the making of such offer.

HOOFSTUK II.

OUDERDOMSGRENS EN KWALIFIKASIES WAT VEREIS WORD VAN KANDIDATE VIR BEKWAAMHEIDCERTIFIKATE.

Ouderdom.

15. 'n Kandidaat vir 'n bekwaamheidsertifikaat as tweede ingenieuroffisier moet minstens een-en-twintig jaar oud wees, en 'n kandidaat vir 'n bekwaamheidsertifikaat as hoof-ingenieuroffisier moet minstens twee-en-twintig en 'n half jaar oud wees.

A. WERKSWINKELDIENS.

Soort werk wat aanvaar word.

16. (1) 'n Kandidaat vir 'n bekwaamheidsertifikaat as tweede ingenieuroffisier moet bewys lewer dat hy sedert hy die ouderdom van vyftien jaar bereik het, vir minstens vier jaar op bevredigende wyse diens gedoen het as leerling-ingenieur of -vakman aan werk wat geskik is vir die opleiding van 'n marine- of masjienbou-ingenieur in die vervaardiging van masjinerie. Tyd uitgedien in werkswinkels waar soliede masjinerie vervaardig en in stand gehou word, bv. marine-masjiene (stoom of olie), soliede hulp-masjiene (pompe, ontwikkelaars, ens.), stuurinrigting, lokomotiewe, industriële kragmasjiene, en soliede masjiene wat by elektriese kragstasies, tekstiel-, mynbou-, meule-naars- en raffineer-nywerhede gebruik word, sal aanvaar word.

(2) Tyd uitgedien in werkswinkels met ander soorte werk mag gedeeltelik bygereken word vir die vereiste vier jaar se werkswinkeldiens. Van kandidaat wat toegelaat word om diens van hierdie aard in hul werkswinkeldiens-tyd in te sluit sal egter verlang word dat hulle vir 'n verdere tydperk, wat deur die Direkteur bepaal moet word, diens moet verrig in 'n ingenieurswerkswinkel van 'n geskikte aard of gereelde waghou- of dagwerkdienste ter see moet doen.

(3) Minstens twee van die vier jaar se werkswinkeldiens wat kragtens paragraaf (1) van hierdie regulasie vereis word, moet bestee gewees het aan die monteer, oprigting of reparasie van masjinerie van 'n geskikte grootte, hetsy in die werkswinkels of daarbuite; en die oorblywende twee jaar kon bestee gewees het—

- (a) aan werk van hierdie aard; of
- (b) aan 'n goedgekeurde tegniese skool, tegniese kollege of universiteit; of
- (c) aan werk in ander vertakings van die ambag, in watter geval die volgende vergunnings gemaak word:—

Metaaldraaiwerk.....	Voltyds tot 'n maksimum van twee jaar.
Koper-afwerking (swaar werk)	Voltyds tot 'n maksimum van een jaar.
Ketelgieterij of herstel van ketels	Voltyds tot 'n maksimum van een jaar.
Modelmakery.....	Voltyds tot 'n maksimum van een jaar.
Skaafwerk, gleufwerk, sterk-arm skaafwerk of freeswerk	Voltyds tot 'n maksimum van een jaar.
Smedery.....	Voltyds tot 'n maksimum van ses maande.
Koperslaanwerk.....	Voltyds tot 'n maksimum van ses maande.
Sweiswerk.....	Voltyds tot 'n maksimum van drie maande.
Werk in tekenaarskantoor as tekenaar of ingenieur	Voltyds tot 'n maksimum van een jaar. As meer as een jaar in die tekenaarskantoor uitgedien is, word slegs die helfte van die bykomstige tyd bygereken.
Elektriese winkel- of herstelwerk (uitgesonderd werk van minderwaardige aard) wat nie ingevolge paragraaf (1) van hierdie regulasie kwalifiseer nie	Voltyds tot een jaar; slegs die helfte van bykomstige diens-tyd word bygereken. Die maksimum totaal is agtien maande.

CHAPTER II.

AGE LIMITS AND QUALIFICATIONS REQUIRED BY CANDIDATES FOR CERTIFICATES OF COMPETENCY.

Age.

15. A candidate for a certificate of competency as Second Engineer-Officer shall be not less than twenty-one years of age, and a candidate for a certificate of competency as Chief Engineer-Officer shall be not less than twenty-two and a half years of age.

A. WORKSHOP SERVICE.

Type of Work Accepted.

16. (1) A candidate for a certificate of competency as Second Engineer-Officer shall prove that since reaching the age of 15 he has served satisfactorily for not less than four years as apprentice engineer or journeyman on work suitable for the training of a marine or mechanical engineer in the manufacture of machinery. Time served in workshops in which the manufacture and maintenance of substantial machinery is performed, e.g. marine engines (steam and oil), substantial auxiliaries (pumps, generators, etc.), steering gears, locomotives, industrial power plant, and substantial machines used in electric power plant, textile, mining, milling and refining industries shall be acceptable.

(2) Time served in workshops on other types of work may be allowed to count in part towards the necessary four years of workshop service. Candidates who are permitted to include service of this kind in their workshop period will, however, be required to perform a further period of service, to be determined by the Director, in an engineering workshop of a suitable character or on regular watch or day work at sea.

(3) Not less than two of the four years workshop service required in terms of paragraph (1) of this regulation shall have been devoted to fitting, erecting or repairing of machinery of a suitable size, either in the works or outside; the remaining two years may have been spent either—

- (a) on work of this nature;
- (b) at an approved technical school, college or university; or
- (c) on work in other branches of the trade, in which case the following allowances will be given:—

Metal turning.....	Full time up to a maximum of two years.
Brass finishing (heavy work)	Full time up to a maximum of one year.
Boiler making or repairing of boilers	Full time up to a maximum of one year.
Pattern making.....	Full time up to a maximum of one year.
Planing, slotting, shaping and milling	Full time up to a maximum of one year.
Smith work.....	Full time up to a maximum of six months.
Coppersmith work.....	Full time up to a maximum of six months.
Welding.....	Full time up to a maximum of three months.
Working in drawing office as draughtsman or engineer	Full time up to one year. Where more than one year has been spent in the drawing office, only half the additional time will count.
Electrical shop or repair work (excluding work of a minor nature) which does not qualify under paragraph (1) of this regulation	Full time up to one year; additional at half rate. Maximum total eighteen months.

(4) Indien die totale tydperk van die kandidaat se werks-winkeldiens, bereken ooreenkomstig die bepalings van paragraaf (3) van hierdie regulasie, minder as vier jaar beloop, kan die kandidaat die tekort opmaak deur diens ter see te verrig, of—

- (a) op dagwerk as ingenieuroffisier aan boord van skepe van minstens 375 perdekrags op seereise vanaf een hawe na 'n ander of in vissersbote of seevarende sleepbote van minstens 375 perdekrags; of
- (b) op gereelde waghoudiens op dergelike skepe.

Twee-derdes van die tyd wat aldus bestee word op skepe op lang seereise, vier-negendes van die tyd wat aldus bestee word op skepe op kort seereise en een-derde van die tyd wat aldus bestee word op vissersbote of op seevarende sleepbote sal gereken word vir die tydperk van kwalifiserende werks-winkeldiens; met dien verstande dat sodanige werk wat verrig word voordat die kandidaat die ouderdom van 20 bereik het, nie aldus bygereken word nie.

Tyd bestee in sekere tegniese skole, tegniese kolleges of universiteite wat aanvaar word in die plek van werks-winkeldiens.

17. (1) *Voltydse studente in masjienbou.*—(a) 'n Kandidaat wat vir minstens drie jaar 'n goedgekeurde voltydse studiekursus in masjienbou aan 'n goedgekeurde tegniese skool, tegniese kollege of universiteit op bevredigende wyse voltooi het, moet, ondanks die bepalings van regulasie 16, bewys lewer dat hy minstens een-en-twintig maande lank werks-winkeldiens verrig het: Met dien verstande dat 'n minimum tydperk van twaalf maande van hierdie werks-winkeldiens tydperk van een-en-twintig maande na voltooiing van die driejarige kursus bestee was aan die mon-teer, oprigting of reparasie van masjinerie van 'n geskikte grootte, in of buite die werks-winkel, van 'n soort soort-gelyk aan dié wat kragtens regulasie 16 erken word. Die kandidaat moet die diploma, graad of sertifikaat wat hy behaal het, voorlê as bewys dat hy sodanige kursus op bevredigende wyse voltooi het, of, indien geen diploma, graad of sertifikaat uitgereik is nie, moet hy 'n sertifikaat van die prinsipaal van die tegniese skool, kollege of univer-siteit voorlê waarin getuig word van die feit dat hy soda-nige kursus op bevredigende wyse voltooi het.

(b) Geskikte werks-winkelopleiding soortgelyk aan dié waarvan in regulasie 16 (1) melding gemaak word wat in vakansie tyd ontvang is, mag bygereken word vir die diens van een-en-twintig maande wat vereis word kragtens sub-paragraaf (a) tot 'n maksimum van nege maande, mits die duur van die individuele tydperke van sodanige opleiding minstens een maand is.

(c) Dienstydsperke van altesame ses maande wat gedurende vakansies bestee is in 'n goedgekeurde werks-winkel-leerlingopleidingskema vir monteurs en draaiers of met soortgelyke opleiding in die werks-winkels van 'n goed-gekeurde tegniese skool, tegniese kollege of universiteit, mag ook bygereken word vir die tydperk van een-en-twintig maande se diens wat kragtens subparagraaf (a) van hierdie paragraaf vereis word.

(2) *Dagkursusse in masjienbou.*—As 'n kandidaat 'n studiekursus van minder as drie jaar gevolg het, sal die tyd wat hy gedurende die dag bestee het aan 'n goed-gekeurde tegniese skool, tegniese kollege of universiteit waar daar 'n masjienbou-laboratorium is, aanvaar word in die plek van werks-winkeldiens volgens 'n verhouding wat deur die Direkteur bepaal moet word ten opsigte van so 'n skool, kollege of universiteit, tot op 'n maksimum van twee jaar; met dien verstande dat die kandidaat die volle masjienboukursus gevolg het en 'n sertifikaat van die prinsipaal voorlê waarin getuig word dat hy gereeld al die goedgekeurde klasse bygewoon het en dat hy bevredigende vordering gemaak het. As 'n kandidaat gedurende die vakansies van die skool, kollege of universiteit werks-

(4) If the total period of the candidate's workshop service calculated in accordance with the provisions of paragraph (3) of this regulation is less than four years, the candidate may make up the deficiency by service at sea either—

- (a) on day work as Engineer-Officer on board ships of not less than 375 horse-power making voyages from one port to another or in fishing boats or sea-going tugs of not less than 375 horse-power; or
- (b) on regular watch in such ships, fishing boats or tugs.

Two-thirds of the time so spent in ships making long voyages, four-ninths of the time so spent in ships making short voyages and one-third of the time so spent in fishing boats or in sea-going tugs shall be counted towards the period of qualifying workshop service; provided that no such work performed before the age of 20 shall be so counted.

Time Spent in Certain Technical Schools, Colleges or Universities Accepted in lieu of Workshop Service.

17. (1) *Full-time Students in Mechanical Engineering.*—

(a) A candidate who has satisfactorily completed at an approved technical school, college or university an approved full-time course of study of at least three years in mechanical engineering shall, notwithstanding the provisions of regulation 16, be required to produce proof of a minimum of twenty-one months' workshop service: Pro-vided that of this period twenty-one months' service a minimum period of twelve months shall, after completion of the three years course, have been spent on the fitting, erecting or repairing of machinery of a suitable size, either in the works or outside, of a type similar to that recognised in terms of regulation 16. The candidate shall produce the diploma, degree or certificate obtained as evidence of his having satisfactorily completed such course, or, if no diploma, degree or certificate is issued, he shall produce a certificate from the principal of the technical school, college or university testifying to the fact that he has satisfactorily completed such course.

(b) Suitable workshop training of a type referred to in regulation 16 (1) carried out during vacation shall be allowed to count towards the twenty-one months' service required in terms of sub-paragraph (a) up to a maximum of nine months, provided that the individual periods of such training are not less than one months' duration.

(c) Periods of service up to an aggregate of six months which have been spent during vacation in an approved works apprentice training scheme for fitters and turners or on similar training in approved technical school, college or university workshops, may also be allowed to count towards the period of twenty-one months' service required in terms of sub-paragraph (a) of this paragraph.

(2) *Day Courses in Mechanical Engineering.*—Where a candidate has undergone a course of study of less than three years' duration, time spent by him at an approved day technical school, college or university where there is a mechanical engineering laboratory, shall be accepted in lieu of workshop service according to a ratio to be deter-mined by the Director in respect of such school, college or university up to a maximum of two years; provided that the candidate has taken the full mechanical engineering course, and produces a certificate from the principal testi-fying to his regular attendance at all the approved classes and to his satisfactory progress. Where during the vaca-

winkeldiens, soortgelyk aan dié waarvan in regulasie 16 melding gemaak word, vir 'n ononderbroke tydperk van minstens een maand verrig, word die duur van die kursus en die tyd wat in die werkswinkels bestee is afsonderlik bereken. Die tydperk wat in die werkswinkels deurgebring is, word ten volle gereken, en die oorblywende gedeelte van die jaar word bereken as twee-derdes van die tyd.

(3) *Aandklasse in masjienbou.*—Tyd wat deurgebring word met die bywoning van *aandklasse* in masjienbou aan 'n goedgekeurde tegniese skool, tegniese kollege of universiteit, word, behoudens die volgende voorwaardes, in die plek van werkswinkeldiens aanvaar:—

- 'n Kandidaat wat aanspraak maak op tyd wat aan die bywoning van sodanige klasse bestee is, moet 'n sertifikaat voorlê geteken deur die prinsipaal van die skool, kollege of universiteit waarin getuig word van die feit dat die kandidaat gereeld 'n bepaalde klas of klasse bygewoon het, wat gespesifiseer moet word, en dat hy bevredigende vordering gemaak het. In so 'n sertifikaat moet die totale aantal ure wat die kandidaat aan die bywoning van elke klas bestee het, vermeld word.
- Tyd wat 'n kandidaat deurgebring het met die bywoning van klasse wat regstreeks betrekking het op die opleiding van marine- of masjienbou-ingenieurs word bereken in die verhouding van vyf uur tot een dag. Die totale aantal dae wat aldus verkry word, word dan aanvaar in die plek van twee-derdes van dieselfde tydperk van werkswinkeldiens.
- Tyd wat 'n kandidaat bestee het aan die bywoning van 'n goedgekeurde aandklaskursus in masjienbou wat lei tot 'n sertifikaat wat 'n kandidaat sal vrystel van deel A van die eksamen of 'n gedeelte daarvan [sien regulasie 28 (3) (a)], sal, behoudens die vereistes van paragraaf (3) (a) van hierdie regulasie, byge-reken word vir vermindering van werkswinkeldiens in die verhouding van een en 'n half maande vir elke voltooide jaar.

[LET WEL.—

(1) Onderstaande is 'n tabel van die tegniese skole, tegniese kolleges en universiteite wat deur die Direkteur goedgekeur is en die berekening van die waarde van kursusse wat in die plek van werklike werkswinkeldiens aanvaar word:—

Opleidingsinrigting.	Berekening van waarde van kursusse.
Universiteit van Natal (Howard-kollege).	Klasse in elektrotegniek word aanvaar teen die helfte van die waarde tot 'n maksimum van agtien maande.

(2) Op aansoek oorweeg die Direkteur die erkenning van ander tegniese skole, tegniese kolleges of universiteite, mits hy tevrede is dat die klasse wat verskaf word dit regverdig dat die tyd wat aan so 'n inrigting deurgebring word as werkswinkeldiens gereken word, en hy gee spesiale oorweging aan die erkenning van opleidingsinrigtings wat deur die Ministerie van Vervoer en Burgerlike Lugvaart van die Verenigde Koninkryk erken word.]

B. SEEDIENS.

Algemeen.

18. (1) Die bewyslas om aanneembare bewys van seediens te lewer rus in alle gevalle op die kandidaat wat op dergelike seediens aanspraak maak.

(2) As 'n kandidaat aanspraak maak op seediens wat verrig is in skepe wat nie in die Unie geregistreer is nie en dergelike diens nie deur die Direkteur geverifieer kan word nie, moet die diens bevestig word deur 'n amptelike gesag van die land aan wie die skip waarin die kandidaat diens gedoen het, behoort. Indien daar enige twyfel bestaan dat die bewyse gelewer voldoende is, word alle dokumente vir beslissing na die Direkteur verwys.

tions of the school, college or university course a candidate performs workshop service of the type referred to in regulation 16 for a continuous period of not less than one month, the period of the course and the time spent in the workshops shall be assessed separately, the period spent in the workshops being counted at the full rate and the remaining portion of the year being assessed at the two-thirds rate.

(3) *Evening Classes in Mechanical Engineering.*—Time spent in attending evening classes in mechanical engineering at an approved technical school, college or university shall, subject to the following conditions, be accepted in lieu of workshop service:—

- A candidate who claims time spent in attending such classes shall produce a certificate signed by the principal of the school, college or university testifying to the fact that he has attended regularly at a definite class or classes which should be specified and that he has made satisfactory progress. This certificate shall state the total number of hours spent by the candidate in attending each class.
- Time spent by a candidate in attending such classes as have a direct bearing on the training of a marine or mechanical engineer shall be reckoned at the rate of five hours to one day. The total number of days so obtained shall then be accepted in lieu of two-thirds of the same period of workshop service.
- Time spent by a candidate at an approved evening class course in mechanical engineering leading up to a certificate which will exempt a candidate from Part A of the examination or some portion of it [see regulation 28 (3) (a)] shall, subject to the requirements of paragraph (3) (a) of this regulation, be allowed to count for remission of workshop service at the rate of one and a half months for each completed year.

[NOTE.—

(1) The following table shows the technical schools, colleges and universities approved by the Director and the assessment of the value of courses which are accepted in lieu of actual workshop service:—

Training Establishment.	Assessment of Courses.
University of Natal (Howard College)	Classes in electrical engineering accepted at half value up to a maximum of 18 months.

(2) The Director will, upon application, consider the recognition of other technical schools, colleges or universities provided he is satisfied that the classes provided justifies time spent there being allowed to count as workshop service, and will give special consideration to the recognition of training establishments recognised by the Ministry of Transport and Civil Aviation of the United Kingdom.]

B. SEA SERVICE.

General.

18. (1) In all cases the onus of producing acceptable proof of sea service shall rest upon the candidate claiming such service.

(2) Where a candidate claims sea service performed in ships not registered in the Union and such service cannot be verified by the Director, the service shall be confirmed by an official authority of the country to which the ship in which the candidate served belonged. If the sufficiency of the proofs given appears to be at all doubtful, all papers shall be referred to the Director for decision.

(3) Slegs diens wat volgens 'n ooreenkoms met die bemanning verrig is, word as seediens getel.

(4) Wanneer 'n gedeelte of die hele tydperk van kwalifiserende diens verrig is in skepe wat vir aansienlike tydperke nie ter see gevaar het nie, moet 'n kandidaat 'n sertifikaat van die eienaars van die skip voorlê waarin die gedeelte van die dienstyd wat werklik ter see deurgebring is, vermeld word. As hierdie dienstyd gelyk is aan minstens twee-derdes van die seediens wat vereis word om vir die eksamen te kwalifiseer, kan die diens ten volle aanvaar word, maar as die werklike diens ter see minder as hierdie tydsbestek beslaan, moet die kandidaat vir die tekort vergoed deur addisionele seediens te verrig.

(5) Diens in skepe waar 'n waghoudende ingenieur-offisier as deel van sy gereelde pligte die werk van 'n stoker of ander werk moet verrig wat nie gewoonlik deur 'n ingenieur-offisier gedoen word nie, word nie as kwalifiserende diens aanvaar nie.

(6) Die Direkteur kan gelas dat diens, vir die aanvaarding waarvan daar nie in hierdie regulasies voorsiening gemaak word nie, as seediens erken moet word, en hy kan bepaal watter gedeelte van diens wat aldus verrig word as seediens gereken moet word.

Hoe seediens bereken word.

19. Die kandidaat se diens, soos in sy ontslagsertifikaat aangetoon, word volgens kalendermaande gereken, d.w.s. die tyd ingesluit tussen enige bepaalde dag in enige maand en die voorafgaande dag van die volgende maand, albei ingesluit. Die aantal volle maande vanaf die aanvang van die tydperk, wat aldus vasgestel word, word bereken, en daarna word die aantal dae wat oorbly getel. Die dag waarop die ooreenkoms 'n aanvang neem, sowel as die dag waarop dit beëindig word, word albei ingesluit, en al die oorblywende dae word bymekaar getel en gereken teen 30 dae per maand.

Vereiste seediens.

20. (1) *Tweede ingenieur-offisier.*—(a) 'n Kandidaat vir 'n bekwaamheidssertifikaat (stoom of motor) as tweede ingenieur-offisier moet, na voltooiing van die werkswinkel diens wat ooreenkomstig regulasie 16 vereis word en die seediens (indien enige) wat ooreenkomstig paragraaf (4) van daardie regulasie in die plek daarvan aangeneem word, bewys lewer dat hy in skepe van minstens 375 perdekras wat lang seereise onderneem as ingenieur-offisier ter see op gereelde waghoudiens van altesaam minstens agt uur per dag die volgende diens verrig het (vergelyk regulasie 21):—

- (i) As 'n bekwaamheidssertifikaat (stoom) vereis word, minstens agtien maande, waarvan minstens nege maande bestee moes gewees het by die ketels en hoofaandryfmasjinerie van 'n stoomskip. Hierdie tydperk van minstens nege maande moet diens van minstens ses maande by die ketels en diens van minstens ses maande by die hoofaandryfmasjinerie insluit, maar die diens by die ketels en die diens by die hoofaandryfmasjinerie kon gelyktydig verrig gewees het. Behoudens die bepalings van subparagraaf (b) kon die oorblywende nege maande (of die balans van nege maande) deurgebring gewees het by die ketels van 'n stoomskip of by die hoofaandryfmasjinerie van 'n stoom- of motorskip, of by geskikte hulpmasjiene van 'n stoom- of motorskip (vergelyk regulasie 22) of met dagwerk (vergelyk regulasie 23);
- (ii) as 'n bekwaamheidssertifikaat (motor) vereis word, minstens agtien maande, waarvan minstens ses maande bestee moes gewees het by die hoofaandryfmasjinerie van 'n motorskip. Behoudens die bepalings van subparagraaf (b), kon die oorblywende twaalf maande (of balans van twaalf maande) deurgebring gewees het by die hoofaandryfmasjinerie van 'n stoom- of motorskip, of by geskikte hulpmasjiene van 'n stoom- of motorskip (vergelyk regulasie 22), of in 'n mate van hoogstens ses maande by die ketels van 'n stoomskip of met dagwerk (vergelyk regulasie 23);

(3) Only service rendered in terms of an agreement with the crew shall be reckoned as sea service.

(4) When part or the whole of the qualifying service has been performed in ships which for considerable periods have not been at sea, a candidate shall produce a certificate from the owners of the ship stating the proportion of time actually spent at sea. If this time amounts to not less than two-thirds of the sea 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 candidate shall be required to make up the deficiency by performing additional sea service.

(5) Service in ships where a watchkeeping Engineer-Officer is, as part of his regular duties, required to do stoking or other work not usually performed by an Engineer-Officer, shall not be accepted as qualifying.

(6) The Director may order that service, the acceptance of which is not provided for in these regulations, shall be recognised as sea service, and may determine what proportion of service so spent shall be counted as sea service.

How Sea Service Calculated.

19. The candidate's service, as shown on his discharges, shall be reckoned by the calendar month, i.e. the time included between any given day in any month and the preceding day of the following month, both inclusive. The number of complete months from the commencement of the period, ascertained in this way, shall be computed, after which the number of odd days shall be counted. The day on which the agreement commences, as well as that on which it terminates, shall both be included, and all odd days added together and reckoned at 30 to the month.

Sea Service Required.

20. (1) *Second Engineer-Officer.*—(a) A candidate for a certificate of competency (steam or motor) as Second Engineer-Officer shall, after completing the workshop service required in terms of regulation 16 and the sea service (if any) accepted in lieu thereof under paragraph (4) of that regulation, produce proof of having performed in ships of not less than 375 horse-power making long voyages the following service as an Engineer-Officer at sea on regular watch totalling at least 8 hours per day (see regulation 21)—

- (i) if a certificate of competency (steam) is required, at least eighteen months, of which at least nine months shall have been spent on the boilers and main propelling machinery of a steam ship. This period of at least nine months shall include at least six months' service on the boilers and six months' service on the main propelling machinery, but the service on the boilers and the service on the main propelling machinery may have been simultaneous. Subject to the provisions of sub-paragraph (b), the remaining nine months (or balance of nine months) may have been spent on the boilers of a steam ship or on the main propelling machinery of a steam or motor ship, or on suitable auxiliaries of a steam or motor ship (see regulation 22) or on day work (see regulation 23);
- (ii) if a certificate of competency (motor) is required, at least eighteen months, of which at least six months shall have been spent on the main propelling machinery of a motor ship. Subject to the provisions of sub-paragraph (b), the remaining twelve months (or balance of twelve months) may have been spent on the main propelling machinery of a steam or motor ship, or on suitable auxiliaries of a steam or motor ship (see regulation 22), or to the extent of not more than six months on the boilers of a steam ship, or on day work (see regulation 23);

- (iii) as 'n gekombineerde bekwaamheidsertifikaat (stoom en motor) vereis word, minstens *een-en-twintig* maande, waarvan minstens—
- (1) nege maande bestee moes gewees het by die ketels en hoofaandryfmasjinerie van 'n stoomskip. Hierdie tydperk van minstens nege maande moet minstens ses maande se diens by die ketels en minstens ses maande se diens by die hoofaandryfmasjinerie insluit: Met dien verstande dat die diens by die ketels en die diens by die hoofaandryfmasjinerie gelyktydig verrig kon gewees het; en
 - (2) ses maande by die hoofaandryfmasjinerie van 'n motorskip uitgedien moes gewees het.
- Behoudens die bepalings van subparagraaf (b), kon die oorblywende diens van ses maande (of balans van ses maande) uitgedien gewees het by die ketels van 'n stoomskip of by die hoofaandryfmasjinerie van 'n stoomskip of motorskip of by geskikte hulpmasjiene van 'n stoom- of motorskip (vergelyk regulasie 22) of met dagwerk (vergelyk regulasie 23).
- (b) Ondanks die bepalings van subparagraaf (i), (ii) en (iii) van paragraaf (2), kan die tydperk van nege maande (of balans van nege maande) of twaalf maande (of balans van twaalf maande) of ses maande (of balans van ses maande), na gelang van die geval, verminder word met hoogstens drie maande in die geval van 'n kandidaat wat—
- (i) binne twee jaar vanaf die datum waarop hy geëksamineer wil word 'n goedgekeurde dagkursus gevolg het aan die Marindepartement van 'n goedgekeurde tegniese skool, tegniese kollege of universiteit, en die kandidaat mag die tyd wat aldus bestee was, reken as gelykaan twee-derdes van dieselfde tydperk wat bestee is aan seediens ingevolge die voorwaardes in paragraaf (a) uiteengesit: Met dien verstande dat, as die kursus die vorm van aandklas aangeneem het, die totale aantal ure van bywoning van sodanige klasse met vyf verdeel en die resultaat as studiedae geag word; of
 - (ii) voordat hy met sy kwalifiserende seediens 'n aanvang gemaak het, in deel A van die eksamen vir 'n bekwaamheidsertifikaat as tweede ingenieuroffisier geslaag het; of
 - (iii) voordat hy met sy kwalifiserende seediens 'n aanvang gemaak het, algehele of gedeeltelike vrystelling verkry het van deel A van die eksamen vir 'n bekwaamheidsertifikaat as tweede ingenieuroffisier.
- (2) *Hoof-ingenieuroffisier.*—(a) 'n Kandidaat vir 'n bekwaamheidsertifikaat as hoof-ingenieuroffisier moet bewys lewer dat hy in skepe van minstens 560 perdekrags wat lang seereise onderneem, terwyl hy in besit was van 'n geldige sertifikaat as tweede ingenieuroffisier, die volgende seediens verrig het as senior ingenieuroffisier in bevel van die hele wag:—
- (i) As 'n bekwaamheidsertifikaat (stoom) vereis word, minstens agtien maande, waarvan minstens nege maande bestee moes gewees het by die ketels en hoofaandryfmasjinerie van 'n stoomskip. Hierdie tydperk van minstens nege maande moet diens van minstens ses maande by die ketels en diens van minstens ses maande by die hoofaandryfmasjinerie insluit; maar die diens by die ketels en die diens by die hoofaandryfmasjinerie kon gelyktydig verrig gewees het. Behoudens die bepalings van subparagraaf (b), kon die oorblywende nege maande (of balans van nege maande) bestee gewees het by die ketels van 'n stoomskip of by die hoofaandryfmasjinerie van 'n stoomskip of motorskip, of by geskikte hulpmasjiene van 'n stoom- of motorskip (vergelyk regulasie 22);
 - (ii) as 'n bekwaamheidsertifikaat (motor) vereis word, minstens agtien maande, waarvan minstens ses maande bestee moes gewees het by die hoofaandryfmasjinerie van 'n motorskip. Behoudens die bepalings van subparagraaf (b), kon die oorblywende twaalf maande (of balans van twaalf maande)
- (iii) if a combined certificate of competency (steam and motor) is required, at least twenty-one months, of which at least—
- (1) nine months shall have been spent on the boilers and main propelling machinery of a steam ship. This period of at least nine months shall include at least six months service on the boilers and six months service on the main propelling machinery: Provided that the service on the boilers and the service on the main propelling machinery may have been simultaneous; and
 - (2) six months shall have been spent on the main propelling machinery of a motor ship.
- Subject to the provisions of sub-paragraph (b), the remaining six months (or balance of six months) may have been spent on the boilers of a steam ship or on the main propelling machinery of a steam or motor ship or on suitable auxiliaries of a steam or motor ship (see regulation 22) or on day work (see regulation 23).
- (b) Notwithstanding the provisions of sub-paragraphs (i), (ii) and (iii) of paragraph (a), the period of nine months (or balance of nine months) or twelve months (or balance of twelve months) or six months (or balance of six months) as the case may be, may be reduced by not more than three months in the case of a candidate who has—
- (i) within two years from the date on which he desires to be examined attended an approved day course at the Marine Department of an approved technical school, college or university, the candidate being allowed to count the time so spent as equivalent to two-thirds of the same period spent as sea service under the conditions set forth in paragraph (a): Provided that where the course has been taken at evening classes, the total number of hours during which attendance has been made at such classes shall be divided by five and the result regarded as days of study; or
 - (ii) before commencing his qualifying sea service, passed Part A of the examination for a certificate of competency as Second Engineer-Officer; or
 - (iii) before commencing his qualifying sea service, secured exemption wholly or in part from Part A of the examination for a certificate of competency as Second Engineer-Officer.
- (2) *Chief Engineer-Officer.*—(a) A candidate for a certificate of competency as Chief Engineer-Officer shall produce proof of having performed in ships of not less than 560 horse-power making long voyages, whilst holding a valid certificate as Second Engineer-Officer, the following sea service as senior Engineer-Officer in charge of the entire watch—
- (i) if a certificate of competency (steam) is required, at least eighteen months of which at least nine months shall have been spent on the boilers and main propelling machinery of a steam ship. This period of at least nine months shall include at least six months service on the boilers and six months service on the main propelling machinery; but the service on the boilers and on the main propelling machinery may have been simultaneous. Subject to the provisions of sub-paragraph (b), the remaining nine months (or balance of nine months) may have been spent on the boilers of a steam ship or on the main propelling machinery of a steam or motor ship, or on suitable auxiliaries of a steam or motor ship (see regulation 22);
 - (ii) if a certificate of competency (motor) is required, at least eighteen months, of which at least six months shall have been spent on the main propelling machinery of a motor ship. Subject to the provisions of sub-paragraph (b), the remaining twelve months (or

bestee gewees het by die hoofaandryfmasjinerie van 'n stoom- of motorskip, of by geskikte hulpmasjiene van 'n stoom- of motorskip (vergelyk regulasie 22), of in 'n mate van hoogstens ses maande by die ketels van 'n stoomskip;

(iii) as 'n gekombineerde bekwaamheidsertifikaat (stoom of motor) vereis word, minstens een-en-twintig maande, waarvan minstens—

(1) nege maande uitgedien moes gewees het by die ketels en hoofaandryfmasjinerie van 'n stoomskip. Hierdie tydperk van minstens nege maande moet minstens ses maande diens by die ketels en ses maande diens by die hoofaandryfmasjinerie insluit. Met dien verstande dat die diens by die ketels en die diens by die hoofaandryfmasjinerie gelyktydig verrig kon gewees het; en

(2) ses maande by die hoofaandryfmasjinerie van 'n motorskip uitgedien moes gewees het.

Behoudens die bepalings van subparagraaf (b) kon die oorblywende ses maande (of balans van ses maande) uitgedien gewees het by die ketels van 'n stoomskip of by die hoofaandryfmasjinerie van 'n stoomskip of motorskip of by geskikte hulpmasjiene van 'n stoom- of motorskip (vergelyk regulasie 22).

(b) Ondanks die bepalings van subparagrafe (i) en (ii) van paragraaf 2 (a) van hierdie regulasie, kan die tydperk van nege maande (of balans van nege maande) of twaalf maande (of restant van twaalf maande) of ses maande (of balans van ses maande), na gelang van die geval, met hoogstens drie maande verminder word in die geval van 'n kandidaat wat—

(i) binne twee jaar vanaf die datum waarop hy geëksamineer wil word 'n goedgekeurde dagkursus aan die Marindepartement van 'n goedgekeurde tegniese skool, tegniese kollege of universiteit bygewoon het, en die kandidaat mag die tyd wat aldus bestee is, reken as gelykaan twee-derdes van dieselfde tydperk wat bestee is aan seediens ingevolge die voorwaardes in paragraaf (a) uiteengesit. Met dien verstande dat as die kursus die vorm van aand-klasse aangeneem het, die totale aantal ure van bywoning van sodanige klasse met vyf verdeel en die resultaat as studiedae geag word; of

(ii) voor die aanvang van sy seediens wat vereis word om as tweede ingenieuroffisier te kwalifiseer, in deel A van die eksamen vir 'n bekwaamheidsertifikaat as tweede ingenieuroffisier geslaag het; of

(iii) voor die aanvang van sy kwalifiserende seediens algehele of gedeeltelike vrystelling verkry het van deel A van die eksamen vir 'n bekwaamheidsertifikaat as tweede ingenieuroffisier.

(c) Diens as tweede in voorrang op skepe wat deur twee of meer stelle masjiene aangedryf word, of op groot enkel-skroefskepe waar drie of meer ingenieuroffisiere tegelykertyd gereelde waghoudiens verrig, word ook teen volle waarde aanvaar (vergelyk regulasie 21).

(d) Waar 'n kandidaat diens doen in skepe soos in paragraaf (2) (a) van hierdie regulasie vermeld maar in graderings laer as dié waarvan in daardie paragraaf melding gemaak word, tel sy seediens slegs as die helfte.

(e) Waar 'n kandidaat aanspraak maak op 'n vermindering van seediens ooreenkomstig die bepalings van paragrafe (1) (b) (i) of (2) (b) (i) van hierdie regulasie, moet hy 'n sertifikaat voorlê wat geteken is deur die prinsipaal van die tegniese skool, tegniese kollege of universiteit waarin getuig word van die feit dat hy al die goedgekeurde klasse vir 'n tydperk van minstens een maand gereeld gevolg het en dat hy bevredigende vordering gemaak het. Die kandidaat moet ook aan die eksaminator sy rekord-

balance of twelve months) may have been spent on the main propelling machinery of a steam or motor ship, or on suitable auxiliaries of a steam or motor ship (see regulation 22), or to the extent of not more than six months on the boilers of a steam ship;

(iii) if a combined certificate of competency (steam or motor) is required, at least twenty-one months, of which at least—

(1) nine months shall have been spent on the boilers and main propelling machinery of a steam ship. This period of at least nine months shall include at least six months service on the boilers and six months service on the main propelling machinery: Provided that the service on the boilers and the main propelling machinery may have been simultaneous; and

(2) six months shall have been spent on the main propelling machinery of a motor ship.

Subject to the provisions of sub-paragraph (b) the remaining six months (or balance of six months) may have been spent on the boilers of a steam ship or on the main propelling machinery of a steam or motor ship or on suitable auxiliaries of a steam or motor ship (see regulation 22).

(b) Notwithstanding the provisions of sub-paragraphs (i) and (ii) of paragraph 2 (a) of this regulation, the period of nine months (or balance of nine months) or twelve months (or balance of twelve months) or six months (or balance of six months), as the case may be, may be reduced by not more than three months, in the case of a candidate who has—

(i) within two years from the date on which he desires to be examined attended an approved day course at the Marine Department of an approved technical school, college or university the candidate being allowed to count the time so spent as equivalent to two-thirds of the same period spent in sea service under the conditions set forth in paragraph (a): Provided that where the course has been taken at evening classes, the total number of hours during which attendance has been made at such classes shall be divided by five and the result regarded as days of study; or

(ii) before commencing his sea service required to qualify as Second Engineer-Officer, passed Part A of the examination for a certificate of competency as Second Engineer-Officer; or

(iii) before commencing his qualifying sea service, secured exemption wholly or in part from Part A of the examination for a certificate of competency as Second Engineer-Officer.

(c) Service as second in seniority on ships propelled by two or more sets of engines, or on large single-screw ships where there are three or more Engineer-Officers on regular watch at the same time, shall also be accepted at full time value (see regulation 21).

(d) Where a candidate serves on ships mentioned in paragraph (2) (a) of this regulation but in ranks below those referred to in that paragraph, his sea service shall count at half rate only.

(e) Where a candidate claims a reduction in sea service in accordance with the provisions of paragraphs (1) (b) (i) or (2) (b) (i) of this regulation, he shall produce a certificate signed by the principal of the technical school, college or university testifying to the fact that all the approved classes have been attended regularly for a period of not less than one month and that he has made satisfactory progress. The candidate shall also produce to

boeke toon, asook die tekeninge wat hy gemaak het terwyl hy die klasse wat deur bostaande sertifikaat gedek word, gevolg het.

[LET WEL.—

(1) (a) Daar is op die oomblik in die Unie geen tegniese skole, tegniese kolleges of universiteite wat oor marine-departemente beskik nie.

(b) Die Direkteur sal op aansoek erkenning van ander tegniese skole, tegniese kolleges of universiteite in ander lande oorweeg, mits hy tevrede is dat die klasse wat deur die marine-departemente verskaf word dit regverdig dat tyd wat daar deurgebring word tel vir 'n vermindering van seediens, en hy sal spesiale oorweging skenk aan die erkenning van skole, kolleges en universiteite in die Verenigde Koninkryk wat oor marine-departemente beskik en wat erken word deur die Ministerie van Vervoer en Burgerlike Lugvaart van die Verenigde Koninkryk.

(2) Die aandag word gevestig op regulasie 49 wat handel oor die endossering van sertifikate as tweede of hoof-ingenieuroffisier.]

Diens in skepe op kort seereise, vissers- of sleepbote.

21. (1) Diens in skepe wat kort seereise onderneem, word vir die kwalifiserende tydperke van seediens by regulasie 20 voorgeskryf vir bekwaamheidsertifikate as twee-derdes aanvaar. Kandidate vir sertifikate as tweede ingenieuroffisiere mag al hul kwalifiserende seediens verrig op gereelde waghoudiens in skepe van minstens 375 perdekras wat kort seereise onderneem. Kandidate vir sertifikate as hoof-ingenieuroffisiere mag al hulle kwalifiserende seediens verrig in bevel van 'n wag in skepe van minstens 560 perdekras wat kort seereise onderneem.

(2) Behoudens die bepalings van paragraaf (3), word diens in vissersbote of in seevarende sleepbote vir die kwalifiserende tydperke van seediens by regulasie 20 voorgeskryf vir bekwaamheidsertifikate as die helfte aanvaar.

(3) Kandidate vir sertifikate as tweede ingenieuroffisiere mag al hul kwalifiserende seediens verrig op gereelde waghoudiens in vissersbote of seevarende sleepbote van minstens 375 perdekras. Kandidate vir sertifikate as hoof-ingenieuroffisiere moet, benewens hul diens in bevel van die wag in vissersbote of seevarende sleepbote van minstens 560 perdekras, vir minstens ses maande in 'n kwalifiserende hoedanigheid [vergelyk regulasie 20 (2)] diens gedoen het in skepe van minstens 560 perdekras wat lang seereise onderneem of vir minstens nege maande in skepe van minstens 560 perdekras wat kort seereise onderneem.

Diens verrig by hulpmasjinerie.

22. (1) Behoudens die bepalings betreffende die minimumdiens by ketels en hoofmasjiene in regulasie 20 uiteengesit, tel tyd wat uitgedien word by hulpmasjinerie wat saam met die hoofaandryfmasjinerie werk (bv. by hulpmasjiene wat noodsaaklik is vir die aandryf van die hoofaandryfmasjinerie en/of ketels) ten volle vir die kwalifiserende tydperk van seediens.

(2) Tyd wat uitgedien word by geskikte hulpmasjiene wat onafhanklik werk van die hoofaandryfmasjinerie tel as die helfte.

Dagwerk.

23. Dagwerk, waarby bedoel word ingenieurswerk ter see, uitgesonderd werk wat op gereelde waghoudiens verrig word, tel vir die kwalifiserende tydperk van seediens vir 'n bekwaamheidsertifikaat as tweede ingenieuroffisier of 'n endossement van so 'n sertifikaat, as die helfte tot op 'n maksimum van ses maande.

(LET WEL.—Algemeen gesproke moet hierdie werk gedoen word in die masjien- of ketelruime van 'n stoom- of motorskip ter see, maar ingenieurswerk van 'n geskikte aard wat ter see verrig word uitgesonderd, dié binne die masjien- of ketelruime, mag ook tel as die helfte met 'n maksimum vergunning van ses maande vir dagwerk.)

the examiner his note books and drawings made by him whilst attending the classes covered by the above certificate.

[NOTE.—

(1) (a) There are not at present any technical schools, colleges or universities in the Union which operate Marine Departments.

(b) The Director will, upon application, consider the recognition of other technical schools, colleges or universities in other countries, provided he is satisfied that the classes provided by the Marine Departments justifies time spent there being allowed to count towards a reduction of sea service, and will give special consideration to the recognition of schools, colleges and universities in the United Kingdom which have Marine Departments and which are recognised by the United Kingdom Ministry of Transport and Civil Aviation.

(2) Attention is invited to regulation 49 which deals with the endorsement of certificates as Second or Chief Engineer-Officer.]

Service in Ships Making Short Voyages, Fishing Boats or Tugs.

21. (1) Service in ships making short voyages shall be accepted towards the qualifying periods of sea service prescribed by regulation 20 for certificates of competency at two-thirds rate. Candidates for Second Engineer-Officers' certificates may perform all their qualifying sea service on regular watch in ships of not less than 375 horse-power making short voyages. Candidates for Chief Engineer-Officers' certificates may perform all their qualifying sea service in charge of a watch in ships of not less than 560 horse-power making short voyages.

(2) Subject to the provisions of paragraph (3), service in fishing boats or in sea-going tugs shall be accepted towards the qualifying periods of sea service prescribed by regulation 20 for certificates of competency at half rate.

(3) Candidates for Second Engineer-Officers' certificates may perform all their qualifying sea service on regular watch in fishing boats or sea-going tugs of not less than 375 horse-power. Candidates for Chief Engineer-Officers' certificates shall, in addition to their service in charge of the watch in fishing boats or sea-going tugs of not less than 560 horse-power, have served in a qualifying capacity [sea regulation 20 (2)] for not less than six months in ships of not less than 560 horse-power making long voyages or for not less than nine months in ships of not less than 560 horse-power making short voyages.

Service on Auxiliary Machinery.

22. (1) Time served on auxiliary machinery run in conjunction with the main propelling machinery (i.e. on auxiliaries which are essential to the running of the main propelling machinery and/or boilers) shall, subject to the provisions regarding the minimum service on boilers and main engines set out in regulation 20, count in full towards the qualifying period of sea service.

(2) Time served on suitable auxiliaries run independently of the main propelling machinery shall count at half rate.

Day Work.

23. Day work, by which is meant engineering work at sea other than that performed on regular watch, shall count towards the qualifying period of sea service for a certificate of competency as Second Engineer-Officer or an endorsement of such a certificate, at half rate up to a maximum of six months.

(NOTE.—Generally this work should be carried out within the engine or boiler spaces of a steam or motor ship at sea, but engineering work of a suitable nature carried out at sea other than within the engine or boiler spaces may also be counted at half rate with a maximum allowance for day work of six months.)

HOOFSTUK III.

EKSAMENGELDE.

Wanneer betaalbaar.

24. 'n Kandidaat wat 'n eksamen vir 'n bekwaamheid-sertifikaat wil aflê, moet die eksamengelde voor die datum van die eksamen betaal, en geen kandidaat word tot die eksamen toegelaat nie tensy hy aan die eksaminator 'n kwitansie vir die eksamengelde vertoon.

Waar betaalbaar.

25. Die eksamengelde moet aan die naaste bevoegde beampte betaal word, wat 'n kwitansie moet uitreik met vermelding van—

- (a) die naam van die kandidaat;
- (b) die bedrag wat betaal is; en
- (c) die graad van die eksamen.

Tabel van eksamengelde.

26. Ondervermelde gelde moet betaal word—

(a) Tweede ingenieuroffisierseksamen (stoom, of motor, of gekombineerde stoom en motor):—

	£	s.	d.
(i) Vir die volle eksamen stoom of motor of gekombineerde stoom en motor	1	0	0
(ii) Deel A of deel B of 'n gedeelte van deel A of deel B	0	10	0
(iii) Eksamen vir endossering van sertifikaat (stoom of motor)	0	10	0

(b) Hoof-ingenieuroffisierseksamen (stoom, of motor, of gekombineerde stoom en motor):—

	£	s.	d.
(i) Vir die volle eksamen stoom of motor of gekombineerde stoom en motor	2	0	0
(ii) Deel A of deel B of 'n gedeelte van deel A of deel B	1	0	0
(iii) Eksamen vir endossering van sertifikaat (stoom of motor)	1	0	0

Terugbetaling van gelde.

27. (1) As 'n kandidaat deur omstandighede buite sy beheer nie in staat is om 'n eksamen waarvoor hy gelde betaal het, af te lê nie, kan hy skriftelik by die bevoegde beampte aansoek doen om terugbetaling van die gelde. As die bevoegde beampte van mening is dat die aansoek op redelike gronde berus, moet hy dit aan die Direkteur deurstuur, wat die terugbetaling kan magtig.

(2) As 'n kandidaat, ingevolge regulasie 11, nie toegelaat word om die eksamen te voltooi nie, kan hy skriftelik by die bevoegde beampte aansoek doen om terugbetaling van die gelde wat hy betaal het, en die gelde word dan aan hom terugbetaal.

(3) As 'n kandidaat nie in enige gedeelte van die eksamen slaag nie word, behoudens die bepalings van paragraaf (2), geen deel van die gelde aan hom terugbetaal nie.

HOOFSTUK IV.

EKSAMENS.

Vir 'n bekwaamheidssertifikaat as tweede ingenieur-offisier.

28. (1) Die leerplanne vir hierdie eksamen word in Aanhangsel C uiteengesit.

CHAPTER III.

EXAMINATION FEES.

When to Pay Fees.

24. A candidate for examination for a certificate of competency shall pay the examination fee prior to the date of the examination and no candidate shall be allowed to sit for the examination unless he produces to the examiner the receipt for the fees paid.

Where to Pay Fees.

25. The fee for examination shall be paid to the nearest proper officer who shall issue a receipt stating—

- (a) the name of the candidate;
- (b) the amount paid; and
- (c) the grade of the examination.

Table of Fees.

26. The Fees payable shall be as follows:—

(a) Second Engineer-Officer's examination (steam or motor, or combined steam and motor):—

	£	s.	d.
(i) The full examination (steam or motor, or combined steam and motor)	1	0	0
(ii) Part A or Part B or a portion of either Part	0	10	0
(iii) The endorsement (steam or motor) examination	0	10	0

(b) Chief Engineer-Officer's examination (steam or motor, or combined steam and motor):—

	£	s.	d.
(i) The full examination (steam or motor, or combined steam and motor)	2	0	0
(ii) Part A or Part B or a portion of either Part	1	0	0
(iii) The endorsement (steam or motor) examination	1	0	0

Refund of Fees.

27. (1) If through circumstances beyond the control of a candidate he is unable to undergo the examination for which fees have been paid, he may apply in writing to the proper officer for a refund of such fees. If the proper officer considers that the application is based upon reasonable grounds, he shall transmit it to the Director, who may authorise the refund.

(2) If a candidate is, in terms of regulation 11, not allowed to complete an examination, he may apply in writing, to the proper officer for a refund of the fees paid by him, and such fees shall be refunded to him.

(3) Subject to the provisions of paragraph (2), if a candidate fails to pass any part of the examination, no part of the fee shall be refunded to him.

CHAPTER IV.

EXAMINATIONS.

For a Certificate of Competency as Second Engineer-Officer.

28. (1) The syllabuses for this examination are set out in Annexure C.

(2) Die eksamen word in twee dele verdeel, soos volg:—

Deel A.

- (a) Algemene ingenieurswetenskap (toegepaste meganika) (een vraestel van drie uur).
- (b) Hitte en hitte-motore (een vraestel van drie uur).
- (c) Tekening (een vraestel van ses uur).

Deel B.

- (a) (i) Elektrotegniek } een vraestel van
(ii) Elementêre skeepsboukunde } drie uur.
- (b) (i) Ingenieurswese [twee vraestelle, wat elk drie uur duur: Met dien verstande dat 'n derde vraestel van drie uur beantwoord moet word in die eksamen vir 'n gekombineerde sertifikaat (stoom en motor)].

(ii) Mondeling.

(3) Kandidaat kan vrygestel word van deel A of 'n gedeelte daarvan en kan die eksamen in afsonderlike dele soos volg aflê:—

- (a) 'n Kandidaat wat 'n goedgekeurde instruksiekursus gevolg het wat minstens twee van die drie vakke wat in deel A ingesluit word, dek, en wat 'n sertifikaat verkry het met die strekking dat hy in die toepaslike eksamen aan die einde van die kursus geslaag het, word vrygestel van die vak in deel A wat deur die sertifikaat gedek word.
- (b) 'n Kandidaat kan hom vir deel A van die eksamen in sy geheel aanmeld of, as hy ingevolge paragraaf (a) hierbo van twee van die eksamen vakke vrygestel was, vir die oorblywende vak te eniger tyd nadat hy die vereiste werksinkeldiens voltooi het.
- (c) Van 'n kandidaat wat nie ingevolge (a) hierbo van deel A of 'n gedeelte daarvan vrygestel is nie en wat slegs in twee vakke slaag wanneer hy deel A van die eksamen aflê, sal nie verlang word dat hy daardie vakke moet herhaal nie, en hy mag hom te eniger tyd vir hereksamen in die oorblywende vak aanmeld. As hy slegs in een vak slaag, moet hy by die hereksamen in die deel in sy geheel eksamen aflê.
- (d) 'n Kandidaat mag deel B van die eksamen te eniger tyd aflê nadat hy die vereiste tydperke van kwalifiserende werksinkel- en seediens voltooi het, mits hy ook terselfdertyd deel A van die eksamen in sy geheel aflê of eksamen doen in dié vakke, indien enige, in daardie deel waarin hy nie reeds geslaag het nie of waarvan hy nie ingevolge (a) hierbo verstelling verkry het nie.
- (e) 'n Kandidaat slaag nie in deel B of enige afdeling van deel B nie tensy hy deel A en deel B tegelykertyd voltooi of tensy hy deel A voorheen voltooi het.
- (f) 'n Kandidaat wat deel A voltooi of voltooi het en wat, wanneer hy deel B van die eksamen aflê in afdeling (a) (elektrotegniek en elementêre skeepsboukunde) slaag maar in afdeling (b) (ingenieurswese en mondeling) druip, ontvang 'n slaagmerk in afdeling (a) en mag te eniger tyd in afdeling (b) 'n hereksamen aflê.
- (g) 'n Kandidaat wat deel A voltooi of voltooi het en wat, wanneer hy deel B van die eksamen aflê in afdeling (b) (ingenieurswese en mondeling) slaag maar in afdeling (a) (elektrotegniek en elementêre skeepsboukunde) druip, ontvang 'n slaagmerk in afdeling (b) en mag te eniger tyd in afdeling (a) 'n hereksamen aflê.

Vir 'n Bekwaamheidsertifikaat as hoof-ingenieuroffisier.

29. (1) Die leerplanne vir hierdie eksamen word in Aanhangsel C uiteengesit.

(2) The examination is divided into two parts as follows:—

Part A.

- (a) General Engineering Science (Applied Mechanics) (one paper of three hours).
- (b) Heat and Heat Engines (one paper of three hours).
- (c) Drawing (one paper of six hours).

Part B.

- (a) (i) Electrotechnology } one paper of
(ii) Elementary Naval Architecture } three hours.
- (b) (i) Engineering Knowledge [two papers, each of three hours: Provided that in the examination for a combined certificate (steam and motor) a third paper of three hours is set.]
- (ii) Oral.

(3) Candidates may be exempted 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 which covers not less than two of the three subjects included in Part A, and who has obtained a certificate stating that he has passed the appropriate examination at the termination of the course, shall be granted exemption from the subject 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 he has been exempted under paragraph (a) above from two subjects of the examination, for the remaining subject at any time after he has completed the necessary workshop service.
- (c) A candidate who has not been exempted under (a) above from Part A or a part of it, and who, when taking Part A of the examination passes in two subjects only, shall not be required to take those subjects again and may present himself for re-examination in the remaining subject at any time. If he passes in one subject only, he shall sit for the whole Part on re-examination.
- (d) A candidate may take Part B at any time after he has completed the necessary periods of qualifying workshop and sea service, provided 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 has not been exempted 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 unless he has previously completed it.
- (f) A candidate who completes, or has completed, Part A and who when taking Part B passes in section (a) (Electrotechnology and Elementary Naval Architecture), but fails in section (b) (Engineering Knowledge and Oral), shall be given a pass in section (a) and may sit for re-examination in section (b) at any time.
- (g) A candidate who completes, or has completed, Part A and who when taking Part B passes in section (b) (Engineering Knowledge and Oral), but fails in section (a) (Electrotechnology and Elementary Naval Architecture), shall be given a pass in section (b) and may sit for re-examination in section (a) at any time.

For a Certificate of Competency as Chief Engineer-Officer.

29. (1) The syllabuses for this examination are set out in Annexure C.

(2) Die eksamen word in twee dele verdeel, soos volg:—

Deel A.

- (a) Algemene ingenieurswetenskap (toegepaste meganika) (een vraestel van drie uur).
- (b) Hitte en hitte-motore (een vraestel van drie uur).

Deel B.

- (a) (i) Elektrotegniek } een vraestel van
- (ii) Elementêre skeepsboukunde } drie uur.
- (b) (i) Ingenieurswese [twee vraestelle, van drie uur elk: Met dien verstande dat 'n derde vraestel van drie uur beantwoord moet word in die eksamen vir 'n gekombineerde sertifikaat (stoom en motor)].
- (ii) Mondeling.

(3) Kandidate kan vrygestel word van deel A of van 'n gedeelte daarvan en mag die eksamen in afsonderlike dele soos volg aflê:—

- (a) 'n Kandidaat wat vrystelling verkry het van die tweede ingenieuroffisierseksamen in algemene ingenieurswetenskap of hitte en hitte-motore, of in albei, word ook vrygestel van hierdie eksamen in enige van of in albei bogemelde vakke.
- (b) 'n Kandidaat wat in besit is van 'n bekwaamheid-sertifikaat as tweede ingenieuroffisier mag of deel A van die eksamen in sy geheel aflê of, indien hy ingevolge (a) hierbo van een vak vrygestel is, mag hy te eniger tyd in die oorblywende vak eksamen doen.
- (c) Van 'n kandidaat wat nie ingevolge (a) hierbo vrygestel is van deel A of 'n gedeelte daarvan nie en wat, wanneer hy deel A van die eksamen aflê in slegs een vak slaag, word nie verlang dat hy weer in daardie vak eksamen moet doen nie en hy mag te eniger tyd 'n eksamen in die oorblywende vak aflê.
- (d) 'n Kandidaat mag te eniger tyd deel B van die eksamen aflê mits hy in besit is van 'n bekwaamheid-sertifikaat as tweede ingenieuroffisier en die vereiste tydperk van kwalifiserende seediens voltooi het, en mits hy ook terselfdertyd eksamen doen in deel A van die eksamen in sy geheel of in sodanige vak, indien enige, in daardie deel waarin hy nie reeds geslaag het nie of waarvan hy nie ingevolge (a) hierbo vrystelling verkry het nie.
- (e) 'n Kandidaat slaag nie in deel B van die eksamen of in enige afdeling van deel B nie, tensy hy deel A en deel B terselfdertyd voltooi of deel A voorheen voltooi het.
- (f) 'n Kandidaat wat deel A voltooi of voltooi het en wat, wanneer hy deel B van die eksamen aflê, in afdeling (a) (elektrotegniek en elementêre skeepsboukunde) slaag maar in afdeling (b) (ingenieurswese en mondeling) slaag, ontvang 'n slaagmerk in afdeling (a) en mag te eniger tyd in afdeling (b) hereksamen doen.
- (g) 'n Kandidaat wat deel A van die eksamen voltooi of voltooi het en wat, wanneer hy deel B van die eksamen aflê, in afdeling (b) (ingenieurswese en mondeling) slaag maar in afdeling (a) (elektrotegniek en elementêre skeepsboukunde) druipt, ontvang 'n slaagmerk in afdeling (b) en mag te eniger tyd in afdeling (a) hereksamen doen.

Eksamen vir endossering van sertifikate van tweede en hoof-ingenieuroffisier.

30. Die eksamen sluit die volgende in:—

- (a) Een vraestel van drie uur oor ingenieurswese.
- (b) Mondeling.

Die leerplanne vir hierdie eksamens word in Aanhangsel C uiteengesit.

(2) The examination is divided into two parts as follows:—

Part A.

- (a) General Engineering Science (Applied Mechanics) (one paper of three hours).
- (b) Heat and Heat Engines (one paper of three hours).

Part B.

- (a) (i) Electrotechnology } one paper of
- (ii) Elementary Naval Architecture } three hours.
- (b) (i) Engineering Knowledge [two papers, each of three hours: Provided that in the examination for a combined certificate (steam and motor) a third paper of three hours is set.]
- (ii) Oral.

(3) Candidates may be exempted from Part A or of a part of it and may take the examination in separate parts as follows:—

- (a) A candidate who has been exempted from the Second Engineer-Officer examination in General Engineering Science or Heat and Heat Engines, or both, shall also be exempted from this examination in either or both of the above-mentioned subjects.
- (b) A candidate possessing a Second Engineer-Officer's certificate may take either the whole of Part A or, if exempted under (a) above from one subject, the remaining subject at any time.
- (c) A candidate who has not been exempted 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 at any time.
- (d) A candidate may take Part B at any time provided he holds a certificate as Second Engineer-Officer and has completed the necessary period of qualifying sea service, and provided also that he takes at the same time either the whole of Part A of the examination or such subject, if any, in that Part, in which he has not already passed or from which he has not been exempted 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 it.
- (f) A candidate who completes or has completed Part A and who when taking Part B passes in section (a) (Electrotechnology and Elementary Naval Architecture), but fails in section (b) (Engineering Knowledge and Oral), shall be given a pass in section (a) and may sit for re-examination in section (b) at any time.
- (g) A candidate who completes, or has completed Part A and who, when taking Part B, passed in section (b) (Engineering Knowledge and Oral), but fails in section (a) (Electrotechnology and Elementary Naval Architecture), shall be given a pass in section (b) and may sit for re-examination in section (a) at any time.

Examination for Endorsement of Second and Chief Engineer-officers' Certificates.

30. The examination consists of:—

- (a) One written paper of three hours in Engineering Knowledge.
- (b) Oral.

The syllabuses for these examinations are set out in Annexure C.

Vereiste punte om te slaag.

31. (1) Ten einde in die skriftelike gedeelte van die eksamen te slaag, moet 'n kandidaat 'n minimum aantal punte in elke vak behaal en ook minstens een-helfte van die totale aantal punte vir alle vakke. In die mondelinge eksamen word 'n hoër standaard vereis.

(2) Die eksaminator sal die uitslag van die eksamen aan die kandidaat meedeel.

Druip in eksamens.

32. (1) As 'n kandidaat druipt in 'n eksamenvak waar gebrek aan kennis van die vak daartoe mag lei dat 'n ingenieuroffisier iets mag doen wat werklik onveilig is vir die bestuur van enige gedeelte van die skip se masjinerie of dat hy versuim om iets noodsaakliks te doen in die belange van veiligheid (bv. as hy druipt in vraestelle oor die manipulerings en die lees van die waterpeilglas, die gevare van brand en ontploffing in stoom- en motorvaartuie) word daar geag dat hy gedruip het in praktiese kennis, en 'n kandidaat wat aldus druipt mag hom nie vir hereksamen aanmeld voordat hy bewys lewer dat hy verdere seediens in 'n kwalifiserende hoedanigheid verrig het nie.

(2) 'n Kandidaat wat in 'n eksamen druipt as gevolg van gebrek aan kennis van fundamentele beginsels of vanweë algemene ondoeltreffendheid in die eksamen mag hom vir 'n tydperk van tot drie maande, wat deur die eksaminator vasgestel moet word, nie vir hereksamen aanmeld nie: Met dien verstande dat die Direkteur na goedgekenke, behoudens die bepalings van paragraaf (5), die tydperk op meer as drie maande kan vasstel.

(3) 'n Kandidaat wat in 'n eksamen druipt in omstandighede uitgesonderd die wat in paragrafe (1) en (2) van hierdie regulasie uiteengesit word, mag homself te eniger tyd vir hereksamen aanmeld, maar as hy drie keer in deel A of drie keer in deel B druipt binne enige tydperk van drie maande, word hy vir 'n tydperk van tot drie maande, wat deur die eksaminator vasgestel moet word, nie weer geëksamineer nie: Met dien verstande dat die Direkteur na eie goedgekenke, behoudens die bepalings van paragraaf (5), die tydperk op meer as drie maande kan vasstel.

(4) Die tydperk van verdere seediens wat ingevolge paragraaf (1) van hierdie regulasie vereis word, word deur die eksaminator vasgestel en is hoogstens drie maande, tensy, in 'n geval waar die eksaminator die mening toegedaan is dat 'n dienstyfperk van meer as drie maande geregverdig is, die goedkeuring van die Direkteur vooraf daartoe verkry word.

(5) Die tydperk wat moet verstryk voordat 'n kandidaat hom vir 'n hereksamen kan aanmeld en wat deur die Direkteur ingevolge paragraaf (2) of (3) vasgestel word, of die tydperk van verdere seediens wat ingevolge paragraaf (4) van hierdie regulasie vereis word, is in geen geval meer as ses maande nie.

Erkenning van gedeeltelike slaagpunte in eksamens wat in ander dele van die Statebond gehou is.

33. Gedeeltelike slaagpunte in 'n eksamen vir 'n bekwaamheidsertifikaat as ingenieuroffisier of vir endosering van 'n tweede of hoof-ingenieur se sertifikaat wat in 'n ander deel van die Statebond as die Unie behaal is, word vir die doel van die ooreenstemmende eksamen in die Unie-aanvaar, en die bepalings van hierdie hoofstuk is ten opsigte van sodanige gedeeltelike slaagpunte van toepassing.

HOOFTUK V.**HOU VAN EKSAMENS.***Kandidate moet stip op tyd wees.*

34. Kandidate moet stip op die vasgestelde tyd in die eksamenkamer aanwesig wees.

Marks Required for Pass.

31. (1) To secure a pass in the written portion of the examination, a candidate shall be required to obtain a minimum number of marks in each subject and also to obtain not less than one-half of the total number of marks for all subjects. In the oral examination a higher standard will be required.

(2) The result of the examination will be communicated to the candidate by the examiner.

Failure in Examination.

32. (1) Failure in a subject in an examination ignorance of which may lead an Engineer-Officer to do something actually unsafe in the management of any part of a ship's machinery or to fail to do something essential in the interests of safety (e.g. failure in questions on manipulation and reading of the water-gauge, the danger of fire and explosion in steam and motor vessels) shall be regarded as failure in practical knowledge, and a candidate so failing shall not present himself for re-examination until he produces proof of further sea service in a qualifying capacity.

(2) A candidate who fails in an examination through ignorance of fundamental principles or on account of general defectiveness in the examination shall not present himself for re-examination for a period of up to three months, to be determined by the examiner: Provided that the Director in his discretion may, subject to the provisions of paragraph (5), fix a period in excess of three months.

(3) A candidate who fails in an examination in circumstances other than those set out in paragraphs (1) and (2) of this regulation may present himself for examination at any time, but if he fails three times in Part A or three times in Part B within any period of three months he shall not be examined for a period of up to three months, to be determined by the examiner: Provided that the Director in his discretion may, subject to the provisions of paragraph (5), fix a period in excess of three months.

(4) The period of further sea service required in terms of paragraph (1) of this regulation shall be determined by the examiner and shall not exceed three months, unless, in a case where the examiner is of the opinion that a period of service in excess of three months is warranted, the prior approval of the Director has been obtained.

(5) The period of time which must elapse before a candidate may again present himself for examination and which is fixed by the Director in terms of paragraphs (2) or (3), or the period of further sea service required in terms of paragraph (4) of this regulation shall in no case exceed six months.

Recognition of Partial Passes at Examinations Held in Other Parts of the Commonwealth.

33. A partial pass in an examination for a certificate of competency as an Engineer-Officer or for endorsement of a Second or Chief Engineer's certificate obtained in a part of the Commonwealth other than the Union shall be accepted for the purpose of the corresponding examination in the Union, and the provisions of this chapter shall apply in respect of such pass.

CHAPTER V.**CONDUCT OF EXAMINATIONS.***Candidates to be Punctual.*

34. Candidates shall appear at the examination room punctually at the time appointed.

Geen vreemdelinge word toegelaat nie.

35. Niemand word in die kamer tydens die afneem van 'n eksamen toegelaat nie, behalwe diegene wat pligmatig teenwoordig mag wees. Geen instruktors word tydens die hou van 'n eksamen op die perseel toegelaat nie.

Stille.

36. Terwyl 'n skriftelike eksamen afgeneem word, moet daar stilte in die eksamenkamer bewaar word.

Los velle papier en boeke.

37. Voor die aanvang van die eksamen moet alle stukke papier en boeke, uitgesonderd dié wat ingevolge hierdie regulasies in die eksamenkamer veroorloof is, van die tafels of lessenaars verwyder word.

Gebruik van matematiese tafels.

38. 'n Kandidaat mag geen ander matematiese tafels, uitgesonderd dié wat deur die eksaminator verskaf word, gebruik nie.

Gebruik van instrumente.

39. (1) Tekenborde en tekenhake wat vir gebruik by die eksamens benodig word, sal deur die eksaminator verskaf word, maar kandidate moet hul eie tekeninstrumente verskaf.

(2) Kandidate wat rekenliniale vir hul berekenings gebruik, moet in ink in hul antwoordboeke volledig aantoon hoedat hulle te werk gegaan het om die resultate te verkry. As hul metode van werk nie aldus aangetoon word nie, word geen punte toegeken ten opsigte van die betrokke resultate nie.

Ongemagtigde boeke en geskrifte is streng verbode.

40. Kandidate mag geen boeke, aantekeninge, memoranda of geskrifte, uitgesonderd dié wat vir gebruik by die eksamen verskaf is, by hulle hê nie. Ingeval 'n kandidaat boeke, aantekeninge, memoranda of geskrifte in sy besit het, moet hy dit voor die aanvang van die eksamen aan die eksaminator oorhandig.

Skade aan boeke, instrumente, ens.

41. As 'n kandidaat 'n boek, dokument of instrument wat deur die eksaminator aan hom verskaf is, skend of andersins beskadig, moet hy die beskadigde boek, dokument of instrument vervang of andersins die skade herstel.

Uitgaan uit kamer.

42. 'n Kandidaat mag nie sonder toestemming van die eksaminator sy sitplek of die kamer verlaat nie. As hy die kamer verlaat, mag hy nie sonder toestemming van die eksaminator met die vraestel of opgaaf waarmee hy besig was, aangaan nie.

Werk moet vertoon word.

43. (1) 'n Kandidaat mag slegs op een kant van die antwoordboek werk of skryf en moet sy antwoorde duidelik en leesbaar skryf, en hy moet sy naam onderaan elke bladsy teken.

(2) 'n Kandidaat mag nie sy opgawes op skeurpapier uitwerk nie, of op vloeiopapier wat vir sy gebruik by die eksamen verskaf is, skryf nie.

(3) Alle werk, uitgesonderd skets- en tekenwerk, moet met ink gedoen word.

(4) 'n Oortreding van die bepalings van hierdie regulasie kan die verlies van punte tot gevolg hê.

Straf vir afskryf.

44. As 'n kandidaat 'n ongemagtigde boek of geskrif raadpleeg, of van 'n ander kandidaat afskryf of aan iemand anders hulp verleen of inligting verstrek, of tydens die eksamen enigerwyse met iemand in verbinding tree, of enige deel van die opgawes afskryf met die doel om dit uit die eksamenkamer te verwyder, word daar beskou dat

No Strangers Admitted.

35. No persons other than those whose duties require them to be present shall be allowed in the room during examination. No instructors shall be allowed on the premises while examinations are in progress.

Silence.

36. Silence shall be kept in the examination room while a written examination is in progress.

Loose Papers and Books.

37. Before the examination begins, the tables or desks shall be cleared of all scraps of paper and books other than those permitted in the examination room in terms of these regulations.

Use of Mathematical Tables.

38. A candidate shall not use any mathematical tables other than those provided by the examiner.

Use of Instruments.

39. (1) Drawing boards and T. squares necessary for use in the examinations will be supplied by the examiner, but candidates shall provide their own drawing instruments.

(2) Candidates who use slide rules for their calculations shall show in ink on the answer papers the full working statement necessary for arriving at the results. If the statement is not so shown no marks will be given in respect of the results concerned.

Unauthorised Books and Papers Strictly Forbidden.

40. Candidates shall not have with them any books, notes, memoranda or papers other than those supplied for use at the examination. If any candidate has brought any books, notes, memoranda or papers with him, he shall hand them to the examiner before commencing the examination.

Damage to Books, Instruments, etc.

41. If a candidate defaces or otherwise damages any book, document or instrument supplied to him by the examiner, he shall replace the damaged book, document or instrument or otherwise make good the damage.

Leaving Room.

42. A candidate shall not, without the permission of the examiner, leave his seat or the examination room. If he leaves the room, he shall not without the consent of the examiner go on with any paper or problem on which he was engaged.

All Work to be Shown.

43. (1) A candidate shall work or write only on one side of the paper and shall write in a clear and legible hand and he shall sign his name at the foot of each page.

(2) A candidate shall not blot out his problems on waste paper, nor write on the blotting paper supplied for his use in the examination.

(3) All work other than sketching and drawing shall be done in ink.

(4) A contravention of the provisions of this regulation may involve loss of marks.

Penalty for Copying, etc.

44. Any candidate who refers to any unauthorised book or paper, or copies from another or affords any assistance or gives any information to another, or communicates in any way with another during the time of examination, or copies any part of the problems for the purpose of taking

hy in die eksamen gedruip het, en hy mag vir 'n tydperk van ses maande nie weer tot die aflê van 'n eksamen toegelaat word nie. 'n Kandidaat wat hom aan 'n tweede oortreding skuldig maak, mag nie voor na verloop van twaalf maande na sodanige tweede oortreding eksamen aflê nie. Die eksaminator moet van elke oortreding aan die Direkteur verslag doen.

Kandidate kan eie metode volg.

45. Kandidate mag die verskillende opgawes volgens hul eie gebruiklike metode uitwerk, mits sodanige metode in beginsel korrek is. Duidelike uiteensettings, beredenering en berekening in die oplossing van opgawes sal paslike erkenning ontvang.

Straf vir oortreding van regulasies.

46. Ingeval 'n kandidaat enigeen van hierdie regulasies oortree, uitgesonderd 'n regulasie vir die oortreding waarvan 'n ander straf by hierdie regulasie bepaal word, of brutaal teenoor 'n eksaminator is, of homself wanordelik of onbehoorlik in of by 'n eksamenkamer gedra, kan die eksaminator hom afwys asof hy in die eksamen gedruip het, en as hy so afgewys word, mag hy vir 'n tydperk van drie maande nie toegelaat word om opnuut eksamen te doen nie.

HOOFSTUK VI.

UITREIKING VAN SERTIFIKATE.

Magtiging vir lewering van bekwaamheidsertifikate.

47. 'n Kandidaat wat in die eksamen slaag, ontvang van die eksaminator 'n vorm M. 6 soos in Aanhangsel A uiteengesit, behoorlik voltooi, waarby die persoon aan wie dit geadresseer is, gemagtig word om die sertifikaat aan die kandidaat te lewer. 'n Kandidaat wat gedeeltelik in die eksamen geslaag of gedruip het, ontvang van die eksaminator 'n vorm M. 11, soos in Aanhangsel A uiteengesit, behoorlik voltooi, wat die kandidaat moet behou en, wanneer hy weer eksamen kom aflê, aan die eksaminator moet vertoon.

Uitreiking van bekwaamheidsertifikate as ingenieur-offisier.

48. As 'n kandidaat vir 'n bekwaamheidsertifikate soos by hierdie regulasies voorgeskrif, die vereiste ondervinding opgedoen en die werkswinkel- en seediens verrig het en in die voorgeskrewe eksamen geslaag het, word die sertifikaat, behoudens die bepalings van hierdie regulasies, aan hom uitgereik: Met dien verstande dat, ingeval die kandidaat, ingevolge hierdie regulasies, in besit moet wees van 'n bekwaamheid- of dienssertifikate ten einde vir die aflê van die eksamen te kwalifiseer, hy laasgenoemde sertifikaat aan die eksaminator moet afgee.

(LET WEL.—Die aandag word gevestig op die voetnoot van regulasie 12.)

Endossering van sertifikaat as tweede of hoof-ingenieur-offisier.

49. (1) As 'n kandidaat wat die houer is van 'n sertifikaat wat hom die reg gee om as tweede ingenieur-offisier of as hoof-ingenieur-offisier met stoomaandryfmasjinerie op te tree, verlang dat sy sertifikaat geëndosseer moet word om hom die reg te gee om in dieselfde of laer hoedanigheid met binnebrandaandryfmasjinerie op te tree, moet hy met binnebrandaandryfmasjinerie onderstaande seediens verrig:—

- (a) Ingeval 'n endossement verlang word wat hom die reg gee om as tweede ingenieur-offisier op te tree, minstens ses maande seediens soos by paragraaf (1) (a) (iii) (2) van regulasie 20 voorgeskrif;
- (b) ingeval 'n endossement verlang word wat hom die reg gee om as hoof-ingenieur-offisier op te tree, minstens ses maande seediens soos by paragraaf (2) (a) (iii) (2) van regulasie 20 voorgeskrif,

en in die relatiewe eksamen waarvan in regulasie 30 melding gemaak word, slaag.

them out of the examination rooms, shall be regarded as having failed the examination, and shall not be accepted for re-examination for a period of six months. A candidate guilty of a second offence shall not be allowed to be examined until twelve months have elapsed after such second offence. Each offence shall be reported to the Director by the examiner.

Candidates may Use Own Method.

45. Candidates may work out the various problems according to any method they have been accustomed to use, provided such method is correct in principle. Suitable recognition will be given for clear statements, reasoning and calculation in solving the problems.

Penalty for Breach of Regulations.

46. If a candidate contravenes any of these regulations other than a regulation for the contravention of which another penalty is by these regulations prescribed, or is insolent to an examiner, or conducts himself in a disorderly or improper manner in or about the examination room, the examiner may treat him as having failed the examination, and if he is so treated he shall not be accepted for re-examination for a period of three months.

CHAPTER VI.

ISSUE OF CERTIFICATES.

Authority for Delivery of Certificates of Competency.

47. A candidate who passes the examination shall receive from the examiner a form M. 6 set forth in Annexure A, duly completed, authorising the person to whom it is addressed to issue the certificate. A candidate who is partially successful or unsuccessful in the examination, shall receive from the examiner a form M. 11 set forth in Annexure A, duly completed, which must be retained and produced to the examiner when he next presents himself for examination.

Issue of Certificate of Competency as Engineer-Officer.

48. If a candidate for a certificate of competency provided for by these regulations has gained the experience and performed the workshop and sea service required thereby and has passed the prescribed examination, the certificate shall, subject to the provisions of these regulations, be issued to him: Provided that if in terms of these regulations, it is necessary for the candidate to hold any certificate of competency or service in order that he may be qualified to sit for the examination, he surrenders the last-mentioned certificate to the examiner.

(NOTE.—Attention is invited to the note appended to regulation 12.)

Endorsement of Certificate as Second or Chief Engineer-Officer.

49. (1) If a candidate who is the holder of a certificate entitling him to act as Second Engineer-Officer or as Chief Engineer-Officer on steam-driven propelling machinery requires his certificate to be endorsed to entitle him to act in the same or a lower capacity on motor propelling machinery, he shall perform the following sea service on motor propelling machinery:—

- (a) If such an endorsement as will entitle him to act as Second Engineer-Officer is required, at least six months' sea service as prescribed by paragraph (1) (a) (iii) (2) of regulation 20;
- (b) if such an endorsement as will entitle him to act as Chief Engineer-Officer is required, at least six months' sea service as prescribed by paragraph (2) (a) (iii) (2) of regulation 20,

and shall pass the relative examination referred to in regulation 30.

(2) As 'n kandidaat wat die houer is van 'n sertifikaat wat hom die reg gee om as tweede ingenieuroffisier of as hoof-ingenieuroffisier met binnebrandaandryfmasjinerie op te tree, verlang dat sy sertifikaat geëndosseer moet word om hom die reg te gee om in dieselfde of laer hoedanigheid met stoomaandryfmasjinerie op te tree, moet hy met stoomaandryfmasjinerie onderstaande seediens verrig:—

(a) Ingeval 'n endossement verlang word wat hom die reg gee om as tweede ingenieuroffisier op te tree, minstens nege maande seediens soos by paragraaf (1) (a) (iii) (1) van regulasie 20 voorgeskryf;

(b) ingeval 'n endossement verlang word wat hom die reg gee om as hoof-ingenieuroffisier op te tree, minstens nege maande seediens soos by paragraaf (2) (a) (iii) (1) van regulasie 20 voorgeskryf,

en in die relatiewe eksamen waarvan in regulasie 30 melding gemaak word, slaag.

(3) Die sertifikaat van 'n kandidaat word geëndosseer as hy bewys lewer dat hy die seediens verrig het soos voorgeskryf by paragraaf (1) of (2), na gelang van die geval, en in die eksamen waarna hierbo verwys word, geslaag het.

(4) Nieteenstaande die feit dat die houer van 'n sertifikaat wat hom die reg gee om as tweede ingenieuroffisier met stoomaandryf- en binnebrandaandryfmasjinerie op te tree, ingevolge regulasie 20 reg verkry het op die uitreiking aan hom van 'n bekwaamheidsertifikaat (stoom of motor) as hoof-ingenieuroffisier, word laasgenoemde sertifikaat nie aan hom uitgereik nie tensy hy die sertifikaat wat deur hom gehou word, afgee, en na sodanige afgifte word die sertifikaat as hoof-ingenieuroffisier, behoudens die bepalinge van hierdie regulasies, aan hom uitgereik en geëndosseer met die strekking dat hy ook die reg het om as tweede ingenieuroffisier met binnebrandaandryf- of stoomaandryfmasjinerie, na gelang van die geval, op te tree.

(LET WEL.—Die aandag word gevestig op die voetnoot van regulasie 12.)

HOOFSTUK VII.

DIENSSERTIFIKATE.

Hoe aansoek gedoen moet word.

50. 'n Applikant vir 'n dienssertifikaat ingevolge artikel tagtig van die Wet, moet die aansoekvorm M. 5, soos in Aanhangsel A uiteengesit, voltooi, met vermelding van die nodige besonderhede, en dit aan die bevoegde beamppte oorhandig of aan hom pos. Die bevoegde beamppte stuur dan die aansoek aan die Direkteur.

(2) If a candidate who is the holder of a certificate entitling him to act as Second Engineer-Officer or as Chief Engineer-Officer on motor propelling machinery requires his certificate to be endorsed to entitle him to act in the same or a lower capacity on steam-driven propelling machinery, he shall perform the following sea service on steam-driven propelling machinery:—

(a) If such an endorsement as will entitle him to act as Second Engineer-Officer is required, at least nine months' sea service as prescribed by paragraph (1) (a) (iii) (1) of regulation 20;

(b) if such an endorsement as will entitle him to act as Chief Engineer-Officer is required, at least nine months' sea service as prescribed by paragraph (2) (a) (iii) (1) of regulation 20,

and shall pass the relative examination referred to in regulation 30.

(3) If a candidate for an endorsement produces proof that he has performed the sea service prescribed by paragraph (1) or (2), as the case may be, and has passed the examination referred to therein, his certificate shall be endorsed.

(4) Notwithstanding the fact that the holder of a certificate entitling him to act as Second Engineer-Officer on steam-driven and on motor propelling machinery has, in terms of regulation 20, become entitled to the issue of a certificate of competency (steam or motor) as Chief Engineer-Officer, the last-mentioned certificate shall not be issued to him unless he surrenders the certificate held by him, and upon such surrender the certificate as Chief Engineer-Officer shall, subject to the provisions of these regulations, be issued to him and be endorsed to the effect that he is also entitled to act as Second Engineer-Officer on motor or steam-driven propelling machinery, as the case may be.

(NOTE.—Attention is invited to the Note appended to regulation 12.)

CHAPTER VII.

CERTIFICATE OF SERVICE.

How Application should be Made.

50. An applicant for a certificate of service in terms of section eighty of the Act shall complete the form of application M. 5 set forth in Annexure A giving the necessary particulars, and shall hand or post it to the proper officer. The proper officer shall forward the application to the Director.

AANHANGSEL A.

LYS VAN VORMS WAT IN HIERDIE REGULASIES VOORKOM.

Regulasie 6.....	Aansoek om ondersoek te word vir 'n bekwaamheidsertifikaat as hoof- of tweede ingenieuroffisier, of vir 'n endossement van so 'n sertifikaat.....	M. 2.
Regulasie 13.....	Aansoek om 'n gesertifiseerde afskrif van 'n bekwaamheidsertifikaat, bevoegdheidsertifikaat of dienssertifikaat.....	M. 3.
Regulasie 47.....	(a) Magtiging vir lewering van 'n bekwaamheidsertifikaat of bevoegdheidsertifikaat.....	M. 6.
	(b) Uitsae van eksamens.....	M. 11.
Regulasie 50.....	Aansoek om 'n dienssertifikaat.....	M. 5.

ANNEXURE A.

LIST OF FORMS APPEARING IN THESE REGULATIONS.

Regulation 6.....	Application to be examined for a certificate of competency as Chief or Second Engineer-Officer, or an endorsement of such a certificate.....	M. 2.
Regulation 13.....	Application for certified copy of a certificate of competency or qualification or a certificate of service.....	M. 3.
Regulation 47.....	(a) Authority for delivery of a certificate of competency or qualification.....	M. 6.
	(b) Results of examination.....	M. 11.
Regulation 50.....	Application for a certificate of service.....	M. 5.

Volgnommer _____

UNIE VAN SUID-AFRIKA.

DEPARTEMENT VAN DOEANE EN AKSYNS.

MARINE-AFDELING.

AANSOEK OM ONDERSOEK TE WORD VIR 'N BEKWAAMHEIDSERTIFIKAAT AS _____
 *(Meld hier graad van sertifikaat, ens. verlang.)

* Hierdie vorm word gebruik indien die sertifikaat wat verlang word een van die volgende is of waar die sertifikaat geëndosseer moet word:—

Hoof-ingenieur-offisier.
 Tweede-ingenieur-offisier.
 See-masjinis.
 Assistent-see-masjinis.

A.—Naam van applikant, ens.

Hawe _____

Voorname voluit (drukletters).	Familienaam (drukletters).	Permanente adres, meld stad, straat, huisno. en naam van persoon by wie woonagtig (indien enige).

Datum van geboorte.			Geboorteplek.	Nasionaliteit. (Indien 'n burger as gevolg van registrasie of naturalisasie, moet dit hier gemeld en die nommer van die sertifikaat verstrek word.)
Dag.	Maand.	Jaar.	Stad en land.	

B.—Besonderhede van alle vorige sertifikate, of in die Unie van Suid-Afrika of elders uitgereik. Indien geen, meld aldus dwarsoor hierdie afdeling.

No.	Stoom, motor, gekombineerde stoom en motor, endossement, assistent-see-masjinis (indien ander, spesifiseer).	Klas.	Plek en datum van:—		Indien te eniger tyd opgeskort of ingetrek, vermeld deur watter hof of gesag.	Datum.	Rede.
			Eksamen.	Uitreiking.			

C.—Sertifikaat tans verlang.

Stoom, motor, gekombineerde stoom en motor, endossement, Deel A of Deel B, see-masjinis of assistent-see-masjinis.	Klas.	Hawe waar applikant eksamen wil aflê en datum.	Kantoor waarna die sertifikaat gestuur moet word. (Nie vir Deel A alleenlik nie.)

Rotation No. _____

UNION OF SOUTH AFRICA.

DEPARTMENT OF CUSTOMS AND EXCISE.

MARINE SECTION.

APPLICATION TO BE EXAMINED FOR A CERTIFICATE OF COMPETENCY AS _____

*(State here grade of certificate, etc., required.)

* This form is for use when the certificate required is one of the following or where a certificate requires an endorsement:—

Chief Engineer Officer.
 Second Engineer Officer.
 Marine Engineman.
 Assistant Marine Engineman.

A.—Name of applicant, etc.

Port of _____

Christian Names in Full (Block Letters).	Surname (Block Letters).	Permanent Address, stating Town, Street, House Number and Name of Person (if any) with whom Residing.

Date of Birth.			Place of Birth.	Nationality.
Day.	Month.	Year.	Town and Country.	(If a Citizen by Registration or Naturalization, this should be stated here and the number of the certificate given.)

B.—Particulars of all previous certificates whether issued in the Union of South Africa or elsewhere. If none, state so across this division.

No.	Steam, Motor, Combined Steam and Motor, Endorsement, Assistant Marine Engineman (if Other specify).	Class.	Place and Date of:—		If at any time Suspended or Cancelled, State by what Court or Authority.	Date.	Cause.
			Examination.	Issue.			

C.—Certificate now required.

Steam, Motor, Combined Steam and Motor, Endorsement, Part A only, Part B only, Marine Engineman or Assistant Marine Engineman.	Class.	Port at which Applicant desires to be Examined, and Date.	Office to which Certificate is to be Sent. (Not for Part A only.)

Where any exemption from Part A is claimed, state nature of the exempting qualification.

[illegible]

(N.B.—Candidates for certificates as Marine Engineer or Assistant Marine Engineer need not complete items 1 and 2 of this Division.)

No. of Testimonials.	Name and Address of Firm and Works.	Nature of the Business for which the Works Exist.	Nature of Work Done by Applicant (see "Workshop Service" in Regulations).	Dates.		Period.		
				From.	To.	Years.	Months.	Days.
				Net qualifying service				

[illegible][illegible]

Seediens.
Besonderhede van seediens moet waar moontlik uit die Verslagboek en Ontslagsertifikate van Seeman of Ontslagboek van
Vissermanne genceem word.

* Meld of diens voltooi is—

- (i) op monteurswerk of bedags of op wag op dek of in masjienkamer of ketelruim;
- (ii) op gereelde wag by hulpmasjiene of koelvat;
- (iii) op gereelde wag by hoofmasjiene;
- (iv) op gereelde wag by hoofketels;
- (v) op gereelde wag by hoofmasjiene en ketels tegelyk.

Die gebruik van die paslike Romeinse syfers sal voldoende wees.

Verwysing na korrespondensie (indien enige).

F.—Sertifikaat van bevoegde beamppte.

Die Verklaring G was voor my geteken en die bedrag van (Kwitansie No.)

ontvang die _____ dag van _____ 19 _____

Datumstempel.

Handtekening en amptitel van bevoegde beambte.

G.—Verklaring deur kandidaat gedoen.

(Moet voor die bevoegde beampte of eksaminator geteken word.)

L.W.—Die aandaag van die kandidaat word gevestig op die feit dat enige wanvoorstelling kragtens artikel 315 van Wet No. 57 van 1951 strafbaar is.

Ek verklaar hierby dat die besonderhede bevat in Afdelings A, B, C, D en E van hierdie vorm na my beste wete en oortuiging juist en waar is; en dat die dokumente genoem in Afdeling E en wat hierdie vorm vergesel eg en waar is en uitgereik en geteken is deur die persone wie se name daarop voorkom. Verder verklaar ek dat die diensstaat wat in Afdeling E uiteengesit is, 'n volkome, juiste en korrekte verslag van al my diens bevat.

En ik doen hierdie verklaring plegtig in die oortuiging dat dit waar is.

Gedateer te _____ die _____ dag van _____ 19____

Teenswoordige adres _____

Handtekening van kandidaat.

Handtekening van getuie.

H.—Sertifikaat van Eksaminator.

(L.W.—In gevalle waar die eksamen ten opsigte van 'n bekwaamheidsertifikaat as see-masjiniis of assistent-see-masjiniis was, hoef kolomme „Deel A” en „Deel B” nie voltooi te word nie. Die eksaminator moet aantoon of die kandidaat „Geslaag” of „Gedruip” het en dan die oorblywende kolomme in hierdie afdeling voltooi.)

30

J.—Persoonlike beskrywing van kandidaat.

Lengte.		Kleur van		Ras. Meld indien Blanke, Kleurling, Naturel, Indiër of ander.	Persoonlike merke of eienaardighede (indien enige).
Voet.	Duim.	Oë.	Hare.		

Hierby sertifiseer ek dat die besonderhede in Afdelings H en J juis is en dat werkswinkel- en seediens deur verwysing na ontslag-sertifikate en getuigskrifte bevestig is.

Datum _____

Eksaminator. _____

M. 3.

UNIE VAN SUID-AFRIKA.

DEPARTEMENT VAN DOEANE EN AKSYNS.

MARINE-AFDELING.

AANSOEK OM 'N GESERTIFISEERDE AFSKRIF VAN 'N BEKWAAMHEID- OF BEVOEGDHEIDSERTIFIKAAT OF DIENSSERTIFIKAAT.

No. van verlore sertifikaat.

Graad van verlore sertifikaat.

Hawe van _____

AFDELING A.—NAAM, ENS., VAN APPLIKANT.

Naam. (1)	Adres. (2)

Datum van geboorte. (3)	Geboorteplek. (4)

AFDELING B.—BESONDERHEDE VAN LAASTE DIENS.

Naam van laaste skip. (5)	Registrasiehawe en amptelike No. van laaste skip. (6)	Rang of gradering aan boord laaste skip. (7)	Beskrywing van laaste seereis.			
			Van. (8)	Na. (9)	Begin. (10)	Beëindig. (11)

J.—Personal description of candidate.

Height.		Colour of		Race. State whether European, Coloured, Native, Indian or Other.	Personal Marks or Peculiarities (if any).
Feet.	Inches.	Eyes.	Hair.		

I hereby certify that the particulars in Divisions H and J are correct and that Workshop and Sea Service have been verified by reference to discharges and testimonials.

Date _____

Examiner. _____

M. 3.

UNION OF SOUTH AFRICA.

DEPARTMENT OF CUSTOMS AND EXCISE.

MARINE SECTION.

APPLICATION FOR CERTIFIED COPY OF A CERTIFICATE OF COMPETENCY OR QUALIFICATION OR A CERTIFICATE OF SERVICE.

No. of lost certificate.

Grade of lost certificate.

Port of _____

DIVISION A.—NAME, ETC., OF APPLICANT.

Name. (1)	Address. (2)

Date of Birth. (3)	Place of Birth. (4)

DIVISION B.—PARTICULARS OF LAST SERVICE.

Name of Last Ship. (5)	Port of Registry and Official No. of Last Ship. (6)	Rank or Rating on Board Last Ship. (7)	Description of Last Voyage.			
			From. (8)	To. (9)	Commenced. (10)	Ended. (11)

BESONDERHEDE AANGAANDE VAARTUIE WAAROP APPLIKANT DIENS GEDOEN HET VOOR EN NA DIE UITREIKING AAN HOM VAN DIE SERTIFIKAAT WAT VERLORE IS.

Naam van skip.	Registrasiehawe en amptelike No.	Rang of gradering aan boord skip.	Indien in vreemde of kushandel, of in die vissersbedryf.	Diens.	
				Begin.	Beëindig.
(12)	(13)	(14)	(15)	(16)	(17)

AFDELING C.—BESTEMMING VAN SERTIFIKAAT.
(Moet deur die applikant voltooi word.)

Ek versoek dat die gesertifiseerde afskrif van my sertifikaat aan my afgelewer word by_____

Handtekening van applikant.

AFDELING D.—VERKLARING WAT GEMAAK MOET WORD DEUR DIE APPLIKANT VOOR DIE BEVOEGDE BEAMPTTE.

Ek, _____ van _____

VERKLAAR HIERMEE—

- (1) dat my sertifikaat 'n sertifikaat was van* _____
as _____
en dat dit genommer was _____

- (2) dat genoemde sertifikaat onder die volgende omstandighede verlore of vernietig is:—†

- (3) dat die verklarings wat hierin en in Afdelings A en B op die keersy hiervan gemaak is na my beste wete en oortuiging korrek en waar is.

Handtekening van applikant.

VERKLAAR VOOR MY TE _____

en die hernuwingsgelde van _____ Bewys No. _____
ontvang die _____ dag van _____ 19 _____

Handtekening en ampstitel van bevoegde beampte.

* Voeg in die woord Bekwaamheid, Bevoegdheid, of Diens en Graad.

† Meld hier die plek, datum en oorsaak van die verlies van die sertifikaat.

Die Direkteur van Handelskeepvaart,
Pretoria.

M 6 _____

No. _____

Naam van applikant _____

Volgnommer _____

Graad waarin geslaag _____

Magting aan bogemelde kandidaat verleen om sy * Bekwaamheidsertifikaat / Bevoegdheidsertifikaat van die Bevoegde

Beampte by die Hawe _____

te ontvang.

Datum _____

Eksaminator _____

* Skrap die woord wat nie van toepassing is nie.

UNIE VAN SUID-AFRIKA.

DEPARTEMENT VAN DOEANE EN AKSYNS.

MARINE-AFDELING.

MAGTING VIR AFLEWERING VAN 'N BEKWAAMHEIDSERTIFIKAAT OF BEVOEGDHEIDSERTIFIKAAT.

(L.W.—Hierdie magting is onderworpe aan die goedkeuring van die Direkteur van Handelskeepvaart, Pretoria.)

Naam van applikant _____ Graad waarin geslaag _____

Lengte _____ Voet _____ Duim. Kleur van oë _____ Hare _____

Ras (Blanke, Kleurling, Naturel, Indiër: ander, spesifiseer) _____

Handtekening van applikant.

Geliewe aan bogemelde persoon af te lewer die *Bekwaamheidsertifikaat/Bevoegdheidsertifikaat nadat hy die besonderhede wat daarin vereis word voltooi het en getuigskrifte of ander dokumente wat namens hom aan u deur die Direkteur van Handelskeepvaart, Pretoria, deurgestuur is.

Hawe _____ Datum _____ 19 _____

Aan _____ Handtekening van eksaminator.

* Skrap die woord wat nie van toepassing is nie.

PARTICULARS OF VESSELS IN WHICH APPLICANT HAS SERVED BEFORE AND AFTER THE ISSUE TO HIM OF THE CERTIFICATE NOW LOST.

Name of Ship. (12)	Port of Registry and Official No. (13)	Rank or Rating on Board Ship. (14)	Whether in Foreign or Coasting Trade, or in Fishing. (15)	Service.	
				Commenced. (16)	Ended. (17)

DIVISION C.—DESTINATION OF CERTIFICATE.
(To be completed by applicant.)

I request that the certified copy of my certificate may be delivered to me at _____

Signature of Applicant.

DIVISION D.—DECLARATION TO BE MADE BY APPLICANT BEFORE THE PROPER OFFICER.

I, _____ of _____

DO HEREBY DECLARE—

(1) that my certificate was a certificate of* _____
as _____
and that it was numbered _____(2) that the said certificate was lost or destroyed under the following circumstances:†

(3) that the statements made herein and in Divisions A and B on the reverse side hereof are correct and true to the best of my knowledge and belief.

Signature of Applicant.

DECLARED BEFORE ME AT _____

and the renewal fee of _____ Receipt No. _____
received this _____ day of _____ 19 __________
Signature and Designation of Proper Officer.

* Insert the word Competency, Qualification or Service and Grade.

† Here state the place, date and cause of the loss of the certificate.

The Director of Merchant Shipping,
Pretoria.

M 6 _____

No. _____

Name of applicant _____

Rotation number _____

Grade for which passed _____

Authority given to the above
Candidate to obtain his * Certificate
of Competency/Qualifica-
tion from the Proper Officer at

the Port of _____

Date _____

Examiner _____

* Delete the word which does
not apply.

UNION OF SOUTH AFRICA.

DEPARTMENT OF CUSTOMS AND EXCISE.

MARINE SECTION.

AUTHORITY FOR DELIVERY OF A CERTIFICATE OF COMPETENCY OR
QUALIFICATION.(N.B.—This authority is subject to the approval of the Director of Merchant Shipping,
Pretoria.)

Name of Applicant _____ Grade for which passed _____

Height _____ Feet _____ Inches. Colour of Eyes _____ Hair _____

Race (European, Coloured, Native, Indian: other, specify) _____

Signature of Applicant.Please deliver to the above-named person the Certificate of * Competency/Qualification when he
has completed the particulars required therein and testimonials or other documents forwarded to you
on his behalf by the Director of Merchant Shipping, Pretoria.

Port _____ Date _____ 19 _____

To _____
Signature of Examiner.

* Delete the word which does not apply.

M. 11.

UNIE VAN SUID-AFRIKA.
DEPARTEMENT VAN DOEANE EN AKSYNS.
MARINE-AFDELING.
EKSAMINERING VAN INGENIEUROFFISIERS.

UITSLAE VAN EKSAMENS.

*(Voeg in „Vrygestel”, „Geslaag”, „Gedruip”, of „Nie bereken nie”).

Volgnommer _____

Naam van kandidaat _____
Verwysing na korrespondensie (indien enige) _____

Datum.	Hawe.	Klas.	Kwalifiserende* seediens wanneer eksamen afgeleë word.			Slegs Deel A, Stoom, Motor, Gekombineerde S. en M., Endossement (S. of M.).	Deel A.			Deel B.		Tydperk wat moet verstryk voor her- eksami- nering.	Eksaminator se voorletters.
			J.	M.	D.		Algemene* ingenieurs- wetenskap.	Hitte- en* stoom- motore.	Tekening.*	Elektro-* tegniek en skeeps- boukunde.	Ingenieurs- wese en mondelings.		

Datumstempel.

Handtekening van kandidaat _____

Handtekening van eksaminator _____

L.W.—Hierdie vorm moet deur die kandidaat tesame met sy dokumente by die daaropvolgende eksamen vertoon word.

* Kwalifiserende seediens wat tot 'n applikant se voordeel vir Deel B van die eksamen staan (nadat daarvan gebruik gemaak is om 'n tekort in werkswinkeldiens aan te vul).

M 11 _____
Hawe _____
Aanvangsdatum van eksamen en klas _____
Naam van kandidaat _____
Kwal. seediens _____
Verwysing na korrespondensie (indien enige) _____

Eksamen..... { Slegs Deel A,
(Skrap dié wat nie van Stoom,
toepassing is nie.) Motor,
Gekombineerde S. en M.
Endossement S. of M.

Deel A	Alg. ing. weten.*	
	Hitte- en stoom-motore *	
	Tekening *	
Deel B	Elek. en skeepsbou *	
	Ing.-wese en mond.*	

Tydperk wat moet verstryk voor hereksaminering _____

Eksaminator se voorletters _____

M. 11 _____

Port _____

Commencing date of examination and class _____

Name of candidate _____

Q.S. Service _____

Reference to correspondence (if any) _____

Examination..... { Part A only,
(Delete those not applicable.) Steam,
Motor,
Combined S. and M.
Endorsement S. or M.

Part A	G.E.S.*	
	H. and H.E.*	
	Drawing *	
Part B	E. and N.A.*	
	E.K. and Orals *	

Interval to elapse before re-examination _____

Initials of examiner _____

UNION OF SOUTH AFRICA.

DEPARTMENT OF CUSTOMS AND EXCISE.

MARINE SECTION.

EXAMINATION OF ENGINEER OFFICERS.

RESULTS OF EXAMINATION.

*(Insert "Exempt", "Passed", "Failed", or "Not Assessed").

Name of Candidate _____ Rotation No. _____

Reference to correspondence (if any) _____

Date.	Port.	Class.	Qualifying* Sea Service at Time of Examination.			Part A only, Steam, Motor, combined S. and M., Endorsement (S. or M.).	Part A.			Part B.		Interval to Elapse before Re-examination.	Examiner's Initials.
			Y.	M.	D.		General* Engineering. Science.	Heat* and Heat Engines.	Drawing.*	Electrotech-* nology and Architecture.	Engineering* Knowledge and Orals.		

Office Stamp.

Signature of Candidate _____

Signature of Examiner _____

N.B.—This form must be produced by the candidate with his papers on subsequent examination.

* Qualifying sea service standing to applicant's credit for Part B of the examination (after any appropriation to compensate for a deficiency in qualifying workshop service).

UNIE VAN SUID-AFRIKA.

DEPARTEMENT VAN DOEANE EN AKSYNS.

MARINE-AFDELING.

AANSOEK OM 'N DIENSSERTIFIKAAT KRAGTENS DIE BEPALINGS VAN ARTIKEL TAGTIG VAN DIE HANDELSKEEP-
VAARTWET, 1951 (WET No. 57 VAN 1951).

Lees onderstaande opmerkings sorgvuldig:—

- (1) Artikel tagtig van die Handelskeepvaartwet 1951, is op bladsy 4 van hierdie vorm gedruk. Die artikel verskaf volledige inligting aangaande watter dienssertifikate toegeken kan word en aangaande die persone wat daarvoor aansoek kan doen.
- (2) (a) Persone wat in artikel tagtig (1) (a) genoem word kan te eniger tyd aansoek om 'n dienssertifikaat kragtens hierdie Wet doen. Hulle word egter aangeraai om so gou doenlik aansoek te doen omdat hulle nie in sekere skepe in diens geneem kan word nie tensy hulle in besit is van 'n geldige dienssertifikaat wat kragtens Wet No. 57 van 1951 toegeken is. Hulle moet ook enige sertifikate wat deur hulle gehou word afgee.
- (b) Persone wat in artikel tagtig (1) (b) genoem word kan dienssertifikate kragtens hierdie Wet toegeken word met dien verstande dat hulle voor 31 Desember 1959 aansoek doen en met dien verstande dat hulle die sertifikate wat deur hulle gehou word afgee.
- (c) Persone wat in artikel tagtig (1) (c) genoem word kan te eniger tyd binne drie (3) jaar d.i. tot 31 Desember 1961, aansoek om 'n dienssertifikaat kragtens die Wet doen. Omdat hierdie dienssertifikate slegs geldig is tot 31 Desember 1961, tensy die geldigheidsduur deur endosament verleng is, word dit aanbeveel dat die betrokke persone voor die vervaldatum vroegtydig aansoek doen ten einde dit moontlik te maak om die praktiese eksamen waarna in artikel tagtig (6) verwys word, af te neem. (Sien ook die spesiale OPMERKING AAN KANDIDATE wat in Afdeling D van hierdie vorm voorkom.)
- (3) Bewys van die vereiste seediens moet voorgelê en aan hierdie aansoek geheg word. Die bewys kan 'n ontslagsertifikaat, of 'n brief van 'n eienaar of ander verantwoordelike persoon wees.
- (4) Applikante vir dienssertifikate as gesagvoerder, navigasie-offisier, skipper, stuurman of bootsman moet kleur- en vorm-visietoetse, wat 'n oogtoets is, slaag. Hierdie is nie op persone waarna in paragrawe (a) en (b) van Opmerking (2) hierbo verwys word, van toepassing nie.
- (5) Applikante vir dienssertifikate word vereis om op hierdie vorm 'n beëdigde verklaring te doen. Indien 'n valse verklaring gedoen is sal die applikant skuldig aan 'n misdryf wees en onderhewig aan 'n boete van £500.

A.—BESONDERHEDE VAN APPLIKANT.

Familienaam (in drukletters).	Voorname (in drukletters).	Datum van geboorte.	Plek van geboorte.	Nasionaliteit.	Adres.

Ek verlang 'n dienssertifikaat as _____
 en indien toegeken, moet dit aan die bevoegde beampte te _____ gestuur word vir uitreiking aan my.

B.—BESONDERHEDE VAN SEEDIENS.

Besonderhede van vaartuig.						Besonderhede van applikant se seediens.						Opmerkings.
Naam van vaartuig.	Stoom, motor, ander.	Bruto tonnemaat.	Perdekrag van masjiene.	Registrasiehawe en amptelike No. of registrasie No. van vaartuig.	Handel waarin gedryf word (Meld of viskushandel, ander).	Hoedanigheid.	Vanaf.	Tot.	Diensttermyn.			
									Jare.	Maande.	Dae.	
Totale seediens.....												
Dienstyd waarvoor bewys nou voorgelê is.....												
Dienstyd waarvoor geen bewys voorgelê is nie.....												

C.—VERKLARING WAT DEUR APPLIKANT GEDOEN MOET WORD.

Ek, die ondergetekende _____ verklaar hierby:—

- (1) dat die besonderhede wat in Afdelings A en B van hierdie vorm bevat is, na my beste wete en oortuiging juis en waar is; en
- (2) dat ek *(nie) 'n bekwaamheid- of dienssertifikaat het *(nie) *(wat ek nou afgee).

Handtekening van applikant.
 (Indien die applikant nie kan skrywe nie, moet hy sy merk in die spasie hierbo, maak.)

Voor my verklaar te _____ op die _____ dag van _____ 19____

Handtekening en ampstittel van bevoegde beampte
 of Kommissaris van Ede.

* Skrap indien nie van toepassing nie.

UNION OF SOUTH AFRICA.

DEPARTMENT OF CUSTOMS AND EXCISE.

MARINE SECTION.

APPLICATION FOR A CERTIFICATE OF SERVICE UNDER THE PROVISIONS OF SECTION EIGHTY OF THE MERCHANT SHIPPING ACT, 1951 (ACT No. 57 OF 1951).

Read the following notes carefully:—

- (1) Section eighty of the Merchant Shipping Act, 1951, is printed on page 4 of this form. The section provides full information as to what certificates of service may be granted and as to the persons who may apply for them.
- (2) (a) Persons who are mentioned under section eighty (1) (a) may apply at any time for a certificate of service under this Act. However, they are advised to apply as soon as possible since they may not be employed in certain ships unless they are in possession of a valid certificate of service granted under Act No. 57 of 1951. They must also surrender any certificates held by them.
- (b) Persons who are mentioned under section eighty (1) (b) may be granted certificates of service under this Act provided they make application before 31st December, 1959, and provided they surrender the certificates held by them.
- (c) Persons who are mentioned under section eighty (1) (c) may apply at any time within three (3) years i.e. up to 31st December, 1961, for a certificate of service under the Act. Because these certificates of service will cease to be valid on 31st December, 1961, unless the period of validity is extended by endorsement, it is recommended that persons concerned should apply well in advance of the expiry date in order that it may be possible to hold the practical examination referred to in section eighty (6). (See also the special NOTE TO CANDIDATES appearing in Division D of this form.)
- (3) Evidence of the sea service required should be produced and attached to this application. The evidence may be a discharge certificate, or a letter from an owner or other responsible person.
- (4) Applicants for certificates of service as master, navigating officer, skipper, mate or boatswain must pass colour and from vision tests which is a test of eyesight. This does not apply to the persons referred to in paragraphs (a) and (b) of Note (2) above.
- (5) Applicants for certificates of service are required to make a sworn declaration on this application form. If a false statement is made the applicant will be guilty of an offence and liable to a fine of £500.

A.—PARTICULARS OF APPLICANT.

Surname (in Block Letters).	Christian Names (in Block Letters).	Date of Birth.	Place of Birth.	Nationality.	Address.

I desire a certificate of service as _____

and if granted, it should be forwarded to the proper officer at _____ for issue to me.

B.—PARTICULARS OF SEA SERVICE.

Particulars of Vessel.						Particulars of Applicant's Sea Service.						Remarks.
Name of Vessel.	Steam, Motor, Other.	Gross Tons.	Horse-power of Engines.	Port of Registry and Official No.: or Registration No. of Vessel.	Trade in which engaged (state whether Fishing, Coasting, other).	Capacity.	From.	To.	Length of Service.			
									Years.	Months.	Days.	
Total Sea Service.....												
Time served for which evidence is now produced.....												
Time served for which no evidence is produced.....												

C.—DECLARATION TO BE MADE BY APPLICANT.

I, the undersigned _____ hereby declare:—

- (1) that the particulars contained in Divisions A and B of this form are correct and true to the best of my knowledge and belief; and
- (2) that I have *(not) a certificate of competency or service *(which I now surrender).

Signature of Applicant.
(If applicant is unable to write, he should make his mark in the space above.)

Declared before me at _____ this _____ day of _____ 19 _____

Signature and Designation of Proper Officer or
Commissioner of Oaths.

* Delete if not applicable.

D.—SERTIFIKAAT VAN EKSAMINATOR.

Datum en plek van kleur- en vorm- visie-toets.		Uitslag.		Persoonlike beskrywing van kandidaat.					Persoonlike merke of eienaardighede (indien enige).
				Lengte.		Kleur van—		Ras (meld of Blanke, Kleurling, Naturel, Indiër of ander).	
Datum.	Plek.	Lettertoets.	Lanterntoets.	Voet.	Duim.	Oë.	Hare.		

Hierby sertifiseer ek dat die besonderhede bevat in Afdeling D na my beste wete en oortuiging juis is, en myninsiens mag 'n dienssertifikaat as _____ toegeken word.

Gedateer te _____ op die _____ dag van _____ 19____

Datumstempel.

Handtekening van eksaminator.

OPMERKING AAN KANDIDAAT.

'n Dienssertifikaat toegeken kragtens artikel tagtig (2) (c) van hierdie Wet bly van krag tot 31 Desember 1961. Om die geldigheidsduur te behou, moet die houer van sodanige sertifikaat voor bogenoemde datum aansoek doen om 'n endossement op sy sertifikaat aan te bring. Hierdie endossement word aangebring nadat die houer in 'n praktiese (mondelinge) eksamen geslaag het.

Aan Die Direkteur van Handelskeepvaart,
Pretoria.

E.—SLEGS VIR AMPTELIKE GEBRUIK.

Graad en nommer van sertifikaat uitgereik.	Datum en plek van uitreiking.	Vorige sertifikate afgegee.

TOEKENNING VAN DIENSSERTIFIKATE.

Artikel tagtig van die Handelskeepvaartwet, 1951, lees:—

(1) Enige persoon wat—

- onmiddellik voor die herroeping van die Koopvaardij (Certifikaten van Bekwaamheid) Wet, 1925 (Wet No. 45 van 1925), deur hierdie Wet, kragtens die voorbehoudsbepaling van subartikel (3) van artikel een van daardie Wet geregtig was om as gesagvoerder, stuurman of ingenieur op te tree; of
- die houer is van 'n ongekanselleerde dienssertifikaat verleen kragtens artikel vyftien van genoemde Koopvaardij (Certifikaten van Bekwaamheid) Wet, 1925; of
- te eniger tyd voor die inwerkingtreding van hierdie artikel ononderbroke vir minstens een jaar, of binne drie jaar voor gemelde inwerkingtreding vir twee of meer tydperke van altesame minstens een jaar—

- as bootsman of as assistent tot die masjinië of masjienewerker van 'n vissersboot van eenhonderd of meer bruto-registerton wat in die Unie geregistreer is, opgetree het; of
- as skepskaptein, skipper, stuurman, maat, bootsman, masjinië of masjienewerker of as assistent tot die masjinië of masjienewerker van 'n kusvaarder of 'n vissersboot of robbe- of walvisvaarder van minder as eenhonderd bruto-registerton wat in die Unie geregistreer is, opgetree het,

kan om 'n dienssertifikaat by die Direkteur aansoek doen.

(2) Die Direkteur kan aan die applikant—

- as die aansoek kragtens paragraaf (a) van subartikel (1) gedoen word, 'n paslike dienssertifikaat toestaan wat hom magtig om as gesagvoerder, navigasie-offisier of ingenieuroffisier, al na die geval, van 'n skip van hoogstens eenduizend bruto-registerton (in die geval van 'n gesagvoerder of navigasie-offisier) of van hoogstens eenduizend aangegewe perdekrag (in die geval van 'n ingenieuroffisier) op te tree; of
- as die aansoek kragtens paragraaf (b) van subartikel (1) gedoen word, 'n paslike dienssertifikaat toestaan wat hom magtig om as skipper, stuurman of see-masjinië, al na die geval, van 'n vissersboot op te tree; of
- as die aansoek—

- kragtens paragraaf (c) (i) van subartikel (1) gedoen word, 'n paslike dienssertifikaat toestaan wat hom magtig om as bootsman of as assistent-see-masjinië, al na die geval, van 'n vissersboot op te tree; of
- kragtens paragraaf (c) (ii) van subartikel (1) gedoen word, 'n paslike dienssertifikaat toestaan wat hom magtig om op te tree as skipper, maat, ingenieuroffisier of assistent-see-masjinië, al na die geval, van 'n kusvaarder of 'n vissersboot of robbe- of walvisvaarder, al na die geval, van minder as eenhonderd bruto-registerton, en die hoedanigheid waarin hy aldus gemagtig word om op te tree mag nie hoër wees nie as die laagste hoedanigheid waarin hy opgetree het gedurende die tydperk of tydperke ten aansien waarvan sy eis gegrond is.

(3) Voordat 'n dienssertifikaat toegeken word, word daar aan die Direkteur afgegee—

- as die aansoek gedoen word kragtens paragraaf (a) van subartikel (1) en uit hoofde van die besit van 'n sertifikaat bedoel in die in daardie paragraaf vermelde voorbehoudsbepaling, daardie sertifikaat; of
- as die aansoek gedoen word kragtens paragraaf (b) van subartikel (1), die sertifikaat op die besit waarvan die aansoek gegrond is.

(4) In geval van 'n aansoek kragtens paragraaf (c) van subartikel (1) kan die toekenning van 'n dienssertifikaat agterweë gehou word totdat die applikant in die voorgeskrewe gesigstoets vir kleur en vorm geslaag het.

(5) Subartikel (1) en (2) is van toepassing op dié in paragraaf (b) van subartikel (1) bedoelde dienssertifikate gedurende die tydperk van een jaar na die inwerkingtreding van hierdie artikel en niks langer nie.

(6) 'n Dienssertifikaat wat kragtens paragraaf (c) van subartikel (2) toegeken is, bly van krag vir die tydperk van drie jaar na die inwerkingtreding van hierdie artikel en niks langer nie: Met dien verstande dat indien die persoon aan wie die sertifikaat toegeken is, voor verstryking van daardie tydperk in 'n praktiese eksamen wat deur die Direkteur voorgeskryf is, en wat bedoel is om die bekwaamheid van die houer van die sertifikaat om in die hoedanigheid vermeld in die sertifikaat op te tree te toets, bevredigend slaag, die Direkteur 'n aantekening van die feit dat hy in sodanige eksamen aldus geslaag het op die sertifikaat laat maak, en, behoudens die bepalinge van artikels sewe-en-tagtig, agt-en-tagtig en nege-en-tagtig, bly die sertifikaat na verstryking van vermeldde tydperk van krag.

(7) 'n Dienssertifikaat wat kragtens hierdie artikel toegeken is, word vir die doeleindes van hierdie Wet en in die mate in sodanige dienssertifikaat aangedui, as 'n bekwaamheidsertifikaat beskou.

D.—CERTIFICATE OF EXAMINER.

Date and Place of Colour and Form Vision Tests.		Result.		Personal Description of Candidate.					Personal Marks or Peculiarities (if any).
				Height.		Colour of—		Race (state whether European, Coloured, Native, Indian or Other).	
Date.	Place.	Letter Test.	Lantern Test.	Feet.	Inches.	Eyes.	Hair.		

I hereby certify that the particulars contained in Division D are to the best of my knowledge and belief correct, and in my opinion a certificate of service as _____ should be issued.

Dated at _____ this _____ day of _____ 19____

Date Stamp.

Signature of Examiner.

NOTE TO CANDIDATE.

A certificate of service granted under section *eighty* (2) (c) of this Act remains in force until 31st December, 1961. To preserve its validity the holder of such a certificate should apply *before* the above date for an endorsement to be made on his certificate. This endorsement is made after the holder passes a practical (oral) examination.

To the Director of Merchant Shipping.
Pretoria.

E.—FOR OFFICIAL USE ONLY.

Grade and No. of Certificate Issued.	Date and Place of Issue.	Previous Certificates Surrendered.

GRANTING OF CERTIFICATES OF SERVICE.

Section *eighty* of the Merchant Shipping Act, 1951, reads:—

(1) Any person who—

- (a) immediately before the repeal by this Act of the Merchant Shipping (Certificates of Competency) Act, 1925 (Act No. 45 of 1925), was entitled in terms of the proviso to sub-section (3) of section *one* of that Act, to act as master, mate or engineer; or
- (b) is the holder of an uncanceled certificate of service granted under section *fifteen* of the said Merchant Shipping (Certificates of Competency) Act, 1925; or
- (c) at any time before the coming into operation of this section has for a continuous period of not less than one year, or within three years before the said coming into operation has for two or more periods amounting in the aggregate to not less than one year—
 - (i) acted as boatswain or as assistant to the engineer or driver of a fishing boat of one hundred or more gross register tons registered in the Union; or
 - (ii) acted as master, skipper, mate, second hand, engineer or driver or as assistant to the engineer or driver of a coasting ship or a fishing, sealing, or whaling boat of less than one hundred gross register tons registered in the Union,

may apply to the Director for a certificate of service.

(2) The Director may grant to the applicant—

- (a) if the application is made under paragraph (a) of sub-section (1), an appropriate certificate of service authorising him to act as master, navigating officer or engineer-officer, as the case may be, of a ship of not more than one thousand gross register tons (in the case of a master or navigating officer) or of not more than one thousand indicated horse-power (in the case of an engineer-officer); or
- (b) if the application is made under paragraph (b) of sub-section (1), an appropriate certificate of service authorising him to act as skipper, mate or marine engineman, as the case may be, of a fishing boat; or
- (c) if the application is made—
 - (i) under paragraph (c) (i) of sub-section (1), an appropriate certificate of service authorising him to act as boatswain or assistant marine engineman, as the case may be, of a fishing boat; or
 - (ii) under paragraph (c) (ii) of sub-section (1), an appropriate certificate of service authorising him to act as skipper, mate, engineer-officer or assistant marine engineman, as the case may be, of a coasting ship or a fishing, sealing or whaling boat, as the case may be, of less than one hundred gross register tons, and the capacity in which he is so authorised to act shall not be higher than the lowest capacity in which he acted during the period or periods in respect of which his claim is based.

(3) Before a certificate of service is granted there shall be surrendered to the Director—

- (a) if the application is made under paragraph (a) of sub-section (1), and by virtue of the possession of such a certificate as is referred to in the proviso mentioned in that paragraph, that certificate; or
- (b) if the application is made under paragraph (b) of sub-section (1), the certificate upon the possession of which the application is based.

(4) In the case of an application under paragraph (c) of sub-section (1), the grant of a certificate of service may be withheld until the applicant has passed the colour and form vision tests prescribed.

(5) Sub-section (1) and (2) shall apply in respect of certificates of service referred to in paragraph (b) of sub-section (1) during the period of one year after the coming into operation of this section and no longer.

(6) A certificate of service granted in terms of paragraph (c) of sub-section (2) shall remain in force for a period of three years after the coming into operation of this section and no longer: Provided that if before the expiration of that period the person to whom the certificate is issued passes satisfactorily a practical examination prescribed by the Director and designed to test the ability of the holder of the certificate to act in the capacity mentioned in the certificate, the Director shall cause the fact that he has so passed such examination to be recorded upon the certificate, and subject to the provisions of section *eighty-seven*, *eighty-eight* and *eighty-nine*, the certificate shall remain in force after the expiration of the said period.

(7) A certificate of service granted in terms of this section shall, for the purposes of this Act, and to the extent indicated in such certificate of service, be deemed to be a certificate of competency.

AANHANGSEL B.

(1) VOORBEELD VAN GETUIGSKRIFVORM VIR WERKSWINKELDIENS.

Naam en adres van ingenieurswerke _____

Hiermee getuig ek dat onderstaande 'n volledige en juiste opgaaf is van die werkswinkeldiens wat deur _____
 onder my toesig by bostaande onderneming verrig is: _____

Tydperk van diens. Datums.		Totale tydperk.	Aard van pligte. (Vir toepaslike beskrywing kyk hieronder.)	Besonderhede van verlof tot afwesigheid wat weekliks toe- gestaan is ten einde applikant in staat te stel om tegniese studies te onderneem.
Van.	Tot.			

Verslag oor bekwaamheid _____

Verslag oor gedrag _____

Opmerkings (indien enige) _____

Handtekening van werkgever of van sy verteenwoordiger _____

BESKRYWING VAN PLIGTE.

- I. Monteer- en/of oprigting by die vervaardiging en/of instandhouding van soliede masjinerie (bv. masjinerie met hoofas wat meer as ses duim in deursnee is).
 - II. Monteerwerk, uitgesonderd die monteer van soliede masjinerie.
 - III. Metaaldraai (goeie swaar werk).
 - IV. Masjienwerk (uitgesonderd by die draaibank).
 - V. Werk in tekenaarskantoor, as tekenaar of ingenieur.
 - VI. Ander werk, waarvan die aard gespesifiseer moet word.
- Die gebruik van die toepaslike telwoorde is voldoende behalwe in die geval van VI.

(2) VOORBEELD VAN GETUIGSKRIFVORM VIR SEEDIENS.

Naam en adres van eienaar van skip of redery _____

Hiermee sertifiseer ek dat onderstaande 'n volledige en juiste opgaaf is van die seediens wat mnr. _____
 onder my toesig aan boord van die* _____ verrig het.

Tydperk van diens. Datums.		Rang van offisier en werklike voorrang tydens waghoudiens.	Soort hoofmasjiene en ketels. Enkel- of dubbelskroef.	Aard van pligte. (Vir toepaslike beskrywing kyk hieronder.)
Van.	Tot.			

Verslag oor bekwaamheid _____

Verslag oor gedrag _____

Verslag oor soberheid _____

Handtekening van hoofingenieur _____

Opmerkings (indien enige) _____

Handtekening van { Ingenieur-superintendent _____
 of _____
 Gesagvoerder of ander verteenwoordigers van eienaars _____

BESKRYWING VAN PLIGTE.

- I. Op monteerwerk, hetsy bedags of op gereelde waghoudings:—
 - (a) In die hoofmasjiene- en ketelruim.
 - (b) Buitekant die hoofmasjiene- en ketelruim.
- II. (a) By verkoelings of ander masjinerie wat nie noodsaaklik is vir die aandryf van die vaartuig nie.
 (b) By hulpmasjiene wat afsonderlik is van die hoof-aandryfeenhede maar wat daarmee saam werk.
- III. Op gereelde waghoudings by hoofmasjiene as:—
 - (a) eerste masjienkamer-assistent onder die senior beampte wat in volle bevel is;
 - (b) tweede masjienkamer-assistent.
 - (c) junior masjienkamer-assistent.
- IV. Op gereelde waghoudings by hoofketels:—
 - (a) In bevel van alle stookplekke.
 - (b) In bevel van 'n gedeelte van of van slegs een stookplek.
 - (c) As ketelkamer-assistent.
- V. Op gereelde waghoudings by hoofmasjiene en ketels tegelykertyd:—
 - (a) In volle bevel van die hele wag.
 - (b) As eerste assistent van die senior beampte, wat in volle bevel is.
 - (c) As junior assistent.

OPMERKING.—Daar word aanbeveel dat hierdie vorm gebruik moet word wanneer die ingenieur oor wie verslag gedoen word, of die hoofingenieur, die skip verlaat.

* Meld die naam van skip, amptelike nommer, en of dit 'n stoom- of motorskip is.

ANNEXURE B.

(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.

Period of Service. Dates.		Total Period.	Nature of Duties. (For appropriate description see below.)	Particulars of Weekly Release Periods to permit Apprentice to pursue Technical Studies.
From.	To.			

Report as to ability _____

Report as to conduct _____

Remarks (if any) _____

Signature of employer or his representative _____

DESCRIPTION OF DUTIES.

- I. Fitting and/or erecting in the manufacture and/or maintenance of substantial machinery (e.g. machinery with main shaft exceeding six inches in diameter).
- II. Fitting other than on substantial machinery.
- III. Metal turning (good heavy work).
- 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.
The use of the appropriate numerals is sufficient except in case VI.

(2) SPECIMEN FORM OF TESTIMONIAL FOR SEA SERVICE.

Name and address of Shipowner or Company _____

I certify that the following is a full and true statement of the sea service performed by Mr. _____
under my supervision on board the* _____

Period of Service. Dates.		Rank of Officer and actual Seniority on Watch.	Type of Main Engines and Boilers. Single or Twin-screw.	Nature of Duties. (For appropriate description see below.)
From.	To.			

Report as to ability _____

Report as to conduct _____

Report as to sobriety _____

Signature of Chief Engineer _____

Remarks (if any) _____

Signature of { Engineer Superintendent
or
Master or other representative of Owners _____

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 refrigerating 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.

* State name of ship, official number, and whether steam or motor ship.

AANHANGSEL C.

LEERPLANNE VAN DIE EKSAMENS VIR HOOF- EN TWEEDE INGENIEUROFFISIER.

(LET WEL.—KENNIS VAN TALE.)

Vanweë die wederkerige ooreenkomstige waarkragtigens Suid-Afrikaanse bekwaamheidsertifikate vir die grade in paragrawe (k) en (l) van subartikel (1) van artikel vyf-en-sewentig van die Wet uiteengesit, nl. hoof- en tweede ingenieursoffisier, aanvaar word as kwalifikasies vir diens op Statebondskepe, moet elke kandidaat die eksaminator tevrede stel dat hy die Engelse taal goed genoeg kan praat en skryf om die pligte wat van hom aan boord vereis word, uit te voer.)

VAKKE WAARVAN 'N BASIESE KENNIS VEREIS WORD.

Kandidate vir 'n Bekwaamheidsertifikaat as Hoof-ingenieursoffisier moet kennis hê van al die items in die leerplan, met inbegrip van die onderstreepte items. Kandidate vir 'n Bekwaamheidsertifikaat as Tweede Ingenieursoffisier sal nie oor die onderstreepte items eksamen hoef te doen nie.

OPMERKINGS.

- (1) Die probleme sal miskien kennis van die sentimeter-gram-sekondestelsel (S.G.S.) vereis, maar hulle sal van so 'n aard wees dat hulle met 'n kennis van elementêre algebra, meetkunde en plat driehoeksmeting opgelos sal kan word.
- (2) Kennis van die gebruik van logaritmes sal vereis word.
- (3) Formules met betrekking tot die hoër wiskunde of konstantes wat nodig is vir die oplossing van enige probleem sal verstrek word.
- (4) Grafiese oplossings sal aangeneem word wanneer daar nie uitdruklik om 'n analitiese oplossing gevra word nie.
- (5) Kandidate kan, as hulle wil, van die skuipliniaal by hul berekenings gebruik maak, maar moet in iedere geval die trappe wat tot die berekenings gevoer het, volledig opgee.

(a) ALGEMENE INGENIEURSWETENSKAP.

(Een vraestel van drie uur. Slegs ses uit nege vrae moet beantwoord word.)

Massa, volume, betreklike digtheid (soortlike gewig). Oppervlaktes en liggame, toepassing van die Reël van Simpson op oppervlaktes, volumes en swaartepunte.

Verplasing, lineêre en hoeksnelheid. Konstante lineêre en hoekversnelling. Betreklike snelheid. Vektors. Traagheid, wette van beweging van Newton. Hoeveelheid van beweging. Snelheids- of kragtedriehoek, -parallelogram en -veelhoek. Kragte, momente en koppels. Stootkrag. Swaartepunt. Ewigstoestande.

Arbeid, vermoë en energie. Wrywing tussen twee liggame. Hellende vlak. Eenvoudige masjiene, snelheidsverhouding, meganiese voordeel en rendement. Rapsionskuif. Rotasietraagheid. Traagheidsmomente. Kinetiese energie van draaiende liggame. Regulateurs. Middelpuntvliedende krag, die voorkoms daarvan in masjiendele, met inbegrip van die vellings van vliegwiële.

Kragoorebrenging deur middel van ratwerk.

Eenvoudige harmoniese beweging. Elementêre hidrostatika en hidroulika. Beginsel van Archimedes. Basiese idees van vloeistof-druk en vloeistofwrywing. Strooming deur pype en openinge.

Spanning, vervorming en elastisiteit. Die Wet van Hooke. Elastisiteitsmodulusse. Eenvoudige spanning, drukspanning en skuifspanning.

Vervormingsenergie. Spannings as gevolg van skielike belasting. Buigmoment- en skuifkragdiagramme vir vrydraers en enkelvoudig gesteunde balke met punt-, gelykmatige, verdeelde of gekombineerde belasting. Sterkte van balke. Wrywing. Sterkte en styfheid van ronde asse en krag oorgebring. Spiraalverre (digte spiraal). Gekombineerde direkte en buigspanning. Dun silindriese en bolvormige huide. Sterkte van enkele, dubbele en driedubbele klinklap- en -stuitklasse, of sweislasse.

Spanning en vervorming in enkelvoudige of saamgestelde onderdele as gevolg van temperatuurverandering.

(b) WARMTE EN WARMTEMASJIENE.

(Een vraestel van drie uur. Slegs SES uit nege vrae moet beantwoord word.)

Temperatuurskale en die herleiding daarvan. Lengte- en volume-uitsetting of -samentrekking as gevolg van temperatuurverandering. Uitsettingskoeffisiënt. Soortlike warmte. Waterwaarde. Resulterende temperatuur van mengsels by verskillende hittegrade. Geleiding, konveksie en straling van warmte. Die Wet van Boyle en die Wet van Charles en die kombinasie daarvan. Verhouding tussen soortlike warmte by konstante druk en konstante volume. Adiabatische uitsetting en verdigting $pV^\gamma = \text{konstante}$. Verhouding tussen druk, volume en temperatuur. Verandering van aggreagaatstoestand. Meetbare warmte, latente warmte en oorverhitting.

Energie, metodes vir die meting van energie en arbeid. Meganiese warmte-ekwivalent. Brandstowwe en die ontwikkeling van warmte deur verbranding. Hittewaarde van brandstowwe. Lug wat vir verbranding vereis word. Ontwikkeling van stoom. Droogheidsverhouding van stoom. Kondensators en die vakuum, voordeel van die gebruik van die ekspansiewerking van stoom.

Carnot-siklus. Grondbeginsels en werkingsiklusse van stoommasjiene en binnebrandmotore en lugperspompe.

Berekening van gedane arbeid met hipotetiese druk-volumediagramma, met konstante stoomdruk en met uitsetting volgens die Wet $pV = \text{konstante}$. Gemiddelde ontwerpdruk. Silindervolumeverhoudings. Warmtebalanse met betrekking tot motor- en ketelbeproeving. Resultate wat verwag kan word by die aanwending van hoëdrukstoom, van hoë- en laedrukwerking, oorverhitting en stoommanteling.

Elementêre dinamika van die suierstoommasjiene en binnebrandmotor. Klepdiagramme vir stoommasjiene. Nokdiagramme vir binnebrandmotore. Tangensiale drukdiagramme en vliegwiële. Elementêre beginsels van die stoomturbine. Rendement van koelmasjinerie en prestasiekoeffisiënt.

Stoomketels en verdamers.

Termiese nuttige effek, meganiese rendement en totale rendement.

(c) TEKENE.

Hierdie vak moet net geneem word deur kandidate vir 'n Bekwaamheidsertifikaat as Tweede Ingenieursoffisier.

(Een vraestel van ses uur. Daar sal 'n keuse wees tussen twee tekenings.)

Die vraestel in Tekene sal bestaan uit 'n toets van die kandidaat se vermoë om die beginsels van projeksie toe te pas en kandidate sal gevra word om 'n plan, opstand of dwarsdeursnee of 'n kombinasie van hierdie aansigte van 'n stuk skeepsmasjinerie te teken volgens gegewens wat verskaf word. Al die nodige gegewens vir die voltooiing van die tekening sal in die vraestel verstrek word.

(d) ELEKTROTEGNIK EN ELEMENTÊRE SKEEPSONTWERP.

(Een vraestel van drie uur in twee onderafdelings, een vir elke vak. Kandidate moet net drie vrae uit vier in elke onderafdeling aanpak.)

(i) Elektrotegniek.—Die werking van 'n elektriese stroom—chemiese, magnetiese en warmtewerking. Primêre selle en akkumulators. Elektrolise. Eenvoudige magnetiese en elektromagnetiese verskynsels.

Toepassing van elektromagnetiese induksieverskynsels op die generator.

Praktiese elektriese eenhede (beperk tot G.S.-praktyk in die Tweedeklaseksamen.) Die Wet van Ohm. Weerstandswette. Uitwerking van temperatuur op weerstand. Weerstandsgroepeering. Meganiese en warmte-ekwivalente. Metodes van stroomverdeling vir verligtings- en kragdoeleindes.

W.S.-frekwensie. Virtuele of effektiewe waardes van stroom en E.M.K. Topwaardes. Krag en die kragfaktor. Een- en driefasige kragbron. Eenvoudige probleme met betrekking tot elektriese toevoer, meganiese afvoer en rendement van motore in G.S.- en W.S.-stelsels.

(ii) Elementêre Skeepsontwerp.—Verplasing, nat vlak, blok- en prismatiese lynheidskoeffisiënt van verplasing, lynheidskoeffisiënt van die watervlak. Ton per duim indompeling. Verandering in diepgang weens verandering in die digtheid van water. Verskuiwing van swaartepunt deur die bylaai, verwydering, verskuiwing of verbruik van brandstof, ballas of vrug. Dryfvermoë en uitwerking wanneer 'n kompartement vol water laat loop word. Totale druk op ingedompelde oppervlaktes. Drukmiddelpunt. Vergelyking van huidweerstand van romp met model by verskillende snelhede. Verhouding tussen snelheid van skip en brandstofverbruik. Skroefwerking, volgstroom, slip, stukrag en vermoë. Admiraliteits- en brandstofkoeffisiënte. Eenvoudige probleme oor die sterkte van boudele om vloeistofdruk te weerstaan. Stabiliteit onder klein slagsyhoëke. Moment van trimverandering.

ANNEXURE C.

SYLLABUSES FOR THE EXAMINATIONS OF CHIEF AND SECOND ENGINEER-OFFICERS.

(NOTE.—KNOWLEDGE OF LANGUAGES.)

Because of the reciprocal arrangements under which South African certificates of competency for the grades set forth in paragraphs (k) and (l) of sub-section (1) of section seventy-five of the Act, viz., Chief and Second engineer-officers are accepted as qualifications for service in Commonwealth ships, every candidate shall satisfy the examiner that he is able to speak and write the English language sufficiently well to perform the duties required of him on board ship.)

FUNDAMENTAL KNOWLEDGE SUBJECTS.

Candidates for a certificate of competency as Chief Engineer-Officer are expected to show a knowledge of all the items in the syllabus, including the underlined items. Candidates for a certificate of competency as Second Engineer-Officer will not be examined on the items underlined.

NOTES.

- (1) The problems may require a knowledge of the centimetre, gramme, second (C.G.S.) system, 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.

(a) GENERAL ENGINEERING SCIENCE.

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

Mass, volume, relative density (specific gravity). Areas and solids, application of Simpson's Rule to areas, volumes and centroids. Displacement, linear and angular velocity. Uniform linear and angular acceleration. Relative velocity. Vectors. Inertia, Newton's laws of motion. Momentum. Triangle, parallelogram and polygon of velocities or forces. Forces, moments and couples. Impulsive force. Centre of gravity. Conditions of equilibrium. Work, power and energy. Solid friction. Inclined plane. Simple machines, velocity ratio, mechanical advantage and efficiency. Rapson's slide. Rotational inertia. Moments of inertia. Kinetic energy of rotating bodies. Governors. Centrifugal force, its incidence in machine parts, including the rims of flywheels. Transmission of power by gearing. Simple harmonic motion. Elementary hydrostatics and hydraulics. Principle of Archimedes. Basic ideas of fluid pressure and fluid friction. Flow through pipes and orifices. Stress, strain and elasticity. Hooke's Law. Moduli of elasticity. Simple tension, compression and shear. Strain energy. Stresses due to sudden loading. Bending moment and shearing force diagrams for cantilevers and simply supported beams with concentrated, uniform, distributed or combined loading. Strength of beams. Torsion. Strength and stiffness of round shafts and power transmitted. Helical springs (close coiled). Combined direct and bending stress. Thin cylindrical and spherical shells. Strength of single, double and treble riveted lap and butt joints, or welded joints. Stresses and strains in single or compound members due to change of temperature.

(b) HEAT AND HEAT ENGINES.

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

Temperature scales and their conversion. Linear and volumetric expansion or contraction due to change of temperature. Co-efficient of expansion. Specific heat. Water Equivalent. Resulting temperature of mixtures at different temperatures. Conduction, convection and radiation of heat. Boyle's Law and Charles' Law and their combination. Relations between specific heat at constant pressure and constant volume. Adiabatic expansion and compression $p v^\gamma = \text{a constant}$. Relation between pressure, volume and temperature. Change of state. Sensible heat, latent heat and superheat. Energy, methods of measurement of energy and work. Mechanical equivalent of heat. Fuels and the generation of heat by combustion. Calorific value of fuels. Air required for combustion. Generation of steam. Dryness fraction of steam. Condensers and vacuum, advantage of using steam expansively. Carnot cycle. Elementary principles and cycles of operation of steam and internal combustion engines and air compressors. Calculation of work done with hypothetical pressure-volume diagrams, with constant steam pressure and with expansion according to the law $p v = \text{a constant}$. Mean referred pressure. Cylinder volume ratios. Heat balances with reference to engine and boiler trials. Results to be expected from the application of high pressure steam, of compounding, superheating and steam-jacketing. Elementary dynamics of the reciprocating steam and internal combustion engine. Valve diagrams for steam engines. Cam diagrams for internal combustion engines. Crank-effort diagrams and flywheels. Elementary principles of the steam turbine. Efficiency of refrigerating machinery and co-efficient of performance. Boilers and evaporators. Thermal, mechanical and overall efficiencies.

(c) DRAWING.

This subject is to be taken by candidates for a certificate of competency as Second Engineer-Officer 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.

(d) ELECTROTECHNOLOGY AND ELEMENTARY NAVAL ARCHITECTURE.

(One paper of three hours in two sub-sections, one for each subject. Candidates will be expected to attempt three questions only out of four in each sub-section.)

(i) Electrotechnology.—The effects of an electric current—chemical, magnetic and heating. Primary cells and accumulators. Electrolysis. Simple magnetic and electromagnetic phenomena. Application of electromagnetic induction phenomena to the generator. Practical electrical units (limited to D.C. practice in the Second Class Examination) Ohm's Law. Laws of resistance. Effects of temperature on resistance. Grouping of resistances. Mechanical and heat equivalents. Modes of current distribution for lighting and power purposes.

A.C. Frequency. Virtual or R.M.S. values of current and E.M.F. Peak values. Power and Power Factor. Single and three-phase supply. Simple problems relating to electrical input, mechanical output and efficiency of motors on D.C. and A.C. systems.

(ii) Elementary Naval Architecture.—Displacement, wetted surface, block and prismatic co-efficients of fineness of displacement, co-efficients of fineness of water plane. Tons per inch immersion. Alteration in draught owing to change in density of the water. Shift of Centre of Gravity by adding, removing, shifting or consuming fuel, ballast or cargo. Buoyancy and effect of flooding a compartment. Total pressure on immersed surfaces. Centre of Pressure. Comparison of skin resistance of hull with model at different speeds. Relation between speed of vessel and fuel consumption. Action of propeller, wake, slip, thrust and power. Admiralty and fuel co-efficients. Simple problems on strength of structural members to resist liquid pressure. Stability at small angles of heel. Moment of change of trim.

(e) INGENIEURSKENNIS.

Kandidate vir 'n gekombineerde Stoom- en Motorsertifikaat moet bereid wees om in al die items van (a) tot (z) eksamen te doen, maar diegene vir 'n Stoomsertifikaat of die Stoomendossement van 'n Motorsertifikaat sal nie in items (t) tot (z) eksamen hoef te doen nie, en diegene vir 'n Motorsertifikaat of die Motorendossement van 'n Stoomsertifikaat sal nie in items (m) tot (s) eksamen hoef te doen nie. Daarbenewens moet kandidate vir 'n sertifikaat vir 'n hoof-ingenieursoffisier of 'n endossement van 'n sertifikaat vir 'n hoof-ingenieursoffisier wat 'n grondiger kennis moet hê van die verskillende items in die leerplan as kandidate vir 'n sertifikaat vir 'n tweede ingenieursoffisier of 'n endossement van 'n sertifikaat vir 'n tweede ingenieursoffisier, bereid wees om in items (aa) tot (ee) eksamen te doen.

OPMERKINGS.

1. Die ingenieurskennis wat van kandidate verwag word, is dié wat vereis word vir die gebruik, bediening en onderhoud van die masjinerie, uitrusting en skeepsdele waarvoor die ingenieursoffisier gewoonlik verantwoordelik is. Kennis van die metodes vir die vervaardiging van die verskillende onderdele word ook vereis.

2. Kandidate vir sertifikate en endossemente moet 'n skriftelike eksamen en daarna 'n mondelinge eksamen aflê.

3. Die skriftelike eksamen vir 'n Stoom- of Motorsertifikaat bestaan uit twee vraestelle van drie uur elk—net ses uit nege vrae in iedere vraestel moet beantwoord word.

4. Die skriftelike eksamen vir 'n gekombineerde Stoom- en Motorsertifikaat bestaan uit drie vraestelle van drie uur elk—net ses uit nege vrae in elke vraestel moet beantwoord word.

5. Die skriftelike eksamen vir 'n Stoom- of Motorendossement bestaan uit een vraestel van ses uur—net ses uit nege vrae in die vraestel moet beantwoord word.

6. Waar vrae met betrekking tot die hoof elektriese aandryfmasjinerie in die eksamen vir die Sertifikaat vir 'n Hoof-ingenieursoffisier of 'n endossement van die Sertifikaat vir 'n Hoof-ingenieursoffisier gestel word, sal die nege vrae vermeerder word met die aantal vrae wat oor die hoof elektriese aandryfmasjinerie gestel word.

7. Kandidate kan gevra word om hulle antwoorde met sketse uit die vry hand toe te lig.

(a) Die algemene uitwerking van die verskillende behandelings op die fisiese bestanddele van materiale wat gewoonlik by die bou van skeepsmasjiene en stoomketels gebruik word en die meganiese toetse waaraan hierdie materiale gewoonlik onderwerp word.

(b) Warmte en verbranding. Die eienskappe van stoom, brandstof, smeermiddels en ander vloeistowwe, gasse en dampe wat in verband met masjinerie aan boord gebruik word.

(c) Die gebruik, boubesonderhede en beginsels wat betrokke is by die werking van die drukmeter, voltmeter, ammeter, termometer, pirometer, barometer, salinometer, hidrometer en ander meters wat gewoonlik deur ingenieurs aan boord van 'n skip gebruik word.

(d) Die oorsake, uitwerking en gewone maatreëls teen ketelsteenvorming en korrosie. Voedingswater en blaasdigtheid en ketelsteenvorming.

(e) (1) Boubesonderhede en werkingsprinsipe van skeepsmasjiene; metodes ter berekening van hulle remperdekrag. Die werkingsprinsiep en metodes vir die yking van dinamometers en wringingsmeters.

(2) Die metodes waarvolgens slytasie in masjinerie en stoomketels behandel word. Die rig van masjiendele. Die verhelping van defekte as gevolg van gebreke in die materiaal of ongeluk. Tydelike of permanente herstelwerk in die geval van 'n bedryfstesting of algehele weiering.

(f) Boubesonderhede en werkingsprinsipe van sentrifugale, suier- en perspompe. Die algemene vereistes in verband met voedings-, brandstof-, vullings- en ballaspompstelsels.

(g) Die bou-inrigting, besonderhede en werking van stuurmasjiene en stuurgerei, koelmasjinerie, hidrouliese masjinerie en die stoommasjiene en binnebrandmotore wat vir nood- en hulpmasjinerie aan boord gebruik word.

(h) (1) Die aanleg en werking van elektriese lig- en kragkringe; eendraad-, tweedraad-, driedraad- en hoofringleidingstelsels. Die doel van die vereffeningsdinamo. Tipes isolasie. Gebruik van die megger.

(2) Algemene beginsels en funksies van noodsaaklike instrumente. Algemene bou en werking van skakelgerei en veiligheids-toestelle wat by elektriese uitrusting gebruik word. Ontsteking—battery en spoel en H.S.-magneto. Die versorging en onderhoud van akkumulatore.

(3) Die bou-inrigting, werking en onderhoud van elektriese stuurgerei.

(4) Volgens die keuse van die kandidaat, of—

(a) die bouinrigting, werking, onderhoud en algemene karakteristieke prestasie van W.S.-generators en -motors wat algemeen aan boord geïnstalleer is. Die synchronisering en parallelsakeling van alternators; of

(b) die bou-inrigting, werking, onderhoud en algemene karakteristieke prestasie van G.S.-generators en -motors wat algemeen aan boord geïnstalleer is. Parallelsakeling van dinamo's met sytak- en saamgestelde wikkeling.

(i) Aanwending van die indikateur. Berekening van gemiddelde druk en perdekrag. Drukskommeling in die silinder soos aangewys deur indikateurdiagramme.

(j) (1) Voorsorgsmaatreëls teen brand of ontploffings as gevolg van olie of gas. Flitspunt. Ontploffbaarheid van gas of damp wat afgegee word deur brand- of smeerolies wanneer dit met 'n hoeveelheid lug gemeng word. Die gevaar van lekkasie uit olietanks, pype, gasontwikkelaars en verdampers veral in kimme en ander ongeventileerde ruimtes. Die werking van draad-gaasdiagramme en die plekke waarin dit aangebring moet word.

(2) Selfontbranding van steenkool. Ontploffbaarheid van gas wat deur kool afgegee word. Belugting en stuwing van kool.

(3) Brandopsporing. Metodes van brandbestryding. Werking en onderhoud van meganiese en chemiese brandblussers en ander brandbestrydingstoestelle, gasmaskers en veiligheidslampe.

(k) Die algemene bou van 'n gewone staalskip. Die versorging van kimme, bunkers, tenks onder stoomketels en waterdigte deure.

(l) Die algemene terme wat gebruik word by die meting van staalskepe, byvoorbeeld lengte tussen die loodlyne, totale breedte, holte ooreenkomstig die mal, diepgang en vryboord.

(m) Die metodes vir die bou van skeepstoommasjiene en stoomketels, die prosesse waaraan die verskillende dele onderwerp word of wat met die vervaardiging daarvan gepaard gaan en die metodes wat aangewend word by die montering van die masjinerie aan boord van 'n skip.

(n) Die verskillende soorte aandryf- en hulpstoommasjiene nou in gebruik, die funksies van elke belangrike deel daarvan en die sorg wat deur die verskillende dele van die masjinerie aan boord van 'n skip vereis word.

(o) Die metodes waarvolgens die stoominlaat- en -uitlaatkleppe getoets en gestel word en die uitwerking daarvan op die werking van die masjiene wanneer die kleppe op bepaalde maniere verstel word.

(p) Die boubesonderhede en werking van verdampers, voedingswaterverwarmers en voedingswaterfilters.

(q) Skepsketels van verskillende moderne ontwerpe; die manier waarop hulle gestut word, asook die voorkoming van ketelverskuiwing wanneer bote hel en rol. Die vasstelling deur berekening van geskikte bedryfsdrukings vir stoomketels van gegewe afmetings.

(r) Die gebruik en hantering van keteltoebehore en -beslag, veral met betrekking tot watermeters en veiligheidskleppe. Voorsorg wat getref moet word wanneer stoom ontwikkel en afsluitkleppe gewerk word, veral met betrekking tot die gevaar wat deur waterslagwerking ontstaan.

(s) Die boubesonderhede, bediening en onderhoud van installasies wat algemeen gebruik word om lugtrek, oorverhitting van stoom en die verbranding van kool of brandolie aan te help.

(t) Die beginsels wat aan die werking van binnebrandmotore ten grondslag lê. Die onderskeid tussen verskillende tipes motore. Boubesonderhede van binnebrandmotore in algemene gebruik.

(u) Die aard en eienskappe van die brand- en smeerolies wat algemeen vir binnebrandmotore gebruik word. Die toevoer van lug en brandstof na die silinders van verskillende tipes motore. Die boubesonderhede van toestelle vir die vergassing of verstuiwing van die brandstof. Die metodes ter verkoeling van die silinders en suiers. Boubesonderhede en werking van lugperspompe.

(v) Die metodes vir die bou van skeepsbinnebrandmotore. Die prosesse waaraan die verskillende dele daarvan onderwerp word of wat met die vervaardiging daarvan gepaard gaan en die metodes wat by die montering van masjinerie aan boord aangewend word.

(w) Aansit- en omstelinrigtings en die verskillende handelinge wat daarmee in verband staan.

(x) Die sorg wat vereis word vir die bediening en onderhoud van die verskillende masjineriedeel. Die gebruik en hantering van kleppe, pype, verbindings en veiligheids-toestelle wat gebruik word.

(y) Die opnoem en beskrywing van defekte wat uit die werking van masjinerie ontstaan. Die verhelping van sulke defekte.

(z) Die boubesonderhede en hantering van hulpketels, hulle toebehore en beslag. Boubesonderhede en hantering van hulpmasjinerie.

(e) ENGINEERING KNOWLEDGE.

Candidates for a combined Steam and Motor Certificate must be prepared to be examined in all the items (a) to (z), but those for a Steam Certificate or the Steam Endorsement of a Motor Certificate will not be examined in items (t) to (z) and those for a Motor Certificate or the Motor Endorsement of a Steam Certificate will not be examined in items (m) to (s). In addition candidates for a Chief Engineer-Officer's Certificate or an endorsement of a Chief Engineer-Officer's Certificate, who will be expected to display a fuller knowledge of the different items in the Syllabus than candidates for a Second Engineer-Officer's Certificate or an endorsement of a Second Engineer-Officer's Certificate, must be prepared to be examined in items (aa) to (ee).

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-Officer. 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. Where questions relating to main electric propelling plant are asked in the examination for a Chief Engineer-Officer's Certificate or an endorsement of a Chief Engineer-Officer's Certificate, the nine questions set will be increased by the number of questions set on main electric propelling plant.

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

(a) The general effects of the 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, voltmeter, ammeter, 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 principle 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 centrifugal, bucket and force pumps. 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 machinery, and such steam and internal combustion engines as are used for emergency and auxiliary machinery on board ship.

(h) (1) The lay-out and working of electric light and power circuits; single-wire, two-wire, three-wire and ring main systems. The purpose of the balancer. Types of insulation. Use of the megger.

(2) General principles and functions of essential instruments. General construction and operation of switch gear and safety devices employed in the electrical equipment. Ignition—battery and coil and H.T. magneto. The care and maintenance of accumulators.

(3) Constructional arrangement, operation and maintenance of electric steering gears.

(4) At the candidate's option, either—

(a) constructional arrangements, operation, maintenance and general characteristic performance of A.C. generators and motors commonly installed on board ship. The synchronising and parallel running of alternators; or

(b) constructional arrangement, operation, maintenance and general characteristic performance of D.C. generators and motors commonly installed on board ship. Parallel running of shunt and compound dynamos.

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

(j) (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. Ventilation and storage of 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.

(k) The usual structure of an ordinary steel ship. The preservation in good condition of bilges, bunkers, tanks under boilers, and water-tight doors.

(l) The common terms used in the measurement of steel ships, for example, length between perpendiculars, breadth overall, moulded depth, draught and freeboard.

(m) 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.

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

(o) 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 settings of the valves.

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

(q) 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.

(r) 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.

(s) Constructional details, operation and maintenance of installations generally employed for assisting draught, superheating steam and burning coal or oil fuel.

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

(u) 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.

(v) 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.

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

(x) The attention required for the operation and maintenance of the various parts of machinery. The use and management of valves, pipes, connections and safety devices employed.

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

(z) Constructional details and management of auxiliary steam boilers, their fittings and mountings. Constructional details and management of auxiliary machinery.

KANDIDATE VIR DIE SERTIFIKAAT VIR 'N HOOF-INGENIEUROFFISIER EN 'N ENDOSSEMENT VAN SO 'N SERTIFIKAAT.

(aa) Die onderhoud en bedryfstoestand van masjinerie en toestelle waarvoor 'n senior ingenieuroffisier verantwoordelik is. Die sorg wat vereis word om weerings en defekte te voorkom. Die gewone herstelwerk en vernuwings wat vereis word; toesig oor en inspeksie van masjinerie en stoomketels aan boord van 'n skip. Gereedmaking van stoomketels en masjinerie vir ondersoek.

(bb) Afdeling (h) (4), albei onderafdelings, asook die algemene aanleg en werking van hoof elektriese aandryfmasjinerie, die reeks handelinge vir aansit, stopsit, omstelling en snelheidsverandering.

(cc) Die praktiese vereistes om die stabiliteit van 'n skip ter see te verseker. Hantering van voedings-, brandstof-, ballas- en vullings-tensks. Vulling en leegmaak van tensks ter see. Die invloed van vrye vloeistofoppervlaktes in tensks.

(dd) Die herkenning van onreëlmatigheid in die loop van masjiene vanaf indikateurdiagramme. Die regstelling van hierdie onreëlmatighede. Toeligting deur middel van sketse van die verandering wat teweeggebring word in die diagram as gevolg van 'n verstelling of verandering in die werking van die kleppe of enige ander faktore.

KANDIDATE VIR DIE STOOM- EN GEKOMBINEERDE STOOM- EN -MOTORCERTIFIKAAT VIR 'N HOOF-INGENIEUR- OFFISIER EN DIE STOOMENDOSSEMENT VIR 'N HOOF-INGENIEUROFFISIER.

(ee) Die beginsels en praktiese toepassing van oppervlaktekondensasie, oorverhitting en die ekspansiewerking van stoom. Die ekonomiese en doeltreffende gebruik van steenkool en brandolie.

MONDELINGE EKSAMEN.

Die mondelinge eksamen sal hoofsaaklik gebaseer word op die Praktiese Kennisvakke van die eksamen en sal vrae insluit oor die hantering van masjiene en stoomketels ter see, die werksaamhede van die toesighoudende ingenieur, die werk wat aan masjiene, ketels en hulp-masjinerie in die hawe gedoen moet word en die periodieke ondersoek van die bewegende dele.

Kandidate moet ook ten volle bekend wees met masjinerie- en ketelbeskadiging wat op see kan plaasvind en moet kan verduidelik hoe dit voorkom en verhelp kan word.

AANHANGSEL D.

LEES VAN DIE WATERPEILGLAS.

Ondanks die feit dat die lees van die waterpeilglas 'n spesiale kenmerk is van die eksaminering van ingenieuroffisiere vind baie ongelukke by die ketels plaas as gevolg van die feit dat die ingenieuroffisier van die wag nie vertrou is met die bou van die waterpeilglas-toebehoere nie of nie deur werklike proefneming verseker dat die krane, pype, ens., onbelas is nie.

Tensy 'n kandidaat wat geëksamineer word, kan bewys dat hy begryp hoedat hy die aanduidings van die waterpeilglas moet verifieer, kan hy nie in praktiese kennis slaag nie. As 'n kandidaat in praktiese kennis druipt, beteken dit dat hy verdere ondervinding van seediens moet opdoen voordat hy 'n hereksamen mag aflê.

Die sketse, figure 1, 2, 3, 4 en 5 van Plaat 1, verteenwoordig die gebruiklike metodes waarvolgens waterpeilglasmonterings aan marineketels vasgeheg word, met die rookkaste geriefshalwe, by figure 3, 4 en 5 weggelaat. Die belangrike kenmerke in elke waterpeilglas en die metode om die aanduidings daarvan te verifieer, word afsonderlik in die volgende notas behandel.

MET BETREKKING SLEGS TOT FIGUUR 1.

In hierdie geval is die waterpeilglaskrane regstreeks aan die ketel vasgeheg, en die akkuraatheid van die peilglas wanneer die ketel onder stoom is, kan soos volg getoets word:—

Eerstens.—Laat B oop bly, draai dan kraan D toe en draai kraan E oop, en as daar stoom uitkom, is dit 'n bewys dat kraan B en die passaat deur die boonste toebehoere en peilglas onbelas is. As geen stoom of water uitkom nie, beteken dit dat kraan B of die passaat deur die boonste toebehoere en peilglas verstopt is en dat die peilglas nie behoorlik kan werk voordat die hindernis verwyder is nie.

Tweedens.—Draai kraan B toe en draai kraan D en E oop, en as daar water uitkom, is kraan D onbelas. As daar geen water of stoom uitkom nie, beteken dit dat kraan D of die passaat van die ketel af deur die laer toebehoere verstopt is en skoongemaak moet word voordat die peilglas behoorlik kan werk.

MET BETREKKING SLEGS TOT FIGUUR 2.

In hierdie geval is die peilglaskrane vasgeheg aan 'n gebuigde pyp met 'n betreklike groot deursnee (en 'n boring van minstens drie duim) waarvan die boonste gedeelte verbind is met die stoomruim en die onderste gedeelte met die waterruim van die ketel. Weens die feit dat die boring van die pyp groot is, is dit onwaarskynlik dat dit verstopt sal raak of uit aksie sal raak onder die gewone werkstoestande. Die waterpeilglas is derhalwe 'n feitlik dieselfde toestand asof dit regstreeks aan die ketel vasgeheg is soos in figuur 1. Wanneer hierdie peilglas in werking is, word dit getoets presies op dieselfde wyse as die een wat in figuur 1 aangetoon word.

Skrœfproppe word by P.P. en Q.Q. ingevoeg, en deur hulle te verwyder, kan die openinge in die pyp skoongemaak word, indien nodig, deur 'n draad of stok daarin te steek wanneer die stoom laag is.

MET BETREKKING SLEGS TOT FIGUUR 3.

In hierdie peilglas is daar 'n oop verbinding van A tot C deur die kolom Y, en ten einde „deur die glas te blaas” is dit slegs nodig om kraan D en B alternatief toe te draai en E oop te hou. Maar, ten einde „deur die waterpeilglas te blaas”, met inbegrip van pype H en I, is dit nodig om, nadat daar deur die glas geblaas is soos hierby beskryf, A en C alternatief toe te draai, terwyl B, D en E terselfdertyd lank genoeg oopgehou word om te verseker dat die inhoud van die peilglas en sy verbindings heeltemal ontlê word. Wanneer B, D en C onbelas is en A verstopt is, kondenseer die stoom wat opgesluit raak in die glas en in die pyp I wat van kolom Y tot A lei, en die water wat deur C stroom om die plek daarvan in te neem, styg in kolom Y en in die glas tot 'n vlak bo dié van die water in die ketel. Met ander woorde, die peilglas toon 'n valse vlak aan. As E nou oopgedraai word en die water uitgeblaas word, sal die water in die peilglas, wanneer E weer toegedraai word, hoër styg as voorheen en nog verder misleidend wees. Daarenteen, wanneer B, D en A onbelas en C verstopt is, is die water, indien enige, in die glas vasgekeer en styg en daal dit nie meer saam met die water in die ketel of met die beweging van die vaartuig nie. Dit styg egter stadig in die glas weens die kondensering van die stoom in die boonste gedeelte van die waterpeilglas totdat E oopgedraai word, wanneer al die water in die glas uitgeblaas word; en wanneer E toegedraai word, toon die glas geen water nie, ondanks die feit dat die water in die ketel op die behoorlike vlak mag wees. Wanneer die toetskrane T.T.T. aan kolom Y vasgeheg word, soos in figuur 3 aangetoon, hou hulle op om betroubaar te wees wanneer kraan A of C of die pyp wat hulle verbind, verstopt of byna verstopt is. Gevolglik is dit wenslik dat sulke toetskrane regstreeks aan die ketel vasgeheg word en nie aan die kolom soos aangetoon nie.

MET BETREKKING SLEGS TOT FIGUUR 4.

Soms word die waterpeilglastoebehoere ingerig soos in figure 4 en 5 aangetoon, met geen passaat in die kolom op nie en met die sentrale gedeelte (N) van die kolom slegs as 'n pilaar of verbindingstuk van enige gerieflike afdeling tussen die boonste en onderste gedeeltes waaraan die krane B en D vasgeheg is.

Deur middel van hierdie inrigting word dubbele verbindings uitgeskakel en is daar geen noodsaaklikheid vir wat „dubbele afsluiting” by die toetsing van die akkuraatheid van die peilglas genoem word nie. Wanneer die peilglase egter op hierdie wyse gebou is, is die kraan B en D onbetroubaar as toetskrane vir geval daar nie glas in die peilglas is nie. Op hierdie eienskap moet daar sorgvuldig gelet word. Bowendien, wanneer hy behoorlik funksioneer, veroorsaak die vermindering van die drukking in die glas, wat ontstaan wanneer E oopgedraai word, dat die water in pyp H bo sy normale vlak styg. Op hierdie ongewenste eienskap behoort daar ook gelet te word.

MET BETREKKING SLEGS TOT FIGUUR 5.

Soms is daar 'n buiging, L, in die stoompyp I wat van kraan A na kraan B lei. Wanneer nuwe ketels aan boord van 'n skip aangebring is, het dit af en toe die aandag getaan. In die meeste gevalle word hierdie buiging veroorsaak deurdat die pyp in 'n abnormale rigting gelei word om nie aan ander pype, balke of monterings naby die rookkas te raak nie. Met so 'n buiging vergader die gekondenseerde stoom in die pyp en daal tot op die bodem van die pyp, en met die loop van tyd vul dit die pyp geheel-en-al van I tot K. Die stoom van K af tot by die vlak van die water in die glas word sodoende vasgekeer en, namate kondensering voortgaan, lei dit tot 'n vermindering van drukking in die pyp onderkant dié van die ketel en tot 'n gelyke styging van die water in die buiging en ook in die waterpeilglas. Wanneer die vaartuig stil lê, styg die water in die waterpeilglas totdat kraan E oopgedraai word of totdat die drukking in die ketel soveel hoër is as dié in die onderste deel van pyp I dat die water in die buiging as gevolg daarvan in die peilglas ingeblaas word. In albei gevalle veroorsaak dit 'n oombliklike verandering van die watervlak in die glas.

In die gewone loop van die werk word die verskynsel wat hierbo beskryf is min of meer gewysig deur die teenwoordigheid van lug in die boonste gedeelte van die waterpeilglas en deur die styging en daling van die water in die ketel en peilglas wat veroorsaak word deur die rol- of stambewegings van die vaartuig.

CANDIDATE FOR A CHIEF ENGINEER-OFFICER'S CERTIFICATE AND AN ENDORSEMENT OF SUCH A CERTIFICATE.

(aa) The maintenance and working condition of machinery and appliances placed in the charge of a Senior Engineer-Officer. The attention required to prevent breakdowns and defects. The usual repairs and renewals required; supervision and inspection of machinery and boilers on board ship. Preparation of boilers and machinery for survey.

(bb) Section (h) (4) both sub-sections and also the general lay-out and operation of electric main propelling plant, the sequence of operations for starting, stopping, reversing and changing speed.

(cc) The practical requirements to ensure ship's stability at sea. Management of feed, fuel, ballast and bilge tanks. Filling and emptying tanks at sea. The effect of free liquid surfaces in tanks. Bilged compartments.

(dd) 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.

CANDIDATES FOR CHIEF ENGINEER-OFFICER'S STEAM AND COMBINED STEAM AND MOTOR CERTIFICATES AND CHIEF ENGINEER-OFFICER'S STEAM ENDORSEMENTS ONLY.

(ee) The principles and practice of surface condensation, superheating and the working of steam expansively. The economic and efficient use of coal and oil fuel.

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.

ANNEXURE D.**READING THE WATER-GAUGE.**

Notwithstanding that the reading of the water-gauge is made a special feature in the examination of Engineer-Officers, many boiler casualties result from the Engineer-Officer 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, 4 and 5, Plate I, 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 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 the water in the boiler. In other words, the gauge shows a false level. 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 water, notwithstanding that the water in the boiler may be at the 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 such 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 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 smokebox. 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 gauge 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 glass arising from the rolling or pitching motions of the vessel.

ANDER SPESIALE PUNTE WAAROP GELET MOET WORD.

Wanneer krane A en C weggelaat word, soos in figuur 2, is dit omdat die boring van die standpyp groot genoeg is om dit moontlik te maak om dit as deel van die ketel te beskou. Dit is egter noodsaaklik dat sulke pype by tussenposes ondersoek en skoongemaak moet word deur 'n stok deur die gate te druk wat vir dié doel by P.P. en Q.Q. aangebring is.

Krane by A en C is nie nodig vir die toetsing van peilglase wat ingerig is soos in figure 4 en 5 aangetoon nie. Kandidate moet egter terdeë daarvan bewus wees dat dit onmoontlik is om die betroubaarheid te toets van die aanduidings van waterpeilglase wat ingerig is soos in figuur 3 wanneer krane A en C ontbreek, en ook van die uitwerking wat die verstopping van kraan A of C, of pyp H of I, het op die aanduidings van die toetskrane T.T.T. wanneer hulle aan kolom Y vasgeheg is.

Baie drywende skepe is toegerus met waterpeilglase soos in figure 3 en 4 aangetoon, en dit is derhalwe veral belangrik dat ingenieur-kandidate deeglik op die hoogte moet wees van die bou van dergelike peilglase, die beginsel waarvolgens hulle werk en die stappe wat gedoen moet word om hulle in doeltreffende toestand te hou.

Wanneer 'n waterpeilglas in sy plek gemonteer word, is dit veral belangrik dat dit nie so hoog aangebring word dat 'n skoonmaakstok nie by G, figure 1, 2, 3, 4 en 5, ingevoeg kan word nie. Hierdie gebrek, veral as dit voorkom by 'n waterpeilglas wat vasgeheg is aan 'n ketel wat opkook, laat toe dat skuim vinnig vergader om die boonste gedeelte van die glas en veroorsaak die verstopping van die opening wat van kraan B na die waterpeilglas in elk van die figure lei.

As 'n waterpeilglas te kort is of te hoog of te laag in die monterings geplaas word, bestaan daar ook die moontlikheid dat dit verstopt sal raak deurdat die pakkingsmateriaal opgestoot word oor sy eindgedeeltes deur die drukstukke terwyl dit toegeskröef word.

Die gebruik van ongeskikte of onveilige binnepype in verband met die gewone watraskrane van die beskrywing in figuur 1 aangetoon, of met toetskrane wat aan die ketel self vasgelas is, behoort ook sorgvuldig vermy te word.

Ongevalle by die ketels is ook veroorsaak deurdat die onderdele van krane B en D verkeerd aangebring is, soos in figuur 6, Plaat II, aangetoon. In een geval van daardie soort wat die onderwerp uitmaak van verslag No. 208 kragtens die wet op stoomketelontploffings van die Verenigde Koninkryk, het die ingenieur wat die waterpeilglas getoets het, nie toegesien dat die passate in die krane B en D onbelas was toe die handvatsels in hul behoorlike werkposisie was nie. Hierdie gebrek kon maklik opgemerk gewees het as behoorlike aandag bestee was aan die toestand van die krane. 'n Gebrek van hierdie aard mag daaraan te wyte wees dat die peilglas aanvanklik gebrekkig gebou was of aan die feit dat die handvatsels van die kraan te styf toegedraai en die nek gedraai was. Of die passate in die proppe reg en onbelas is, kan egter binne 'n paar minute geverifieer word. By wyse van toeligting kan die waterkraan D, figuur 6, Plaat II, geverifieer word deur deur E te blaas met B toegedraai en deur dan die handvat van D na een kant toe te skuif totdat dit net toe is en dan na die ander kant toe totdat dit weer net toe is; die behoorlike werkposisie van die handvat is ongeveer ewe ver van elk van bostaande posisies. Die ander kraan kan op dieselfde wyse geverifieer word.

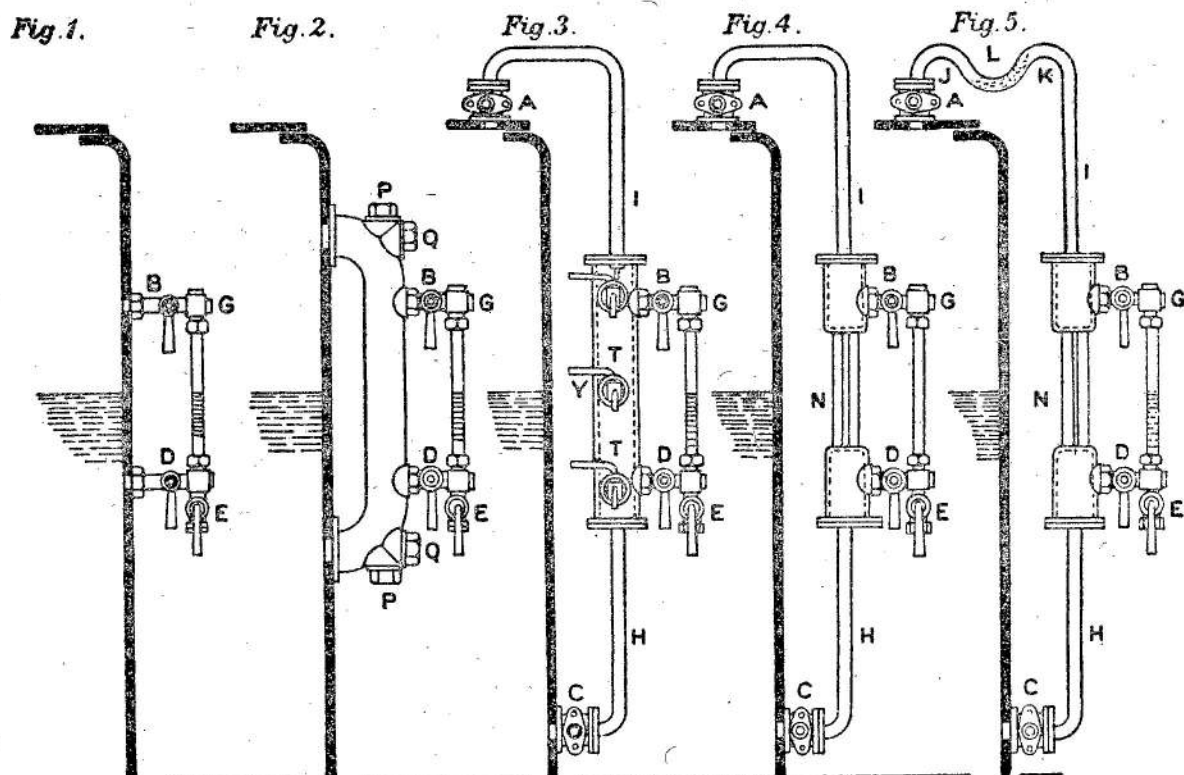
Nog 'n ernstige ongeval het plaasgevind deurdat die handvat van die kraan A, figuur 3, uit sy oorspronklike posisie relatief tot die opening van die kraan gedraai was en dit het daartoe gelei dat die kraan toe was wanneer dit gelyk het of dit oop was.

Wanneer daar deeglik geblaas is deur die waterpeilglas met al sy dele onbelas, styg die water in die glas bo die vlak waarop dit voorheen gestaan het onmiddellik nadat die aftapkraan E toegedraai is, maar as dit vir 'n tyd lank onversteurd gelaat word, daal dit geleidelik na sy vorige posisie. Die mate waarin die water by sulke geleenthede styg, hang hoofsaaklik af van die temperatuur van die inhoud van die ketel en van die lengte van die pype waarmee kolom Y bo en onder met die ketel verbind is, maar in gevalle waar die waterpeilglas ooreenstem met die beskrywing wat in figure 3, 4 en 5 toegelig is, is die styging in ketels van hoë drukking ongeveer vier duim, terwyl dit van 30 tot 40 minute duur voordat die water tot sy vorige vlak terugkeer. Die oorsaak van hierdie styging is tweeledig, naamlik, (a) die verskuiwing van die betreklike koue water in die pyp H deur warmer en, na verhouding, ligter water uit die ketel, en, (b) 'n effense kondensering van die stoom en 'n ooreenstemmende gedeeltelike vermindering van drukking in pyp I. Die oorsaak van die geleidelike daling van die water in die glas tot sy vorige vlak is ook van tweeledige aard, naamlik, (a) die afkoeling van die water in pyp H, en (b) die vermindering in die kondensering van stoom in pyp I weens die versameling daarin van lug wat van die gekondenseerde stoom vrygestel word.

Hierdie resultate sal egter ietwat gewysig word indien die water in die ketel van 'n hoër digtheid is as in pyp H, en dit sal byna altyd die geval wees weens die kondensering van die stoom in die glas en boonste monterings van die waterpeilglas, wat veroorsaak dat die water in die onderste deel varser is as in die ketel.

Kandidate behoort te begryp dat dit noodsaaklik is dat daar periodiek op stelselmatige en deeglike wyse deur die waterpeilglas aan elke ketel (wat die vorm ook al mag wees) geblaas word, en in gevalle waar 'n ketel met twee waterpeilglase toegerus is, dat albei voortdurend in gebruik gehou moet word. Ten slotte moet hulle besef dat dit noodsaaklik is dat die waterpeilglase goed belig, skoon en in alie opsigte doeltreffend gehou moet word.

PLAAT I.



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 gauge 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 whilst 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 1, 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 of the 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.

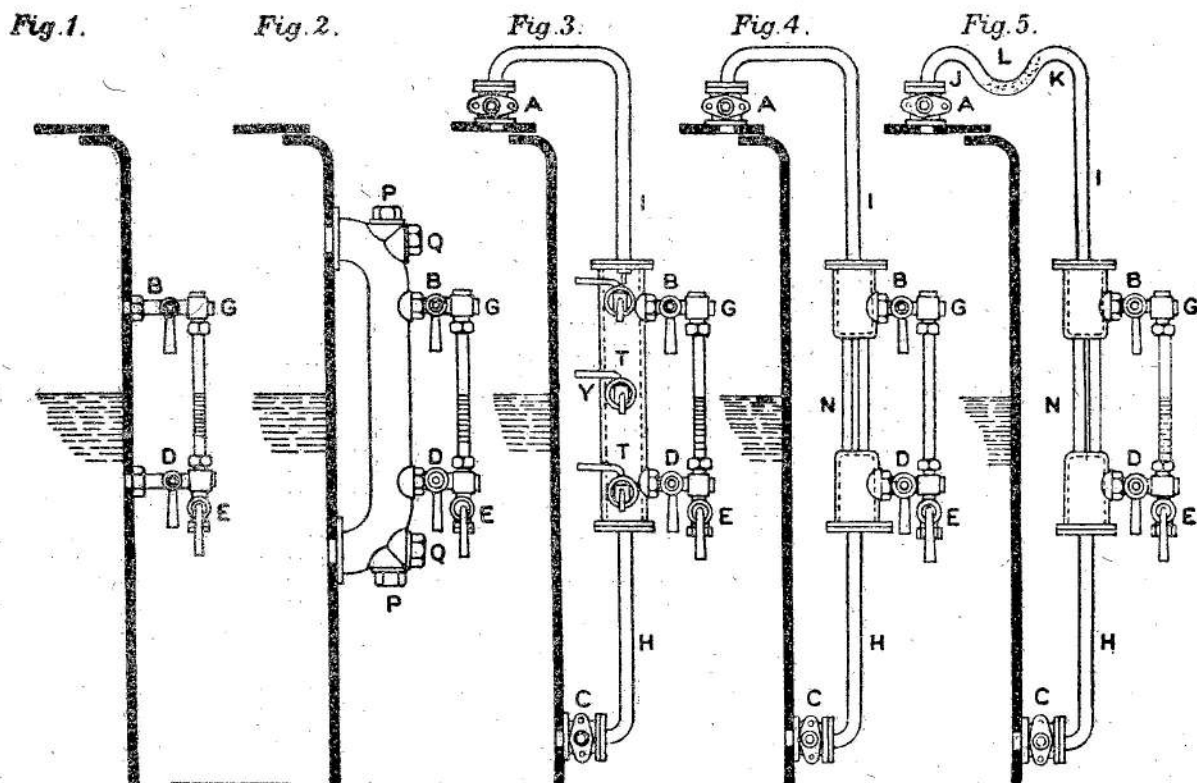
Another serious casualty occurred through the handle of the cock A, Figure 3, having been twisted from its original position relatively to the orifice of the cock, resulting in the cock being shut when apparently open.

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.

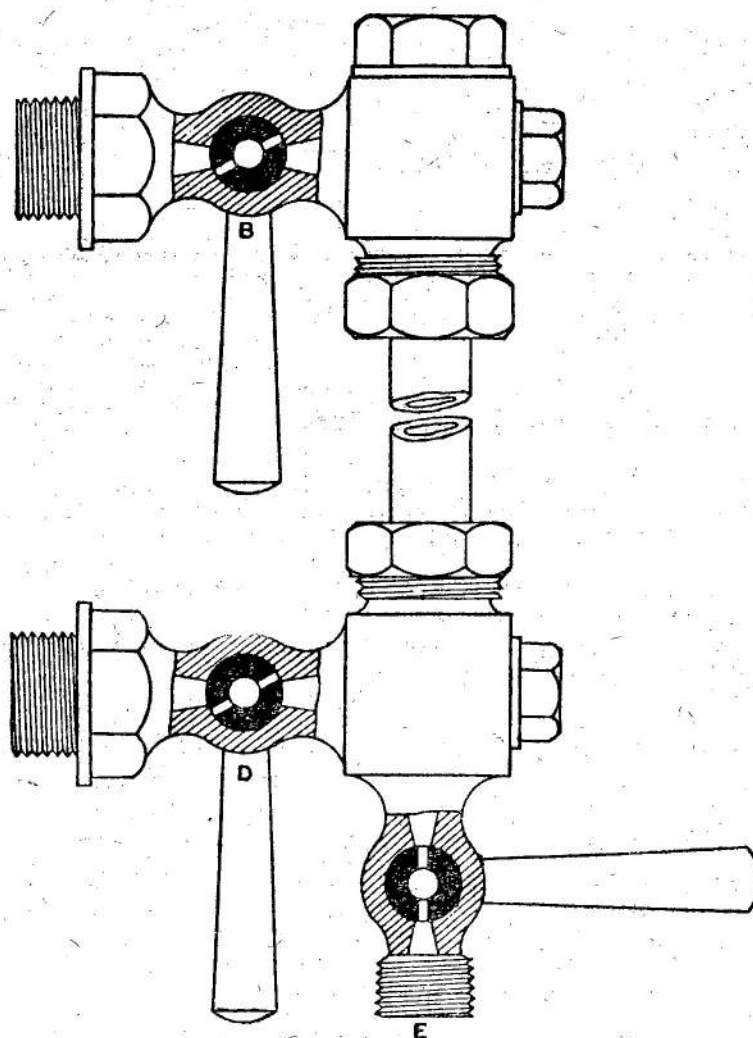
Candidates should understand the necessity for periodically blowing through the water-gauge on each boiler (no matter what the form may be) in a systematic and thorough manner, and in cases where a boiler is fitted with two water-gauges, of keeping both in constant use; finally, they should realize the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

PLATE I.



PLAAT II.

Fig. 6.



AANHANGSEL E.

HANDBOEKE.

Dit is moeilik om kandidate vir bekwaamheidsertifikate as hoof- en tweede ingenieuroffisiere raad te gee in verband met geskikte handboeke wat hulle by hul studies kan gebruik. Kandidate word aangeraai om die hoofde van hul plaaslike tegniese kolleges of tegniese skole te raadpleeg oor die keuse van handboeke wat handel oor die onderwerpe in Aanhangel C vermeld. Onderstaande lys, waaruit 'n geskikte keuse gemaak kan word, is egter omvattend genoeg om voorbereiding vir die Ekstra-eersteklaseertifikaat ook in te sluit en word vir die leiding van aspirantkandidate by hierdie regulasies ingesluit.

(LET WEL.—Die pryse word aangegee bloot as leidraad vir kandidate. Hulle behoort vas te stel wat die heersende pryse is voordat hulle enige van hierdie publikasies bestel.)

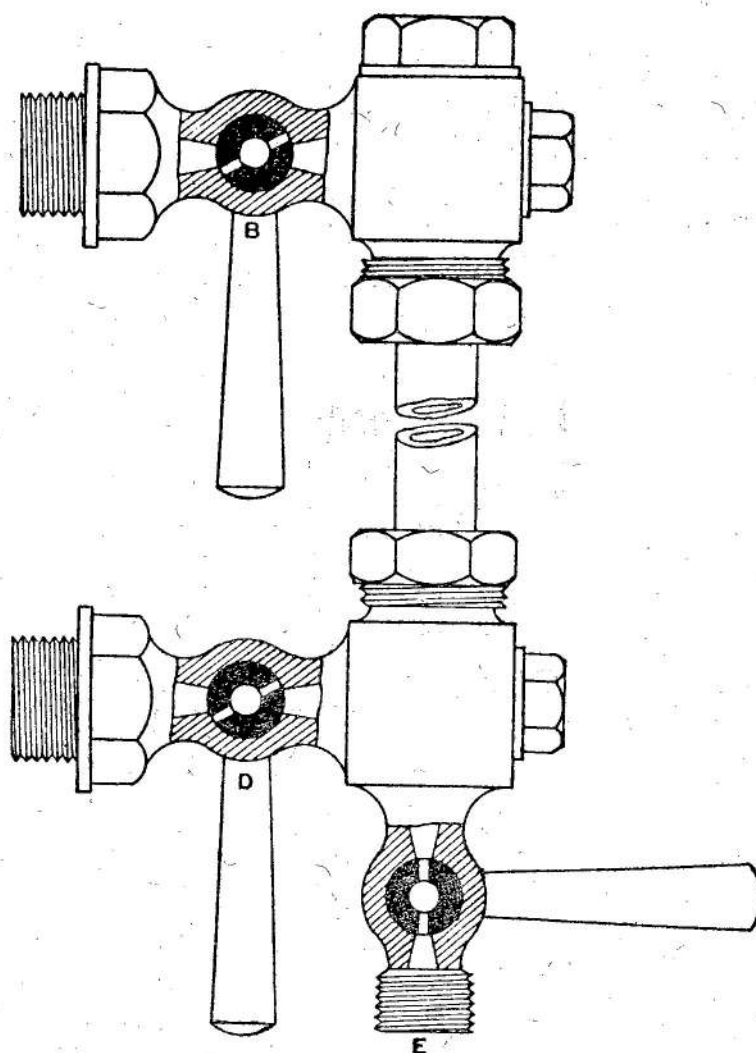
Titel.	Skrywer.	Uitgewer.
Mathematics, 15s.	B. B. Low	Longmans, Green & Co., Ltd.
Mathematics for Engineers, Vol. 1, 12s. 6d.; Vol. 2, 15s.	W. N. Rose	Chapman & Hall, Ltd.
Applied Mechanics, 15s.	D. A. Low	Longmans, Green & Co., Ltd.
Mechanics Applied to Engineering: Vol. 1, 21s.; Vol. 2, 18s.	J. Goodman	Longmans, Green & Co., Ltd.
Inchley's Theory of Heat Engines, 16s.	H. Wright Baker	Longmans, Green & Co., Ltd.
The Theory and Practice of Heat Engines, 25s.	R. H. Grundy	Longmans, Green & Co., Ltd.
Machine Drawing and Design, 7s. 6d.	W. Abbott	Blackie & Sons, Ltd.
Engineering Drawing and Design: Vol. 1, 7s. 6d.; Vol. 2, 5s.	S. H. Wells	Charles Griffin & Co., Ltd.
Elementary Electrical Engineering, 9s. 6d.	Clayton and Shelley	Longmans, Green & Co., Ltd.
Electrical Technology, 15s.	H. Cotton	Sir Isaac Pitman & Sons, Ltd.
Theoretical Naval Architecture, 21s.	E. L. Attwood	Longmans, Green & Co., Ltd.
Merchant Ship Construction, 21s.	H. J. Pursey	Brown, Son & Ferguson, Ltd.
Strength of Materials, 21s.	A. Morley	Longmans, Green & Co., Ltd.
Theory of Machines, 15s.	Toft & Kersey	Sir Isaac Pitman & Sons, Ltd.
Hydraulics, 15s.	E. H. Lewitt	Sir Isaac Pitman & Sons, Ltd.
Metallurgy for Engineers, 10s. 6d.	E. C. Rollason	Edward Arnold & Co.
Steam Turbine Operation, 15s.	W. J. Kearton	Sir Isaac Pitman & Sons, Ltd.
Marine Diesel Oil Engines, Vol. 1, 30s.; Vol. 2, 30s.	J. W. M. Sothorn	Jas. Munro & Co., Ltd.
The Running and Maintenance of Marine Machinery, 12s. 6d.	J. W. M. Sothorn	Inst. of Marine Engineers.
Naval Architecture and Ship Construction, 10s.	R. S. Hogg	Inst. of Marine Engineers.
Electricity Applied to Marine Engineering, 12s. 6d.	W. Laws	Inst. of Marine Engineers.
The Running and Maintenance of the Marine Diesel Engine, 30s.	J. Lamb	C. Griffin & Co.
Question and Answers on the Construction and Operation of Diesel, semi-Diesel, and other Internal Combustion Engines.	J. Lamb	C. Griffin & Co.
The Operation of Motorship Auxiliary Machinery (2 Vols.), 40s.	J. Lamb	C. Griffin & Co.

Kandidate word aangeraai om tegniese tydskrifte en die Transaksies van hul professionele inrigtings te lees. Onderstaande sirkulêres, ens., wat uitgereik word deur die Handelskeerpvaarddepartement van die Ministerie van Vervoer en Burgerlike Lugvaart van die Verenigde Koninkryk, kan ook met voordeel gelees word:—

Kennisgewing M. 106 (Hersien 1946): Fires in Steamship Bunker and Cargo Coal—Spontaneous Combustion.
Kennisgewing M. 355: Prevention of Fire in Cargo Ships using Oil Fuel.

PLATE II.

Fig. 6.



ANNEXURE E.

TEXT BOOKS.

It is difficult to advise candidates for certificates of competency as Chief and Second Engineer-Officers regarding suitable text books from which they should study. Candidates are advised to consult the Principals of their local Technical Colleges or Schools regarding the choice of text books which will deal with the subjects mentioned in Annexure C. The list given below, from which a suitable choice may be made, is however, sufficiently comprehensive to include preparation for the Extra First Class Certificate also and is included in these regulations for the guidance of intending candidates.

(NOTE.—The prices are shown merely as a guide to candidates who should ascertain the current prices before ordering any publication.)

Title.	Author.	Publisher.
Mathematics, 15s.....	B. B. Low.....	Longmans, Green & Co., Ltd.
Mathematics for Engineers, Vol. 1, 12s. 6d.; Vol. 2, 15s.....	W. N. Rose.....	Chapman & Hall, Ltd.
Applied Mechanics, 15s.....	D. A. Low.....	Longmans, Green & Co., Ltd.
Mechanics Applied to Engineering: Vol. 1, 21s.; Vol. 2, 18s.....	J. Goodman.....	Longmans, Green & Co., Ltd.
Inchley's Theory of Heat Engines, 16s.....	H. Wright Baker.....	Longmans, Green & Co., Ltd.
The Theory and Practice of Heat Engines, 25s.....	R. H. Grundy.....	Longmans, Green & Co., Ltd.
Machine Drawing and Design, 7s. 6d.....	W. Abbott.....	Blackie & Sons, Ltd.
Engineering Drawing and Design: Vol. 1, 7s. 6d.; Vol. 2, 5s.....	S. H. Wells.....	Charles Griffin & Co., Ltd.
Elementary Electrical Engineering, 9s. 6d.....	Clayton and Shelley.....	Longmans, Green & Co., Ltd.
Electrical Technology, 15s.....	H. Cotton.....	Sir Isaac Pitman & Sons, Ltd.
Theoretical Naval Architecture, 21s.....	E. L. Attwood.....	Longmans, Green & Co., Ltd.
Merchant Ship Construction, 21s.....	H. J. Pursey.....	Brown, Son & Ferguson, Ltd.
Strength of Materials, 21s.....	A. Morley.....	Longmans, Green & Co., Ltd.
Theory of Machines, 15s.....	Toft & Kersey.....	Sir Isaac Pitman & Sons, Ltd.
Hydraulics, 15s.....	E. H. Lewitt.....	Sir Isaac Pitman & Sons, Ltd.
Metallurgy for Engineers, 10s. 6d.....	E. C. Rollason.....	Edward Arnold & Co.
Steam Turbine Operation, 15s.....	W. J. Kearton.....	Sir Isaac Pitman & Sons, Ltd.
Marine Diesel Oil Engines, Vol. 1, 30s.; Vol. 2, 30s.....	J. W. M. Sothorn.....	Jas. Munro & Co., Ltd.
The running and Maintenance of Marine Machinery, 12s. 6d.....	J. W. M. Sothorn.....	Inst. of Marine Engineers.
Naval Architecture and Ship Construction, 10s.....	R. S. Hogg.....	Inst. of Marine Engineers.
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The Running and Maintenance of the Marine Diesel Engine, 30s.....	J. Lamb.....	C. Griffin & Co.
Question and Answers on the Construction and Operation of Diesel, semi-Diesel, and other Internal Combustion Engines.....	J. Lamb.....	C. Griffin & Co.
The Operation of Motorship Auxiliary Machinery (2 Vols.), 40s.....	J. Lamb.....	C. Griffin & Co.

Candidates are advised to read technical journals and the Transactions of their professional institutions. The following Circulars, etc., issued by the Mercantile Marine Department of the United Kingdom Ministry of Transport and Civil Aviation might also be read with advantage:—

- Notice M. 106 (Revised 1946): Fires in Steamship Bunker and Cargo Coal—Spontaneous Combustion.
 Notice M. 355: Prevention of Fire in Cargo Ships using Oil Fuel.

AANHANGSEL F.
VOORBEELD VAN VRAESTELLE.
EKSAMEN VIR INGENIEUROFFISIERS.
WARMTE EN WARMTEMASJINE.
HOOF-INGENIEUROFFISIER.

Moenie hierdie vraestel skend of merke daarop maak nie.

Moenie die vroe afskryf nie.

Gegewens wat miskien nodig gekry sal word, kan gevind word op die eerste bladsy van die antwoordboek of in die wiskundetafels wat verskaf word.

BEANTWOORD NET SES VRAE.

(Tyd toegelaat: 3 uur.)

1. Definieer „latente warmte”. 'n Hoeveelheid ys by 25° F. word in 'n tenk met water by 42° F. gegooi, waarna stoom onder 'n druk van 225 lb./vk. dm. abs., droogheidsfaktor 0.89, in die mengsel ingeblaas word. As die verhouding, volgens gewig, van water tot ys 2:1 en die eindtemperatuur 70° F. is, bepaal die gewig stoom wat bygevoeg is, uitgedruk in 'n persentasie van die aanvanklike gewig water. Gebruik die stoomtafels wat verskaf word.

2. 'n Silindriese tenk, 3 voet in deursnee en 10 voet hoog, het geslote ente, staan met sy lengteas vertikaal en bevat soetwater tot 'n diepte van 8 vt. Die lug binne-in die tenk is oorspronklik onder atmosferiese druk van 14.7 lb./vk. dm. abs., toe die luggat bo-in die tenk toegestop en 'n klein kraantjie onderin die tenk oopgedraai word.

As veronderstel word dat die temperatuur binne-in die tenk konstant bly en dat geen lug uitlek nie, bepaal—

- (a) die hoeveelheid water wat uit die tenk sal loop; en
(b) die eindlugdruk binne-in die tenk.

3. 'n Sessilinder tweeslag enkelwerkende olie-enjin met kompressie-ontsteking het 'n brandolieverbruik van 0.35 lb./a.p.k./uur om 3,800 a.p.k. by 90 o.p.m. te ontwikkel. Die ontleding van die verbrande brandolie was soos volg: koolstof 84 persent, waterstof 11.5 persent, suurstof 3.5 persent en onverbrandbare stowwe 1 persent.

As 9 kub. vt. lug by 89° F. en onder 'n meterdruk van 2 lb./vk. dm. met elke slag per silinder saamgepers word, wat is—

- (a) die gewig lug wat vereis word vir teoretiese algehele verbranding per slag; en
(b) wat is die persentasie oorgewig van die lug wat per slag saamgepers word?

Let Wel.—Die gewig van 1 kub. vt. lug by 32° F. en onder atmosferiese druk is 0.0807 lb. Die atoomgewig van suurstof is 16 en dié van koolstof is 12, en lug bevat 23 persent suurstof per gewig.

4. Die stoom wat by die straalsyp van 'n pulsturbine met 'n snelheid van 3,200 vt./sek. uitkom, tref die eerste ry blaasie wat met 'n snelheid van 750 vt./sek. draai sonder skok. Die straalsyphoek is 18° en die blaasie is gelykhoekig. As wrywing buiterekening gelaat word, bereken—

- (a) die ingangshoek van die blaasie; en
(b) die absolute uitgangsnelheid van die stoom.

5. 'n Kompressie-ontstekingsenjin gebruik 0.36 lb. olie per aangewese perdekrags per uur. Die persentasieontleding van die gebruikte olie is: koolstof 86, waterstof 12.2 en suurstof 1.6. As die meganiese rendement van die enjin 90 persent is, bepaal die termiese nuttige remeffek van die enjin, as die kaloriese waardes in B.Th.U/lb. koolstof en waterstof onderskeidelik 14,500 en 62,000 is.

6. Stoom onder 'n druk van 200 lb./vk. dm. abs. en met 'n droogheidsfaktor van 0.95 word tot 'n druk van 60 lb./vk. dm. abs. gesmoor. Daarna word dit toegelaat om adiabaties uit te sit tot 'n druk van 15 lb./vk. dm. abs., en die uitsettingsindeks vasgestel as $\frac{1}{2}$. Bepaal die gehalte van die stoom—

- (a) na smoring; en
(b) na uitsetting.

7. Die masjien van 'n sekere skip word gevoer met 13.5 lb. droë versadigde stoom/a.p.k./uur onder 'n druk van 250 lb./vk. dm. abs. en uitlaat vind plaas onder 'n druk van 1.8 lb./vk. dm. abs. met 'n droogheidsfaktor van 0.88.

Die ketels word nou toegerus met oorverwarmers wat stoom lewer wat tot 625° F. oorverhit is. Die aanvangs- en einddruk bly soos vantevore maar die eindtoestand is nou 0.97 droog.

As in aanmerking geneem word dat dieselfde warmtedaling in elke geval dieselfde a.p.k. en gelyke aandryftoestande sal lewer, bereken—

- (a) die gewig oorverhitte stoom vereis/a.p.k./uur;
(b) die nuwe afsluiting in die H.D.-silinder as dit met versadigde stoom by $\frac{1}{2}$ slag plaasgevind het.

Gebruik die stoomtafels wat verskaf word en neem die soortlike warmte van oorverhitte stoom oor die vereiste strek as 0.57 en die soortlike volume by 250 lb./625° F. as 2.45 kub. vt./lb.

8. Stoom word in die silinder van 'n masjien ingelaat onder 'n druk van 220 lb./vk. dm. abs., afsluiting vind plaas by 0.6 van die slag en daar kan aangeneem word dat die uitlaat toe bly tot aan die end van die slag. Die teendruk is 90 lb./vk. dm. abs. en die periode van uitlaatopening is sodanig dat die kompressiedruk aan die end van die terugslag 200 lb./vk. dm. abs. is. Die vryslagvolume is 9 persent van die slagvolume en die uitsettings- en kompressiekrommes kan as hiperbolies aangeneem word.

Skets en bereken die afmetings van die teoretiese indikateurdiagram en bepaal—

- (a) die breuk van die suierslag waarvoor die uitlaatopening gesluit is; en
(b) die teoretiese gemiddelde effektiewe druk deur algebraïese byvoeging van oppervlakte, met inagneming daarvan dat die oppervlakte onder 'n hiperboliese kromme gegee word deur die uitdrukking $P_1 V_1 \log_e r$ waar die simbole hulle gewone betekenis het.

9. 'n CO₂-koelinstallasie maak gebruik van tussenvloeistofkoeling.

Wanneer die gas by die kondensator ingaan waar die druk op 950 lb./vk. dm. abs. gehandhaaf word, word dit vloeibaar gemaak sonder onderkoeling en by die eerste reguleurklep gesmoor voordat dit in 'n skeier ingaan waarin die druk op 400 lb./vk. dm. abs. gehandhaaf word. Die ontbrande damp word weggetrek en die oorblywende vloeistof word by die tweede reguleur gesmoor om die verdamper onder 'n druk van 285 lb./vk. dm. abs. binne te gaan. Die damp het 'n droogheidsfaktor van 0.95 wanneer dit die verdamper verlaat.

Bepaal deur gebruikmaking van die volgende tabel wat die bestanddele van CO₂ aangee—

- (i) die droogheidsfaktor van die damp (a) wanneer dit die skeier binnegaan en (b) wanneer dit die verdamper binnegaan;
(ii) die warmte wat in die verdamper weggeneem word per lb. vloeibare CO₂ wat die kondensator verlaat.

Druk (lb./vk. dm. abs.)	B.Th.U per lb.	
	<i>h</i> (Vloeihitte).	<i>L</i> (Latente Warmte).
950.....	214.5	—
400.....	171.0	111.0
285.....	160.0	122.3

ANNEXURE F.

SPECIMEN EXAMINATION PAPERS.

EXAMINATION OF ENGINEER OFFICERS.

HEAT AND HEAT ENGINES.

CHIEF ENGINEER OFFICER.

Do not deface or make any marks on this paper.

Do not copy the questions.

Data that might be required may be found on the first page of the answer book, or in the mathematical tables provided.

SIX QUESTIONS ONLY TO BE ATTEMPTED.

(Time allowed: 3 hours.)

1. Define Latent Heat. A quantity of ice at 25°F . is dropped into a tank containing water at 42°F . and steam at 225 lb./sq. in. abs., dryness fraction 0.89, is then blown into the mixture. If the ratio by weight of water to ice is 2:1, and the final temperature is 70°F . find, using the steam tables provided, the weight of steam added expressed as a percentage of the initial weight of water.

2. A cylindrical tank 3 ft. in diameter and 10 ft. in height has closed ends, it stands with its longitudinal axis vertical and contains fresh water to a depth of 8 ft. The air inside the tank is originally at atmospheric pressure of 14.7 lb./sq. in. abs., when the air hole on top of the tank is plugged and a small cock on the bottom of the tank opened.

Assuming the temperature inside the tank to remain constant and that no leakage of air occurs, determine—

- the quantity of water that will leave the tank; and
- the final air pressure inside the tank.

3. A six-cylinder two-stroke cycle single-acting compression ignition oil engine, when developing 3,800 i.h.p. at 90 r.p.m., has a fuel oil consumption of 0.35 lb./i.h.p./hr. The analysis of the fuel oil burned was carbon 84 per cent, hydrogen 11.5 per cent, oxygen 3.5 per cent and incombustibles 1 per cent.

If 9 cu. ft. of air at 89°F . and at a pressure of 2 lb./sq. in. gauge are compressed each stroke per cylinder, what is—

- the weight of air required for theoretical complete combustion per stroke; and
- what is the percentage excess weight of the air compressed per stroke?

Note.—1 cu. ft. of air at 32°F . and at atmospheric pressure weighs 0.0807 lb. The atomic weight of oxygen is 16 and of carbon 12, and air contains 23 per cent by weight of oxygen.

4. The steam issuing from the nozzles of an impulse turbine at a velocity of 3,200 ft./sec. impinges without shock on the first row of blades which are moving with a velocity of 750 ft./sec. The nozzle angle is 18° and the blades are equiangular. If friction is neglected, calculate (a) the entrance angle of the blades, and (b) the absolute exit velocity of the steam.

5. A compression ignition engine uses 0.36 lb. of oil per indicated horse-power per hour. The percentage analysis of the oil used, is carbon 86, hydrogen 12.2 and oxygen 1.6. If the mechanical efficiency of the engine is 90 per cent, determine the brake thermal efficiency of the engine, given that the calorific values in B.Th.U./lb. of carbon and hydrogen are 14,500 and 62,000 respectively.

6. Steam at a pressure of 200 lb./sq. in. abs. and with a dryness fraction of 0.95 is throttled to a pressure of 60 lb./sq. in. abs. It is then expanded adiabatically to a pressure of 15 lb./sq. in. abs., the index of expansion being assessed as $\frac{5}{8}$. Determine the quality of the steam (a) after throttling and (b) after expansion.

7. The engines of a certain vessel are supplied with 13.5 lb. of dry saturated steam/i.h.p./hr. at a pressure of 250 lb./sq. in. abs. and exhaust takes place at 1.8 lb./sq. in. abs. with a dryness fraction of 0.88.

The boilers are now fitted with superheaters which supply steam superheated to 625°F . Initial and final pressures remain as before but the final condition is now 0.97 dry.

Considering that the same heat drop in each case will produce the same i.h.p. and equal propulsive conditions, calculate—

- the weight of superheated steam required/i.h.p./hr.;
- the new cut-off in the H.P. cylinder if on saturated steam it was at $\frac{5}{8}$ stroke.

Use the steam tables provided and take the specific heat of superheated steam over the range required as 0.57 and the specific volume at 250 lb./ 625°F . as 2.45 cub. ft./lb.

8. Steam is admitted to an engine cylinder at a pressure of 220 lb./sq. in. abs., cut-off occurs at 0.6 of the stroke and it may be assumed that the exhaust remains closed until the end of the stroke. The back pressure is 90 lb./sq. in. abs., and the period of exhaust opening is such that the compression pressure at the end of the return stroke is 200 lb./sq. in. abs. The clearance volume is 9 per cent of the stroke volume and the expansion and compression curves may be assumed to be hyperbolic.

Sketch and dimension the theoretical indicator diagram and determine—

- the fraction of the piston stroke for which the exhaust port is closed; and
- the theoretical mean effective pressure, by algebraic addition of areas, observing that the area under a hyperbolic curve is given by the expression $P_1 V_1 \log_e r$ where the symbols have their usual significance.

9. A CO_2 refrigerating plant employs intermediate liquid cooling.

The gas on entering the condenser where the pressure is maintained at 950 lb./sq. in. abs., is liquefied without undercooling and is throttled at the first regulator valve before entering a separator wherein the pressure is maintained at 400 lb./sq. in. abs. the “flashed” vapour being withdrawn and the remaining liquid is throttled at the second regulator to enter the evaporator at a pressure of 285 lb./sq. in. abs. The vapour has a dryness fraction of 0.95 when leaving the evaporator.

Using the following table giving the properties of CO_2 , determine—

- the dryness fraction of the vapour (a) entering the separator, and (b) entering the evaporator,
- the heat extracted in the evaporator per lb. of liquid CO_2 leaving the condenser.

Pressure (lb./sq. in. abs.).	B.Th.U. per lb.	
	h (Liquid Heat).	L (Latent Heat).
950.....	214.5	—
400.....	171.0	111.0
285.....	160.0	122.3

EKSAMEN VIR INGENIEUR-OFFISIERS.
ALGEMENE INGENIEURSWETENSKAP.
HOOF-INGENIEUROFFISIER.

Moenie hierdie vraestel skend of merke daarop maak nie.

Moenie die vrae afskryf nie.

Gegewens wat miskien nodig gekry sal word, kan gevind word op die eerste bladsy van die antwoordboek of in die wiskundetfels wat verskaf word.

BEANTWOORD NET SES VRAE.

(Tyd toegelaat: 3 uur.)

1. 'n Tafel is van staal gemaak. Die blad het 'n deursnee van 5 vt. by 1 dm. dik. Dit weeg 800 lb. en aan die onderkant daarvan is 4 vertikale pote, 2 dm. in deursnee by 3 vt. lank, ewever van mekaar op 'n steeksirkel van 4 vt. 5.75 dm. in deursnee vasgesweis. Elke poot weeg 32 lb.

Bereken die minimum krag wat op die kant van die tafel uitgeoefen moet word om dit op twee pote te laat kantel wanneer—

- (a) die krag regaf uitgeoefen word; en
(b) die krag regop uitgeoefen word, en bepaal die arbeid verrig in voetpond in elke geval om die tafel te laat kantel tot by die punt waar dit wil omval.

2. 'n Oop silindriese vat met 'n halfronde boom het 'n deursnee van 3 vt. en 'n totale diepte van 6 vt. 6 dm. en weeg 375 lb. Olie met 'n soortlike gewig van 0.9 word in die vat gegooi totdat dit, met sy as vertikaal, 5 vt. diep in soetwater dryf. Wat is die diepte van die olie in die vat?

3. 'n Liggaam word met 'n aanvangsnelheid van 110 vt./sek. loodreg opgeskiet. Vanaf dieselfde plek word 'n tweede liggaam 4 sek. later op dieselfde manier met 'n aanvangsnelheid van 130 vt./sek. opgeskiet.

Bepaal die hoogte waarop hulle mekaar sal verbygaan hoe lank die eerste liggaam op dié moment al in vlug is en of dit dan besig is om te styg of te daal.

4. 'n Kort kolom word gemaak deur twee U-ysters 6 dm. by 3 dm. rug-aan-rug aanmekaar te sweis. 'n Las 3W werk loodreg na onder deur die middelpunt van die kolom en 'n las W werk op 'n punt halfpad tussen die flense van die een U-yster en 4 dm. van die agterste pasvlak. As die drukspanning in die dwarsprofiel van die kolom hoogstens 8 ton/vk. dm. moet wees, bepaal W. Die oppervlakte van elke U-profiel is 3.65 vk. dm. en die I van elke profiel om 'n as parallel aan die rug van die U-yster en 0.89 dm. daarvandaan is 21.27 dm.⁴ eenhede.

$$\text{Let Wel.} - \frac{M}{I} = \frac{f}{y}$$

Verder.—Die traagheidsmoment van 'n figuur om 'n as is gelyk aan die traagheidsmoment van dié figuur om 'n parallelle as deur die sentroïed, plus die oppervlakte van die figuur maal die kwadraat van die afstand tussen die asse.

5. 'n Stuk slang 40 vt. lank met 'n boring van 2 dm. word met 'n seewaterhoofleiding verbind waar die druk op 100 lb./vk. dm. gehandhaaf word. 'n Straalpyp met 'n uitlaat van 0.75 in deursnee word aan die ander ent van die slang aangesit en by gebruik is die straalpyp uitlaat 20 vt. bokant die hoofverbinding. Bereken die snelheid van die straal, as die verliese in die straalpyp onbeduidend is en die verlies

aan drukhoogte in die slang as gevolg van wrywing = $\frac{4flv^2}{d 2g}$ vt.

waar f = wrywingskoeffisiënt, in hierdie geval 0.01.

l = lengte van slang (vt.).

v = snelheid in slang (vt./sek.).

g = 32 vt./sek./sek.

d = deursnee van slang (vt.).

6. Die koerse van twee skepe kruis mekaar. Skip A vaar reg suid met 'n snelheid van 12½ knope en is 2 seemyl van die punt waar die koerse mekaar sny. Skip B vaar 20 grade N. van W. met 'n snelheid van 11 knope en is 5 seemyl van hierdie punt af.

Bepaal, grafies, hoe ver elke skip van die snypunt van die koerse sal wees wanneer hulle die naaste aanmekaar is, asook hoe lank dit hulle geneem het om in genoemde posisies te kom.

7. Die lengtenaaf van 'n stoomketel is 'n dubbele striplas met drie rye klinknaels waarvan al om die ander klinknael in die buitenste ry weggelaat is. Die huidplaat is 1½ duim dik en die klinknael- en plaatseksies is van dieselfde nuttigheidsgraad. Bepaal die deursnee en buitesteek van klinknaels vir maksimum nuttigheidsgraad as die steek nie 8½ dm. te bowe mag gaan nie. Gee 23 ton toe vir klinknael-skuifvastheid, 29 ton vir plaattrekvastheid, en 1.875 vir dubbelskuiwing.

Skets 'n gedeelte van die las.

8. In 'n horisontale suiermasjien is die suierslaglengte 2 vt. en die lengte van die suierstang 4 vt. Bepaal die maksimum suiersnelheid en die gemiddelde suiersnelheid wanneer die masjien teen 120 o.p.m. loop.

Skets 'n diagram met aanduiding van 'n punt waarom, vir 'n gegewe oomblik, die middelpunte van die kruiskop en krukkop geag kan word te draai en bereken, deur gebruik van hierdie diagram, die suiersnelheid wanneer die kruk 45 grade verby en bo die binneste dooie-punt is.

9. 'n Ronde staaltaaf, 2 dm. in deursnee en 17 duim lank, word vir 7 dm. van sy middellengte tot 1½ dm. in deursnee verminder. Toe die staaf aan 'n direkte trek onderwerp is, is opgemerk dat die totale verlenging 0.0015 dm. was. Bereken die spanning in elke seksie. $E = 30 \times 10^6$ lb./dm.²

EKSAMEN VIR INGENIEUROFFISIERS.

SKEEPSONTWERP.

HOOF-INGENIEUROFFISIER.

Tyd toegelaat vir hierdie vraestel tesame met die vraestel oor elektrotegnologie is 3 uur.

Moenie hierdie vraestel skend of enige merke hoegenaamd daarop maak nie.

Moenie die vrae afskryf nie.

Gegewens wat miskien nodig gekry sal word, kan gevind word op die eerste bladsy van die antwoordboek of in die wiskundetfels wat verskaf word.

BEANTWOORD NET DRIE VRAE.

5. 'n Dryfkraan het 'n kasvormige ponton 180 vt. lank, 80 vt. wyd en die diepgang gelyklastig in seewater is 16 vt. As die swaartepunt 20 vt. bokant die kiel is, bereken die langsskeepse metasentriese hoogte.

Bepaal die diepgange voor en agter in die eindstand wanneer 'n vrag van 80 ton deur die kraan van die dek van die ponton gelig word, 80 vt. voor sy oorspronklike posisie geswaai en in hangende posisie gehou bo die voorste en agterste middellyn, as die kop van die boom 100 vt. bokant die dek is.

EXAMINATION OF ENGINEER OFFICERS.

GENERAL ENGINEERING SCIENCE.

CHIEF ENGINEER OFFICER.

Do not deface or make any marks on this paper.

Do not copy the questions.

Data that might be required may be found on the first page of the answer book, or in the mathematical tables provided.

SIX QUESTIONS ONLY TO BE ATTEMPTED.

(Time allowed: 3 hours).

1. A table is made of steel. The top is 5 ft. diameter by 1 inch in thickness, its weight is 800 lb. and to the under side are welded 4 vertical legs 2 inches in diameter by 3 ft. in length, equally spaced on a pitch circle of 4 ft. 5.75 in diameter. Each leg weighs 32 lb.

Calculate what minimum force applied at the edge of the table would cause it to tilt on two legs when—

- (a) the force is applied directly downward; and
(b) the force is applied directly upward;

and determine the work done in foot-pounds in each case in tilting the table to the extent that it is on the point of falling over.

2. An open cylindrical vessel fitted with a hemispherical bottom is 3 ft. in diameter and 6 ft. 6 inches in depth overall, its weight being 375 lb. Oil of specific gravity 0.9 is placed in the vessel until, when floating in fresh water with its axis vertical, the draught becomes 5 ft. What is the depth of the oil in the vessel?

3. A body is projected vertically upwards with an initial velocity of 110 ft./sec. From the same place 4 sec. afterwards a second body is similarly projected with an initial velocity of 130 ft./sec.

Find at what height they pass each other, the time the first body has been in flight at this instant and whether it is rising or falling?

4. A short column is made by welding two 6 in. by 3 in. channels back to back. A load $3W$ acts vertically downwards through the centre of the column and a vertical load W acts at a point midway between the flanges of one channel and 4 in. from the back mating surface. If the compressive stress in the cross section of the column is not to exceed 8 tons/sq. in., find W . The area of each channel section is 3.65 sq. in. and the I of each section about an axis parallel to the back of the channel and 0.89 in. from it is 21.27 in.⁴ units.

$$\text{Note.} \quad \frac{M}{I} = \frac{f}{y}$$

Also.—The moment of inertia of a figure about an axis is equal to the moment of inertia of the figure about a parallel axis through the centroid plus the area of the figure multiplied by the square of the distance between the axis.

5. A 40 ft. length of 2 in. bore hose is connected to a sea-water main where the pressure is maintained at 100 lb./sq. in. A nozzle having an outlet of 0.75 in. diameter is fitted to the other end of the hose and when in use the nozzle outlet is 20 ft. above the main connection. Calculate the velocity of the jet given that the losses in the nozzle are negligible and the loss of head in the hose due to friction

$$= \frac{4fv^2}{d} \text{ ft.}$$

where f = friction coefficient, in this case 0.01.

l = length of hose (ft.).

v = velocity in hose (ft./sec.).

g = 32 ft./sec./sec.

d = diameter of hose (ft.).

6. The courses of two vessels cross. Ship A, which is steaming due south at 12½ knots, is 2 nautical miles distant from the point of intersection of the courses. Ship B, which is steaming 20 degrees N. of W. at 11 knots, is 5 nautical miles from this point.

Determine, graphically, the distance each vessel will be from the point of intersection of the courses when they are nearest together, also the time since being in the positions stated.

7. The longitudinal seam of a boiler is a treble riveted double butt strap joint, having each alternate rivet omitted from the outer row. The shell plate is 1½ inches in thickness and the rivet and plate sections are of equal efficiency. Find the diameter and outer pitch of rivets for maximum efficiency if the pitch is not to exceed 8½ in. Allow 23 tons for rivet shearing strength, 29 tons for plate tensile strength and 1.875 for double shear.

Sketch a portion of the joint.

8. In a horizontal reciprocating engine the stroke is 2 ft. and the length of the connecting rod 4 ft. Determine, when the engine is working at 120 r.p.m. the maximum piston speed, and the mean piston speed.

Sketch a diagram indicating a point about which, for a given instant, the centres of the cross-head and crank-head may be considered as rotating and, using this diagram, calculate the piston speed when the crank is 45 degrees past and above the inner dead centre.

9. A round steel bar of 2 in. diameter and 17 inches in length is reduced to 1½ in. diameter for 7 in. of its mid-length. When the bar was subjected to a direct pull it was noted that the total elongation was 0.0015 in. Calculate the stress in each section. $E = 30 \times 10^3 \text{ lb./in.}^2$

EXAMINATION OF ENGINEER OFFICERS.

NAVAL ARCHITECTURE.

CHIEF ENGINEER OFFICER.

Time allowed for this question paper together with the question paper on electrotechnology is 3 hours.

Do not deface or make any marks whatever on this paper.

Do not copy the questions.

Data that might be required may be found on the first page of the answer book, or in the mathematical tables provided.

THREE QUESTIONS ONLY TO BE ATTEMPTED.

5. A floating crane has a box-shaped pontoon 180 ft. long, 80 ft. wide and the draught on an even keel in sea water is 16 ft. If the centre of gravity is 20 ft. above the keel calculate the longitudinal metacentric height.

Find the draughts fore and aft in the final condition when a load of 80 tons is lifted by the crane from the deck of the pontoon, swung 80 ft. forward of its original position, and held suspended above the fore and aft centre line, if the head of the jib is 100 ft. above the deck.

6. Hoe beïnvloed veranderinge in weerstand, snelheid of aangewese perdekrag die stukrag van 'n skip?

Gee 'n uitdrukking waarin hulle verbind word.

Met die oorspronklike skroef, 19 vt. 6 dm. in deursnee en met 'n steek van 21 vt. 6 dm. en 'n ekwivalente gemiddelde effektiewe druk van 32 lb./vk. dm., is die snelheid van die masjien 68 o.p.m. Daar word besluit om die ekwivalente gemiddelde effektiewe druk tot 27 lb./vk. dm. te verminder en die o.p.m. tot 72 te verhoog.

Bepaal wat die steek van die skroef moet wees as die deursnee soos voorheen bly.

7. 'n Skip met 'n verplasing van 8,000 ton lê gelyklastig met 'n diepgang van 28 vt. en die moment om die trim 1 dm. te verander, is 850 tonvoet. Gewigte word soos volg aan boord geplaas: een van 170 ton 75 vt. agter die skip se swaartepunt en een van 75 ton 35 vt. voor die skip se swaartepunt. As die ton per duim indompeling 40 is en die posisie van die dryfmiddelpunt op die middellengte bly, bereken die nuwe diepgange voor en agter.

8. Sê kortliks wat die volgende uitdrukkings beteken en gee die gewone simbole en eenhede wat in elke geval gebruik word:—

(a) statiese stabiliteit; en

(b) dwarsskepe metasentriese hoogte.

'n Skip met 'n verplasing van 7,300 ton het 'n metasentriese hoogte van 2.4 vt. Nadat 'n sekere hoeveelheid brandstof waarvan die SP 26.5 vt. van die middellyn lê, verbruik is, het die skip 'n slagsy van 5 grade ontwikkel. Watter gewig brandstof is verbruik? As die brandstof in 'n dubbelboomkompartement is, sal die dwarsskepe metasentriese hoogte beïnvloed word en, indien wel, is die syferantwoord streng korrek?

EKSAMEN VIR INGENIEUROFFISIERS.

ELEKTROTEGNOLOGIE.

HOOF-INGENIEUROFFISIER.

Tyd toegelaat vir hierdie vraestel *tesame met die vraestel oor skeepsontwerp* is 3 uur.

Moenie hierdie vraestel skend of enige merke hoegenaamd daarop maak nie.

Moenie die vrae afskryf nie.

Gegewens wat miskien nodig gekry sal word, kan gevind word op die eerste bladsy van die antwoordboek of in die wiskundetafels wat verskaf word.

BEANTWOORD NET DRIE VRAE.

1. Noem die wette van Kirchoff.

'n Tweedraad ringhoofleiding van 2,000 jaart lank word by 'n punt A met 220 volts gevoer. By 'n punt B sowat 400 jaart van A af is daar 'n belasting van 110 amp. Die weerstand van 1,000 jaart enkelhoofgeleier is 0.032 ohm. Bereken die stroom in elke gedeelte van die hoofkragleiding en die spanning by die belasting.

2. 'n 200 volt sytakmotor van 50 r.p.k. met 'n nuttigheidsgraad van 88 persent word deur twee eenkernkabels vanaf 'n kortsytak-generator met saamgestelde wikkeling 150 voet daarvandaan gevoer; die dwarssnitoppervlakte van die geleiers is 0.15 vierkante duim. As die weerstand van die anker van die generator 0.02 ohm is en as die serie- en sytakvelde daarvan onderskeidelik 0.01 en 25 ohm is, bereken die e.m.k. met toegee vir 'n borselkontakdaling van 2 volt. Soortlike weerstand van die geleier by bedryfstemperatuur is 0.7 mikrohmduim.

3. 'n Stuk apparaat wat by normale werking 5 amperes by 40 volts neem, moet in verband met 'n W.S.-net van 100 volt 50 hertz gebruik word. Bereken die weerstand van die nie-induktiewe weerstand, asook die induktansie van 'n smoorspoel met 'n weerstand van 1 ohm wat gebruik sou kon word en vergelyk die krag wat in die twee gevalle verlore gaan.

4. Vier weerstande word in die vorm van 'n wheatstonebrug gerangskik en nadat die vier punte van die diamant wat aldus gevorm word, A, B, C en D gemerk is, word die klemme van 'n sel met A en C verbind en die galvanometer oorkruis verbind BD. Wanneer die weerstande AB, BC en AD onderskeidelik van sterkte 1,000, 1,750 en 10 ohms is, toon die galvanometer geen defleksie by die aanwending van stroom nie. Bepaal die sterkte van die weerstand DC en verduidelik volledig die werkingstrappe.

EKSAMEN VIR INGENIEUROFFISIERS.

SKEEPSONTWERP.

TWEDE-INGENIEUROFFISIER.

Tyd toegelaat vir hierdie vraestel *tesame met die vraestel oor elektrotegnologie* is 3 uur.

Moenie hierdie vraestel skend of enige merke hoegenaamd daarop maak nie.

Moenie die vrae afskryf nie.

Gegewens wat miskien nodig gekry sal word, kan gevind word op die eerste bladsy van die antwoordboek of in die wiskundetafels wat verskaf word.

BEANTWOORD NET DRIE VRAE.

5. 'n Skip het drie lê brandstoftenks wat van voor af A, B en C gemerk is. Die middelpunt van B is 20 vt. agter die S.P. van die skip en die afstand tussen die middelpunte van A en B en tussen A en C is onderskeidelik 47 en 95 vt. Nadat 750 ton brandstof in die tenks gepomp is, is die trim van die skip onveranderd en is daar driemaal soveel brandstof in A as in C. Hoe is die brandstof tussen die drie tenks verdeel?

6. Die brandstofverbruik van 'n skip in ton/uur word deur die volgende uitdrukking gegee:—

$1.5 + 0.001456 V^3$ waar V die snelheid in knope is. As die normale snelheid 17 knope is, bepaal die verskil in die daaglikse brandstofverbruik en die brandstofbesparing tydens 'n vaart van 6,320 seemyl wanneer die snelheid met $2\frac{1}{4}$ knope verminder word.

7. 'n Kasvormige barkas is 140 vt. lank, 25 vt. wyd en die diepgang is 8 vt. agter en 4 vt. voor. In watter rigting en hoeveel moet in gewig van 90 ton beweeg word om die barkas gelyklastig te maak?

8. As gevolg van skerp kromming by die agterste end van 'n skip se watervlak, is die laaste halfordinaatinterval eweredig onderverdeel sodat die laaste vyf halfordinate h , h , $\frac{h}{2}$ en $\frac{h}{2}$ apart gepaseer is. Bewys dat die hele oppervlakte van die agterend van die watervlak gegee word deur die formule: $A = \frac{2}{3}h(a + 4b + \frac{1}{2}c + 2d + \frac{1}{2}e)$, waar a , b , c , d en e onderskeidelik die laaste vyf halfordinate is.

6. How do variations in resistance, speed or indicated horse-power affect the thrust of a vessel?

Write down an expression connecting them.

With the original propeller, 19 ft. 6 in. in diameter and of 21 ft. 6 in. pitch, and a ref. m.e.p. of 32 lb./sq. in. the engine-speed is 68 r.p.m. It is decided to reduce the ref. m.e.p. to 27 lb./sq. in. and to increase the r.p.m. to 72.

Determine what the pitch of the propeller should be, the diameter remaining as before.

7. A vessel of 8,000 tons displacement rests on an even keel at a draught of 28 ft. and the moment to alter the trim 1 in. is 850 tons 1 ft. Weights are placed on board as follows: one of 170 tons 75 ft. aft. of the vessel's centre of gravity and one of 75 tons 35 ft. forward of the vessel's centre of gravity. If the tons per inch immersion is 40 and the position of the centre of flotation remains at mid length, calculate the new draughts forward and aft.

8. State, briefly, the meaning of the following terms, giving the usual symbols and units used in each case:—

(a) statical stability; and

(b) transverse metacentric height.

A vessel of 7,300 tons displacement has a metacentric height of 2.4 ft. When a certain amount of fuel, the CG of which is 26.5 ft. from the centre line, has been consumed, the vessel has developed a 5 degree list. What weight of fuel has been consumed? If the fuel is in a double bottom compartment will the transverse metacentric height be affected and, if so, is the numerical answer strictly correct?

EXAMINATION OF ENGINEER OFFICERS.

ELECTROTECHNOLOGY.

CHIEF ENGINEER OFFICER.

Time allowed for this question paper together with the question paper in naval architecture is 4 hours.

Do not deface or make any marks whatever on this paper.

Do not copy the questions.

Data that might be required may be found on the first page of the answer book, or in the mathematical tables provided.

THREE QUESTIONS ONLY TO BE ATTEMPTED.

1. State Kirchhoff's Laws.

A two wire ring main 2,000 yards in length is supplied at a point A with 220 volts. At a point B situated 400 yards from A there is a load of 110 amp. The resistance of 1,000 yards of single main conductor is 0.032 ohm. Calculate the current in each section of the main and the voltage at the load.

2. A 50 b.h.p., 200 volt shunt motor of 88 per cent efficiency is supplied from a short shunt compound wound generator 150 feet away by two single-core cables: the cross sectioned area of the conductors being 0.15 square inches. If the resistance of the armature of the generator is 0.02 ohm and if its series and shunt fields are 0.01 and 25 ohm respectively, calculate the e.m.f. allowing for a brush contact drop of 2 volts. Resistivity of the conductor at working temperature is 0.7 microhm inch.

3. A piece of apparatus which in normal working takes 5 amperes at 40 volts is to be used on a 100 volt 50 cycles per second A.C. mains. Calculate the resistance of the non-inductive resistor, also the inductance of a choke of 1 ohm resistance which could be used and compare the power wasted in the two cases.

4. Four resistances are arranged in the form of a Wheatstone Bridge and designating the four points of the diamond so formed A, B, C and D, the terminals of a cell are connected to A and C and the galvanometer connected across BD. When the resistances AB, BC, and AD are of magnitude 1,000, 1,750 and 10 ohms respectively, the galvanometer does not deflect on the application of current. Find, explaining fully the steps of the working, the magnitude of the resistance DC.

EXAMINATION OF ENGINEER OFFICERS.

NAVAL ARCHITECTURE.

SECOND ENGINEER OFFICER.

Time allowed for this question paper together with the question paper on electrotechnology is 3 hours.

Do not deface or make any marks whatever on this paper.

Do not copy the questions.

Data that might be required may be found on the first page of the answer book, or in the mathematical tables provided.

THREE QUESTIONS ONLY TO BE ATTEMPTED.

5. A vessel has three empty fuel tanks, lettered from forward, A, B and C. The centre of B is 20 ft. aft of the C.G. of the vessel the distance between the centres of A and B, and between A and C being 47 and 95 ft. respectively. After pumping 750 tons of fuel into the tanks the trim of the vessel remains as before and there is three times as much fuel in A as there is in C. How has the fuel been distributed between the three tanks?

6. The fuel consumption, in tons/hour, of a vessel is given by the following expression:—

$1.5 + 0.001456V^3$ where V is the speed in kt. If the normal speed is 17 kt., find the difference in the daily fuel consumption and the saving in fuel during a voyage of 6,320 nautical miles when the speed is reduced $2\frac{1}{2}$ kt.

7. A box barge is 140 ft. long, 25 ft. wide and the draughts are 8 ft. aft and 4 ft. forward. In what direction and by how much must a weight of 90 tons be moved in order to bring the barge on to an even keel?

8. Due to sharp curvature at the after end of a ship's waterplane, the last half ordinate interval is equally sub-divided so that the last five half ordinates are spaced h , h , $\frac{h}{2}$, and $\frac{h}{2}$ apart.

Prove that the whole area of the after end of the waterplane is given by the formula: $A = \frac{2}{3} h(a + 4b + \frac{2}{3}c + 2d + \frac{1}{3}e)$, where a , b , c , d and e are the last five half ordinates respectively.

EKSAMEN VIR INGENIEUROFFISIERS.

INGENIEURSWESE.

TWEDE-INGENIEUROFFISIER.

MIDDAGVRAESTEL—KANDIDATE VIR BINNEBRANDMASJIENE.

Moenie hierdie vraestel skend of merke daarop maak nie.

Moenie die vroe afskryf nie.

BEANTWOORD NET SES VRAE.

(Tyd toegelaat: 3 uur.)

1. Vergelyk die brandstofverbruik per R.P.K./uur en A.P.K./uur van 'n swaar olie-enjin wat onder volle en ligte belasting loop. Gee 'n beredeneerde verklaring vir enige waarnemings wat gedoen word.

2. Beskryf 'n lugkompressor en verduidelik die noodsaaklikheid van tussentrapkoeling en nakoeling. Toon deur middel van 'n diagram die effek van oormatige vryruimte.

3. Verduidelik die funksie en werking van 'n vergasser, 'n verdamer en 'n verstuiwer. Met watter besondere soort brandstof word elkeen gebruik?

4. Met betrekking tot 'n suierspoelpomp: skets 'n tipiese indikeurdiagram wat van die pomp geneem is en merk die kardinale punte en onderskeie lugdrukke. Watter persentasie van die totale krag word deur die pomp opgeneem en wat is sy vermoë met betrekking tot die silinders wat hy voer?

5. Beskryf 'n inrigting van lugontvangers en hulle verbindings en verduidelik hoe hulle in verband met die aansit van 'n groot binnebrandmasjien gebruik word. Wat bepaal die vermoë van druklug wat vir aansitdoeleindes aan boord van 'n motorskip behoort te wees?

6. Waarom behoort dubbele geleiers in die geval van 'n nie-omstelbare masjien gebruik te word? Verduidelik hoe die druk per vierkante duim op een van die kruiskopgeleiskoeie naastenby bereken sal kan word en meld die maksimum druk wat gewoonlik toegelaat word.

7. Wat is die gewone aanduidings dat 'n brandstofklep besig is om te kleef en wat kan dit veroorsaak? Hoe kan hierdie defek verhelp word?

8. Wanneer die einde van 'n lang ononderbroke vaart genader word in die geval van 'n motorskip wat deur enkelwerkende vierslag swaar oliemasjiene aangedryf word, watter voorsorgsmaatreëls moet geneem word om te verseker dat geen moeilikheid ondervind sal word wanneer dit nodig is om die hoofmasjiene te manuvreer nie?

9. Beskryf die stu-inrigting in 'n groot skip en toon deur middel van sketse van die bedding en aanliggende gedeeltes van die romp hoe die skroefstukrag na die skip oorgebring word. Hoe word verhoed dat die blok vorentoe en agtertoe skuif?

EKSAMEN VIR INGENIEUROFFISIERS.

ELEKTROTEGNOLOGIE.

TWEDE-INGENIEUROFFISIER.

Tyd-toegelaat vir hierdie vraestel tesame met die vraestel oor skeepsontwerp is 3 uur.

Moenie hierdie vraestel skend of enige merke hoegenaamd daarop maak nie.

Moenie die vroe afskryf nie.

Gegewens wat miskien nodig gekry sal word, kan gevind word op die eerste bladsy van die antwoordboek of in die wiskundetafels wat verskaf word.

BEANTWOORD NET DRIE VRAE.

1. Die lewering van 'n motor wat met 'n toevoer van 110 V werk, word deur 'n tourem opgeneem wat deur 'n stroom water verkoel word. As 85 persent van die warmte wat opgewek word, 748 gellings water per uur 10 grade Celsius laat styg en as die insetstroom 500 ampères is, bereken (1) die rendement van die motor en (2) die lewering uitgedruk in kilowatt.

2. 'n Lengte reepkoper van uniforme deursnit word in die vorm van die buitelyne van 'n driehoek gebuig met sye in die verhouding van 4, 2 en 3. As dieselfde potensiaalverskil om die beurt oor aanliggende toppe van die driehoek aangewend word, vergelyk die verhouding van die warmte wat in die drie gevalle ontwikkel word.

3. Van die volgende besonderhede van 'n vierpolige G.S.-motor met 'n anker met luswikkeling, bepaal die ankerstroom wanneer die snelheid 1,000 o.p.m. is:—

Fluks per pool.....	= 2.725 megalynes
Aantal ankergeleiers.....	= 480
Weerstand van anker.....	= 0.0652 ohm.
Borselpotensiaalverskil.....	= 220 V.

4. Wat word bedoel met die uitdrukking „sulfatering” soos toegepas op lood-suur sekondêre selle? Meld kortliks hoe dit mees algemeen veroorsaak word, hoe dit nagespoor word en hoe dit verwyder kan word. 'n Alkaliese sekondêre sel word vir 12 uur met 'n konstante stroom van 6 ampères ontlaa; die gemiddelde spanning is 1.2 volts. 'n Laaistroom van 5 ampères vir 18 uur is nodig om die sel in dieselfde laaitoestand terug te bring, en die algemene klemspanning tydens lading is 1.46 volts. Bereken die ampère-uur- en watt-uurrendement van die sel.

EKSAMEN VIR INGENIEUROFFISIERS.

INGENIEURSWESE.

TWEDE-INGENIEUROFFISIER.

MIDDAGVRAESTEL—KANDIDATE VIR STOOMMASJIENE.

Moenie hierdie vraestel skend of merke daarop maak nie.

Moenie die vroe afskryf nie.

BEANTWOORD NET SES VRAE.

(Tyd toegelaat: 3 uur.)

1. Beskryf met behulp van 'n skets die straalpytrapdiafragmapakking van 'n pulsturbine. Verduidelik die funksie en werkingsbeginsel van hierdie tipe drukstuk.

2. Skets en beskryf 'n regeneratiewe-kondensator wat geskik is vir 'n turbineskip met 'n geslote voedingstelsel. Toon duidelik die inrigting van die koelingswaterstroming en posisies van die verskillende verbindings.

EXAMINATION OF ENGINEER OFFICERS.
ENGINEERING KNOWLEDGE.
SECOND ENGINEER OFFICER.
AFTERNOON PAPER—MOTOR CANDIDATES.

Do not deface or make any marks on this paper.

Do not copy the questions.

SIX QUESTIONS ONLY TO BE ATTEMPTED.

(Time allowed: 3 hours).

1. Compare the fuel consumption per B.H.P. hour and I.H.P. hour of a heavy-oil engine running at full and light load conditions. Give a reasoned statement for any observations made.
2. Describe an air compressor and explain the necessity for inter-stage cooling and after cooling. Show by a diagram the effect of excessive clearance.
3. Explain the function and working of a carburettor, a vaporizer and an atomizer. With which particular fuel is each used?
4. With reference to a reciprocating scavenge pump: sketch a typical indicator diagram taken from the pump and mark the cardinal points and respective air pressures. What percentage of the total power is absorbed by the pump and what is its capacity referred to the cylinders it supplies?
5. Describe an arrangement of air receivers and their connections, and explain how they are used in connection with the starting of a large internal combustion engine. What determines the capacity of compressed air that should be available for starting purposes on board a motor ship?
6. Why should double guides be required in the case of a non-reversing engine? Explain how the pressure per square inch on one of the crosshead guide shoes might be calculated approximately and state the maximum pressure which is usually allowed.
7. What are the usual indications of a fuel valve sticking and what may cause this to happen? How could this defect be remedied?
8. When nearing the end of a long non-stop run in the case of a motor vessel propelled by single-acting four-stroke cycle heavy-oil engines, what precautions should be taken to ensure that no difficulty will be experienced when manoeuvring of main engines is required?
9. Describe the thrust arrangement in a large vessel showing, by means of sketches of the seating and adjacent portions of the hull, the manner in which the propeller thrust is transmitted to the ship. How is the block prevented from moving in a fore and aft direction?

EXAMINATION OF ENGINEER OFFICERS.
ELECTROTECHNOLOGY.
SECOND ENGINEER OFFICER.

Time allowed for this question paper together with the question paper on naval architecture is 3 hours.

Do not deface or make any marks whatever on this paper.

Do not copy the questions.

Data that might be required may be found on the first page of the answer book, or in the mathematical tables provided.

THREE QUESTIONS ONLY TO BE ATTEMPTED.

1. The output of a motor operating on a 110V supply is absorbed by a rope brake, which is cooled by a stream of water. If 85 per cent of the heat generated raises 748 gallons of water per hour 10 centigrade degrees and the input current is 500 amperes, calculate (1) the efficiency of the motor and (2) the output expressed in kilowatt.
2. A length of uniform section of copper strip is bent into the shape of the outline of a triangle which has sides in the ratio of 4, 2 and 3. If the same potential difference is applied in turn across adjacent apices of the triangle, compare the ratio of the heat developed in the three cases.
3. From the following particulars of a four pole D.C. motor with a lap wound armature, determine the armature current when the speed is 1,000 r.p.m.:—

Flux per pole.....	= 2.725 mega lines
Number of armature conductors.....	= 480
Resistance of armature.....	= 0.0652 ohm
Brush P.D.....	= 220 V.
4. What is meant by the term "sulphating" as applied to lead-acid secondary cells? State briefly how it is caused most usually, how it is detected and how it can be removed. An alkaline secondary cell is discharged for 12 hours at a steady current of 6 amperes, the average voltage being 1.2 volts. A charging current of 5 amperes for 18 hours is required to bring the cell back to the same condition of charge, the average terminal voltage during charging being 1.46 volts. Calculate the ampere hour and watt-hour efficiencies of the cell.

EXAMINATION OF ENGINEER OFFICERS.
ENGINEERING KNOWLEDGE.
SECOND ENGINEER OFFICER.
AFTERNOON PAPER—STEAM CANDIDATES.

Do not deface or make any marks on this paper.

Do not copy the questions.

SIX QUESTIONS ONLY TO BE ATTEMPTED.

(Time allowed: 3 hours).

1. Describe, with the aid of a sketch, the nozzle stage diaphragm packing of an impulse turbine. Explain the function and the principle of operation of this type of gland.
2. Sketch and describe a regenerative condenser suitable for a turbine-driven vessel with a closed feed system. Indicate clearly the arrangement of cooling water flow and the positions of the various connections.

3. Maak detailsketse, met 'n kort beskrywing daarby, van twee tipes hoofstoompyplasse geskik vir 'n bedryfsdruk en -temperatuur van onderskeidelik 450 lb./vk. dm. en 750° F.

4. Beskryf die skuifkleppe en werk van 'n dupleksvoedingspomp en verduidelik kortliks hoe hulle werk.

5. Beskryf die bou en werking van 'n outomatiese voedingswaterreguleerder. Verduidelik die noodsaaklikheid vir die gebruik van hierdie toestel by waterpypketels met hoë verdampingsvermoë.

6. Verduidelik kortliks die effek wat verkry word deur inskakeling op die verdeling van stoom in 'n silinder en illustreer die verduideliking met 'n indikateurdiagram. In die geval van 'n viervoudige ekspansiemasjien, hoe word die perdekrag van die verskillende masjiene geaffekteur deur inskakeling van (a) die hoëdrukmasjiene, (b) die eerste tussendrukmasjiene (c) die laedrukmasjiene?

7. Gee 'n beskouing oor die vernaamste oorsake van die volgende defekte wat dikwels in silindriese skeepsketels aangetref word:—

- (a) Invreting.
- (b) Groefvorming.
- (c) Oondvervorming.

Meld vir elke geval die stappe wat nodig geag word om te keer dat sulke defekte ontstaan.

8. Skets en beskryf 'n oppervlakvoedingsverwarmer; toon die posisie en name van al die monterings waarmee die verwarmer toegerus is.

9. Beskryf hoe die voorloop van 'n suierklep met binnestoominlating gemeet word.

Met betrekking tot 'n gewone suiermasjien, noem die faktore wat die toewysing van voorloop beheer.

EKSAMEN VIR INGENIEUROFFISIERS.

INGENIEURSWESE.

TWEEDE-INGENIEUROFFISIER.

OGGENDVRAESTEL—ALLE KANDIDATE.

Moenie hierdie vraestel skend of merke daarop maak nie.

Moenie die vrae afskryf nie.

BEANTWOORD NET SES VRAE.

(Tyd toegelaat: 3 uur.)

1. Noem die vernaamste bronne van besoedeling van ketelvoedingswater en bespreek kortliks die voorkomingsmaatreëls wat in elke geval geneem moet word. Waarom word dit al hoe wensliker dat die voedingswater suiwer moet wees?

2. Beskryf 'n proses van sweising deur middel van elektrisiteit, en noem die metale waarop die proses toegepas kan word. Noem enkele defekte by ketels en masjinerie wat doelmatig volgens hierdie proses herstel kan word.

3. Beskryf 'n stublok met enkelkraag en verduidelik hoe dit werk. Hoe word die stublok verstel en in lyn gebring?

4. Toon hoe die bewegende dele van smeerolie voorsien word in geslote sneldraaiende hulpsuiermasjiene. Hoe word olieekkasie by die as en by die suierstang of suier voorkom?

5. By watter tipes koelmasjiene word pekkel gebruik? Noem die verskillende chemiese stowwe waarmee dit gemaak kan word, asook die redes waarom hulle gebruik word. Wat is die digtheid van pekkel en hoe word dit bepaal?

6. Beskryf, met behulp van 'n skets, enige vorm van sekondêre sel. Beskryf die werking tydens lading en ontlading en meld duidelik waarom wisselstroom nie vir laaiwerk gebruik kan word nie. Hoe word die rendement van 'n akkumulator gemeet?

7. Beskryf, met behulp van 'n skets, die bou en werking van of—

- (a) 'n snelsluitende brandoliesuigklep; of
- (b) 'n brandoliefilter vir verhitte olie.

Noem die voorsorgsmaatreëls wat geneem moet word voordat beide hierdie monterings vir inspeksie en opknapping uitmekaar-gehaal word.

8. Toon met behulp van 'n skets wat slegs die betrokke kompartemente moet insluit, die inrigting van 'n wenas en ankerkabels. Hoe word die punt van die ketting in die kettingbak bevestig?

Wat word bedoel met—

- (a) kluispyp;
- (b) kettingleipyp;
- (c) kabelligter;
- (d) kabelstopper.

9. Noem die gasse wat onderskeidelik in leë ballastens en brandolietens aangetref word. In watter konsentrasie is hierdie gasse gevaarlik en waarom? Noem die voorsorgsmaatreëls wat nodig is wanneer hierdie tens vir ondersoek oopgemaak word.

EKSAMEN VIR INGENIEUROFFISIERS.

INGENIEURSWESE.

HOOF-INGENIEUROFFISIER.

MIDDAGVRAESTEL—KANDIDATE VIR BINNEBRANDMASJIENE.

Moenie hierdie vraestel skend of merke daarop maak nie.

Moenie die vrae afskryf nie.

BEANTWOORD NET SES VRAE.

(Tyd toegelaat: 3 uur.)

1. Bespreek die onderskeie voor- en nadele van straal- en luglose inspuiting, en beskryf 'n inrigting van brandstofpompe, pype en brandstofkleppe wat vir elke stelsel geskik is.

2. Toon, met behulp van 'n diagram, die posisie van die voorste en agterste nokke, met betrekking tot die posisie van die kruk, vir een eenheid van 'n tweeslag binnebrandmasjiene.

3. Skets en beskryf 'n oliegekoelde kokersuier soos in 'n vierslag swaar olie-enjin ingesit. Toon hoe die koker vasgesit word, die posisie en vorm van die suierringe en die inrigting van die skraapringe.

4. Gee 'n beskrywing van 'n installasie vir die verbranding van brandolie in 'n keteloond en verduidelik hoe dit werk. Skets 'n brander en verduidelik hoe dit in posisie bevestig word.

3. Make detailed sketches and add a brief description of two types of main steam pipe joints suitable for a working pressure and temperature of 450 lb./sq. in. and 750 deg. F. respectively.
4. Describe the slide valves and gear of a duplex feed pump and explain clearly their action.
5. Describe the construction and action of an automatic feed-water regulator. Explain the necessity for the use of this apparatus with water-tube boilers of high evaporative capacity.
6. Explain clearly the effect produced by linking-up on the distribution of steam in a cylinder and illustrate the explanation by an indicator diagram. In the case of a quadruple-expansion engine, how is the horse-power of the various engines affected by linking-up (a) the high-pressure engine, (b) the first intermediate-pressure engine, (c) the low-pressure engine?
7. Give an opinion as to the principal causes of the following defects frequently encountered in cylindrical marine boilers:—
 - (a) Pitting.
 - (b) Grooving.
 - (c) Furnace distortion.

State for each case the action considered necessary to arrest the development of such defects.

8. Sketch and describe a surface feed-heater; indicate the position of and name all the mountings with which the heater is fitted.
9. Describe the manner in which the lap and lead of a piston valve, with inside steam admission, is measured.

With reference to an ordinary reciprocating engine, state the considerations which govern the assignment of lap and lead.

EXAMINATION OF ENGINEER OFFICERS.

ENGINEERING KNOWLEDGE.

SECOND ENGINEER OFFICER.

MORNING PAPER—ALL CANDIDATES.

Do not deface or make any marks on this paper.

Do not copy the questions.

SIX QUESTIONS ONLY TO BE ATTEMPTED.

(Time allowed: 3 hours.)

1. Enumerate the main sources of contamination of boiler feed-water and discuss, briefly, the preventative measures to be taken in each case. Why is purity of the feed becoming increasingly desirable?
2. Describe a process of welding by electricity and state the metals to which this process can be applied. Enumerate some defects of boilers or machinery which may be conveniently repaired by this method.
3. Describe a single collar thrust block and explain its action. How is the thrust block adjusted and aligned?
4. Show how the moving parts are supplied with lubricating oil in enclosed auxiliary high speed reciprocating engines. How is oil leakage prevented at the shaft and at the piston rod or piston?
5. With which types of refrigerating machines is brine used? State the various chemicals with which it can be made and the reasons for the adoption of these chemicals. What is the density of brine and how is the density ascertained?
6. Describe, with the aid of a sketch, any form of secondary cell. Discuss the action during charge and discharge and state clearly why alternating current cannot be used for charging. How is the efficiency of an accumulator measured?
7. Describe, with the aid of a sketch, the construction and operation of either—
 - (a) a quick closing oil fuel suction valve; or
 - (b) an oil fuel filter for heated oil.

Mention precautions which should be taken before dismantling either of these fittings for inspection and overhaul.

8. Show, with the aid of a sketch, which should include only the compartments concerned, the arrangement of a windlass and anchor cables. How is the end of the cable secured in the chain locker?

What is meant by—

- (a) hawse pipe;
- (b) spurling pipe;
- (c) cable lifter;
- (d) cable stopper.

9. State the gases found in empty ballast tanks and oil fuel tanks, respectively. In what concentration are these gases dangerous and why? State the precautions necessary when these tanks are opened up for survey.

EXAMINATION OF ENGINEER OFFICERS.

ENGINEERING KNOWLEDGE.

CHIEF ENGINEER OFFICER.

AFTERNOON PAPER—MOTOR CANDIDATES.

Do not deface or make any marks on this paper.

Do not copy the questions.

SIX QUESTIONS ONLY TO BE ATTEMPTED.

(Time allowed: 3 hours.)

1. Discuss the relative merits and demerits of blast and airless injection, and describe an arrangement of fuel pumps, pipes and fuel valves, suitable for each system.
2. Show, by a diagram, the position of the ahead and astern cams, in relation to the position of the crank, for one unit of a two-stroke cycle internal combustion engine.
3. Sketch and describe an oil cooled trunk piston as fitted to a four-stroke cycle heavy-oil engine. Show how the trunk is secured, the position and form of piston rings, and the arrangement of the scraper rings.
4. Give a description of an installation for burning oil fuel in a boiler furnace and explain its action. Sketch a burner and explain how it is secured in position.

5. Skets in besonderhede die volledige skakel van 'n rollerketting soos gebruik in 'n swaar olie-enjin van die luglose inspuittipe vir nokasaandrywing. Gee kortliks die antwoorde op die volgende:—

- (a) Wat is, by benadering, die veiligheidsfaktor van die ketting wanneer die aangedrewe werk die brandstofpompe insluit?
- (b) Wat is die oorsaak wat tot slapte lei en hoe moet dit wees as dit reg gestel is?
- (c) Waarom is oormatige slapte onwenslik?

6. Skryf 'n verslag, wat aan 'n superintendent-ingenieur gerig is, oor die omstandighede waaronder 'n krukas gebreek het. Die verslag moet die oorsaak van die breuk verduidelik en die stappe beskryf wat gedoen word om die skip veilig in hawe te bring.

7. Hoe kan die vertikale kragte as gevolg van verbranding binne-in die lopende werk van 'n swaar olie-enjin gebalanseer word? Watter voordele bestaan daar in die aanvaarding van 'n ontwerp wat hierdie eienskap behels?

8. Beskryf die algemene oorsaak van kragverlies in groot binnebrandmasjiene en noem die maatreëls wat getref moet word om normale looptoestande te herstel.

9. Beskryf kortliks die lenspomp-inrigtings op 'n motorskip: sê van watter materiaal die suigpype gemaak is en hoe die pompe met die verskillende ruime verbind is. Watter voorsiening word gemaak vir die gebruik daarvan in nood in plaas van die lensinspuitsel wat gewoonlik op 'n stoomskip geïnstalleer is?

EKSAMEN VIR INGENIEUROFFISIERS.

INGENIEURSWESE.

HOOF-INGENIEUROFFISIER.

OGGENDVRAESTEL—ALLE KANDIDATE.

Moenie hierdie vraestel skend of merke daarop maak nie.

Moenie die vrae afskryf nie.

BEANTWOORD NET SES VRAE.

(Tyd toegelaat: 3 uur.)

1. Skets en beskryf 'n telemotorinrigting soos gebruik in verband met 'n stuurmasjiene. Hoe word die stelsel gelaai en met watter vloeistof? Watter voorsiening word gemaak vir uitsetting van die vloeistof en water voorsorgsmaatreëls is in verskillende klimaatte nodig?

2. Defektering van gespanne dele kan deur vermoeidheid veroorsaak word. Verduidelik kortliks wat met hierdie uitdrukking bedoel word, en noem die praktiese faktore wat tot defekte van hierdie aard kan lei; gee voorbeelde.

3. Verduidelik die werkingsbeginsel van 'n termoëlektriese pirometer en toon hoe so 'n instrument gebou is. Hoe word aflesing verkry en watter uitwerking het 'n verandering in die temperatuur van die meteronderdele? Meld vir watter doeleindes hierdie tipe instrument geskik is.

4. Skets en beskryf 'n skroefaskoker met sy busse en toon duidelik hoe die koker in die skip vasgesit word en meld die stappe wat gedoen word om te verseker dat dit reg in lyn is. Hoe word die skroefas gesmeer?

5. Meld die vereistes waaraan die aansitter vir 'n sytakmotor moet voldoen. Beskryf uitvoerig die konstruksie van die handvatsel, die weerstande en die huls van so 'n aansitter vir gebruik in 'n dampbelaaide atmosfeer.

6. Waar 'n dieptenk of droë vraag of waterballas kan bevat, word spesiale voorsorg getref in die pomp-inrigtings. Verduidelik hulle doel en beskryf hulle. Skets die sluitinrigtings van 'n dieptenk wat droë vraag of waterballas kan bevat.

7. Noem die stukke brandbestrydingsuitrusting wat aan boord van 'n skip wat olie as brandstof gebruik, gevoer moet word. Noem die tipe en grootte van die skip waarop die antwoord betrekking het. Watter voorsiening kan gemaak word vir die toevoer van water onder druk wanneer die masjinerieruimtes wat die gewone brandpompe bevat, ontoeganklik is?

8. Skets enige twee van die volgende en toon in elke geval duidelik besonderhede van aanhegting aan die aanliggende struktuur en die benaderde afmetings:—

- (a) die steuninrigtings van 'n masjienkamerloopkraan wat omtrent 5 ton kan oplig;
- (b) 'n aanvaringskot;
- (c) 'n buiteskoorsteen;
- (d) 'n dwarssnit van die waterdek by wyse van 'n groot vragluik.

9. Skets en beskryf die een of ander vorm van beheertoestel wat outomatiese regulering verskaf van 'n metielchlorid- of Freoninstallasie wat vir die preservering van huishoudelike bederfbare produkte aan boord van 'n skip gebruik word. Hoe kan so 'n toestel gebrekkig raak?

EKSAMEN VIR INGENIEUROFFISIERS.

WARMTE EN WARMTEMASJIENE.

TWEDE INGENIEUROFFISIER.

Moenie hierdie vraestel skend of merke daarop maak nie.

Moenie die vrae afskryf nie.

Gegewens wat miskien nodig gekry sal word, kan gevind word op die eerste bladsy van die antwoordboek of in die wiskundetafels wat verskaf word.

BEANTWOORD NET SES VRAE.

(Tyd toegelaat: 3 uur.)

1. 'n Lugontvanger het 500 kub. vt. lug onder 'n druk en by 'n temperatuur van onderskeidelik 375 lb./vk. dm. abs. en 80° F. bevat. As gevolg van 'n brand in die omgewing van die ontvanger het die druk tot 510 lb./vk. dm. abs. gestyg. Bereken die aantal B.Th.U. wat aan die lug in die ontvanger verleen is as aangeneem word dat geen lug daaruit ontsnap het nie. *Let Wel.*—Een kubieke voet lug onder 'n druk en by 'n temperatuur van onderskeidelik 14.7 kub./vk. dm. abs. en 32° F. weeg 0.0807 lb.

Die soortlike warmte van lug by konstante volume is 0.17.

2. Definieer „latente warmte”. Honderd-en-twintig pond water by 52° C. word gemeng met 47 pond water by 32° C., waarna 25 pond ys by nul grade Celsius by die mengsel gevoeg word. As veronderstel word dat die warmte gelykmatig deur die hele massa versprei word, wat sal die resulterende temperatuur in grade Fahrenheit wees?

3. 'n Tweeslag swaar olie-enjin het 'n suierslaglengte van 1,200 mm. Die vryslag is gelyk aan 60 mm., afsluiting vind plaas wanneer die suier 120 mm. beweeg het en die suier laat sowel die inlaat- en uitlaatopeninge oop wanneer dit 950 mm. beweeg het. Wanneer kompressie begin, is die druk in die silinder 20 lb./vk. dm. abs. en wanneer uitsetting begin, is dit 400 lb./vk. dm. abs.

As hiperboliese kompressie en uitsetting veronderstel word, teken die teoretiese indikateurdiagram en toon met stippellyne die vorm wat u van die werklike kaart sou verwag.

Gebruik die volgende skale: 1 dm. = 100 lb. druk.
1 dm. = 200 mm. slag.

5. Sketch in detail the complete link of a roller chain as used in a heavy oil engine of the airless injection type for camshaft drive. Give brief answers to the following:—

- (a) What is, approximately, the factor of safety of the chain when the driven gear includes the fuel pumps?
- (b) What are the causes leading to slackness, and what is the condition of correct adjustment?
- (c) Why is excessive slackness undesirable?

6. Write a report, addressed to a superintendent engineer, describing the circumstances attending the fracture of a crank shaft. The report should explain the cause of the fracture, and describe the steps taken to bring the ship safely into port.

7. How may the vertical forces due to combustion be balanced within the running gear of a heavy oil engine? What advantages accrue in the adoption of a design embracing this feature?

8. Describe the common causes of the loss of power in large internal combustion engines and state the measures necessary to restore normal running conditions.

9. Describe briefly the bilge pumping arrangements on a motor ship: state the material of which the suction pipes are made and the manner in which the pumps are connected to the various holds. What provision is made for use in emergency in lieu of the bilge injection system usually installed in a steamship?

EXAMINATION OF ENGINEER OFFICERS.

ENGINEERING KNOWLEDGE.

CHIEF ENGINEER OFFICER

MORNING PAPER—ALL CANDIDATES.

Do not deface or make any marks on this paper.

Do not copy the questions.

SIX QUESTIONS ONLY TO BE ATTEMPTED.

(Time allowed: 3 hours.)

1. Sketch and describe a telemotor gear as used in conjunction with a steering engine. How is the system charged, and with what liquid? What provision is made for expansion of the liquid, and what precautions are necessary in different climates?

2. Failure of stressed parts may be caused by fatigue. Explain briefly what is meant by the term and mention the practical considerations which can lead to failures of this sort; quote examples.

3. Explain the working principle of a thermo-electric pyrometer, and show how such an instrument is constructed. How are readings obtained and what is the effect of a variation in the temperature of the meter parts? Mention suitable applications for this type of instrument.

4. Sketch and describe a stern tube with its bushes, showing clearly how the tube is secured in the ship and the steps taken to ensure that its alignment is correct. How is lubrication of the propeller shaft effected?

5. State the requirements of a starter for a shunt motor. Describe in detail the construction of the handle, the resistances and the casing of such a starter for use in a vapour-laden atmosphere.

6. Where a deep tank may contain either dry cargo or water ballast alternatively, special provisions are made in the pumping arrangements. Explain their purpose and describe them.

Sketch the closing arrangements of a deep tank which may contain dry cargo or water ballast.

7. Enumerate the items of fire-fighting equipment required to be carried aboard a ship using oil as fuel. Mention the type and size of vessel to which the answer refers. What provision may be made for the supply of water under pressure when the machinery spaces containing the usual fire service pumps are inaccessible?

8. Sketch any two of the following, showing clearly in each case, details of attachment to the adjacent structure and approximate scantlings—

- (a) the supporting arrangements of an engine-room travelling crane able to lift about 5 tons;
- (b) a collision bulkhead;
- (c) an outer funnel;
- (d) a transverse section of the weather-deck in way of a large cargo hatch.

9. Sketch and describe some form of controlling device which provides automatic regulation of a methyl chloride or Freon plant used for the preservation of domestic perishables aboard ship. How may such a device become faulty?

EXAMINATION OF ENGINEER OFFICERS.

HEAT AND HEAT ENGINES.

SECOND ENGINEER OFFICER.

Do not deface or make any marks on this paper.

Do not copy the questions.

Data that might be required may be found on the first page of the answer book, or in the mathematical tables provided.

SIX QUESTIONS ONLY TO BE ATTEMPTED.

(Time allowed: 3 hours.)

1. An air receiver contained 500 cu. ft. of air at a pressure and temperature of 375 lb./sq. in. abs. and 80 deg. F. respectively. Owing to a fire in the vicinity of the receiver, the pressure rose to 510 lb./sq. in. abs.

Calculate the number of B.Th.U. that were imparted to the air in the receiver assuming that there was no escape of air therefrom.

Note.—One cubic foot of air at a pressure and temperature of 14.7 lb./sq. in. abs. and 32 deg. F. respectively weighs 0.0807 lb. The specific heat of air at constant volume is 0.17.

2. Define latent heat. One hundred and twenty pounds of water at a temperature of 52 deg. C. are mixed with 47 pounds of water at 32 deg. C. and then 25 pounds of ice at zero-Cent are added to the mixture. Assuming that the heat becomes uniformly distributed throughout the whole mass, what will be the resulting temperature in degrees Fahrenheit?

3. A two-stroke cycle heavy oil engine has a piston stroke of 1,200 mm. The clearance is equivalent to 60 mm. cut-off takes place when the piston has travelled 120 mm., and the piston uncovers both the inlet and exhaust ports when it has travelled 950 mm. The pressure in the cylinder when compression begins is 20 lb./sq. in. abs., and when expansion begins is 400 lb./sq. in. abs.

Assuming hyperbolic compression and expansion, draw the theoretical indicator diagram and show by dotted lines the shape you would expect the actual card to have.

Use the following scales:—

- 1 in. = 100 lb. pressure.
- 1 in. = 200 mm. stroke.

4. Die suier van 'n lugkompressor het 'n deursnee van 310 mm. en die slaglengte daarvan is 420 mm. Die volgende drukhoogtes word op die kompressiekromme van die indikateurdiagram gemeet: By 210 mm. van die slag, 14 lb./vk. dm., en by 340 mm. van die slag, 43 lb./vk. dm. gemeet. As isotermaal kompressie veronderstel word, bepaal die kapasiteit van die vryslagrūimte in kubieke duim.

5. 'n Viervoudige ekspansie-enjin het silinders van onderskeidelik 25½, 36½, 52 en 75 dm. in deursnee. Die gemiddelde effektiewe druk is onderskeidelik 60·9, 30·7, 17·9 en 8·8 lb./vk. dm. Bepaal die gemiddelde effektiewe druk met betrekking tot die laedruksilinder, en die slag van die enjin as 2,650 a.p.k. teen 78 o.p.m. ontwikkel word.

6. Een pond stoom onder 'n druk van 400 lb./vk. dm. abs. wat 280° F. oorverhit word, word in 'n turbine laat uitsit tot 'n druk van 1 lb./vk. dm. abs.

As 255,000 voetpond arbeid verrig word, bereken met behulp van tafels I en II van die stoomtafels wat verskaf word, die droogheidsfaktor van die stoom onder die laer druk.

7. 'n Masjien van 5,620 a.p.k. gebruik 14 lb. stoom per a.p.k. per uur en 1 lb. van die stoom gee 1,030 B.Th.U. af by kondensasie. As die inspuutwater by 65° F. verkry word en 19 ton per minuut deur die kondensatorpype stroom, wat is—

- die temperatuur van die stortwater; en
- die hoeveelheid warmte in B.Th.U. wat oorboord gaan per a.p.k. in die omloopwater per minuut; en
- die termies nuttige effek van die masjien as die verlies as gevolg van die kondensator 62 persent is?

8. Bepaal, met behulp van die stoomtafels wat verskaf word, die perdekrags wat vereis word om 120 kilogram stoom onder 'n druk van 210 lb./vk. dm. abs., droogheidsfaktor 0·95, in ys by 'n temperatuur van minus 10° C. in 40 minute om te sit.

9. Die stoomketels van 'n skip bevat 206 ton water, en aan die begin van die reis van 15 dae, is hulle gevul met water wat 1,001 ons per kub. vt. weeg. Aan die einde van die reis was die digtheid van die water in die ketels as gevolg van 'n lek in die kondensator 3·91 dertig sekondes. As die gemiddelde digtheid van die water in die kondensaatbak 0·76 ons per gelling was en die gemiddelde a.p.k. 2,200, wat was die stoomverbruik in lb. per a.p.k. per uur?

EKSAMEN VIR INGENIEUROFFISIERS.

ALGEMENE INGENIEURSWETENSKAP.

TWEEDE INGENIEUROFFISIER.

Moenie hierdie vraestel skend of merke daarop maak nie.

Moenie die vrae afskryf nie.

Gegewens wat miskien nodig gekry sal word, kan gevind word op die eerste bladsy van die antwoordboek of in die wiskundetafels wat verskaf word.

BEANTWOORD NET SES VRAE.

(Tyd toegelaat: 3 uur.)

1. Toon deur middel van 'n grafiek hoe snelheid en tyd onderling in verhouding staan wanneer 'n liggaam met konstante versnelling beweeg. Lei van die grafiek 'n uitdrukking af vir die afstand afgelê deur 'n liggaam wanneer dit met konstante versnelling „F” van 'n aanvangsnelheid „U” tot 'n eindsnelheid „V” beweeg.

'n Barkas wat uit die rusposisie beweeg, het 'n konstante versnelling van ½ vt./sek.² vir 1 min.; daarna beweeg dit met 'n konstante snelheid vir 5 min. en word uiteindelik met 'n konstante snelheidsvermindering in 2 min. tot rus gebring. Bepaal die totale afgelegde afstand.

2. 'n Geslote silindriese vat, 3 vt. 6 dm. in deursnee en 2 vt. 6 dm. lank, is gemaak van plaatstaal met 'n gewig van 3·8 lb./vk. vt. Wanneer dit met olie gevul word, dryf dit oorspoel in water met 'n digtheid van 1,024 ons/kub. vt. Bepaal die soortlike gewig van die olie daarin.

3. 'n Stoomketel word met soetwater gevul tot 'n diepte van 10 vt. 4·75 dm. bo die bokant van die mangat deur waarvan die langas horisontaal lê. Die mangat is ellipties en meet 16 dm. by 12 dm.. Die wydte van die las is 1 dm. en die totale afmetings van die deur is 18·5 dm. Bereken die totale belasting op die deurlas as gevolg van die waterdrukhoogte.

Let Wel.—Die oppervlakte van 'n ellips is $\frac{\pi}{4} D \cdot d$ waar D en d onderskeidelik die lang- en kortas is.

4. In 'n tweeslag enkelwerkende binnebrandmasjien is die bokant van die uitlaatpoort 25 persent van die slag voor die onderste dooiepunt en die krukhoek om die afsuigpoort oop te maak is 20 grade na die opening van die uitlaatpoort. As die slaglengte van die masjien 1,200 mm. is en die lengte van die suierstang tweemaal die slaglengte is, wat is die afstand tussen die bokant van die uitlaatpoort en die bokant van die afsuigpoort?

5. 'n Balk met reghoekige profiel, 10 ft. lank en vry gesteun by die ente, dra 'n gekonsentreerde las van 6 ton by die middelpunt. As die diepte van die balk driemaal die breedte is en die maksimum spanning nie 10,000 lb./vk. dm. te bowe mag gaan nie, bereken die afmetings van die dwarsprofiel.

Let Wel.— $\frac{M}{I} = \frac{f}{y}$ waar I in hierdie geval = $\frac{bd^3}{12}$

6. Wanneer 'n eenvormige balk AB van 'n punt 4·5 vt. van A af geslinger word, verg dit 'n gewig van 80 pond wat by A gehang word om die balk in die horisontale stand te bring. Wanneer dit 4·8 vt. van dieselfde ent af geslinger word, is 'n las van 60 lb. by A geplaas voldoende om die balk in die horisontale stand te laat bly.

Bepaal die gewig en lengte van die balk.

7. Twee skepe verlaat die hawe op dieselfde tyd; A stoom suidoos met 'n snelheid van 14 knope en B stoom 20 grade Noord van Oos. As hulle na 2 uur 35 myl van mekaar af is, bereken die werklike snelheid van B en die betreklike snelheid en rigting van B tot A.

8. Wat word bedoel met „middelpuntvliedende krag”? Die sterkte van middelpuntvliedende krag word gegee deur die uitdrukking $C.F. = \frac{Wv^2}{Rg}$. Meld die eenhede van elke draai en herlei hierdie uitdrukking tot 'n formule in sy laagste terme waarin die vektorsnelheid in terme van o.p.m. aangewend kan word.

Gebruik die aldus afgeleide formule om die volgende voorbeeld op te los. Die rotor van 'n stoomturbine draai teen 6,000 o.p.m. Die blaie weeg elk 1·5 ons, en hulle swaartepunt is 9 dm. van die rotasie-as. Bepaal die middelpuntvliedende krag as gevolg van elke blad.

9. 'n Silindriese vat van sagte staal het 'n buitendeursnee van 22·25 dm. en 0·25 dm. dikte. Die lengtelas is V-vormig gesweis deur middel van 'n elektriese proses. Die trekvasheid van die plaat en van die neergesmelte metaal is onderskeidelik 27 en 25 ton/vk. dm. As die bedryfsdruk 15 lb./vk. dm. is, bereken—

- die intensiteit van die spanning by die sweislas (waarvan die dikte dieselfde as dié van die plaat geneem kan word); en
- die veiligheidsfaktor van die lengtelas.

4. The piston of an air compressor is 310 mm. in diameter, and its stroke is 420 mm.

The following pressures are measured on the compression curve of the indicator diagram: At 210 mm. of the stroke, 14 lb./sq. in.; and at 340 mm. of the stroke, 43 lb./sq. in. by gauge. Assuming isothermal compression, find the capacity of the clearance space in cubic inches.

5. A quadruple expansion engine has cylinders 25½, 36½, 52 and 75 inches in diameter respectively. The mean effective pressures are respectively 60.9, 30.7, 17.9 and 8.8 lb./sq. in. Find the mean effective pressure referred to the low-pressure cylinder, and the stroke of the engine if 2,650 i.h.p. are developed at 78 r.p.m.

6. One pound of steam at a pressure of 400 lb./sq. in. abs., superheated 280 deg. F., is expanded in a turbine to a pressure of 1 lb./sq. in. abs.

If 255,000 ft. lb. of work are done, calculate, using tables I and II of the Steam Tables provided, the dryness fraction of the steam at the lower pressure.

7. An engine of 5,620 i.h.p. uses 14 lb. of steam per i.h.p. per hour and 1 lb. of the steam in condensing rejects 1,030 B.Th.U. If the injection water is obtained at 65 deg. F. and 19 tons pass through the condenser tubes per minute, what is—

- (a) the temperature of the discharge water;
- (b) the amount of heat, in B.Th.U. passing overboard per i.h.p. in the circulating water per minute; and
- (c) the thermal efficiency of the engine if the loss due to the condenser is 62 per cent?

8. Determine, using the Steam Tables provided, the horse-power required to convert 120 kilogrammes of steam at a pressure of 210 lb./sq. in. abs., dryness fraction 0.95, into ice at a temperature of minus 10 deg. C., in 40 minutes.

9. The boilers of a vessel contain 206 tons of water, and at the commencement of a voyage of 15 days, they were filled with water weighing 1,001 oz. per cu. ft. At the end of that voyage, owing to a leak in the condenser, the density of the water in the boilers was 3.91 thirty-seconds. If the average density of the water in the hotwell had been 0.76 oz. per gallon, and the average i.h.p. 2,250, what was the steam consumption in lb. per i.h.p. per hour?

EXAMINATION OF ENGINEER OFFICERS.

GENERAL ENGINEERING SCIENCE.

SECOND ENGINEER OFFICER.

Do not deface or make any marks on this paper.

Do not copy the questions.

Data that might be required may be found on the first page of the answer book, or in the mathematical tables provided.

SIX QUESTIONS ONLY TO BE ATTEMPTED.

(Time allowed: 3 hours.)

1. Show by means of a graph how velocity and time are related when a body moves with constant acceleration. From the graph deduce an expression for the distance covered by a body when moving with constant acceleration "f" from an initial velocity "U" to a final velocity "V".

A launch moving from rest has a constant acceleration of 1/3 ft./sec.² for 1 min, it then proceeds at constant speed for 5 min., finally being brought to rest with constant retardation in 2 min. Find the total distance covered.

2. A closed cylindrical vessel, 3 ft. 6 inches in diameter and 2 ft. 6 inches in length, is made of sheet steel weighing 3.8 lb./sq. ft. When filled with oil it floats awash in water which has a density of 1,024 oz./cu. ft. Find the specific gravity of the contained oil.

3. A boiler is filled with fresh water to a depth of 10 ft. 4.75 in. above the top edge of the manhole door, which has its major axis horizontal. The manhole is elliptical and measures 16 in. by 12 in. The width of the joint is 1 in. and the overall dimensions of the door are 18.5 in. by 14.5 in. Calculate the total load on the door joint due to the head of water.

Note.—The area of an ellipse is $\frac{\pi}{4} Dd$, where D and d are the major and minor axis respectively.

4. In a two-cycle single-acting internal combustion engine the top edge of the exhaust port is 25 per cent of the stroke before the bottom dead centre, and the crank angle for opening of scavenge port is 20 degrees after opening of exhaust port. If the stroke of the engine is 1,200 mm. and the length of the connecting rod is twice the stroke, what is the distance between the top of the exhaust port and the top of the scavenge port?

5. A beam of rectangular section 10 ft. in length and freely supported at the ends carries a concentrated load of 6 tons at the centre. If the depth of the beam is three times the breadth and the maximum stress is not to exceed 10,000 lb./sq. in., calculate the dimensions of the cross section.

Note.— $\frac{M}{I} = \frac{f}{y}$ where I in this case = $\frac{bd^3}{12}$.

6. A uniform beam AB when slung from a point 4.5 ft. from A requires a weight of 80 lb. hung at A to bring the beam horizontal. When slung at 4.8 ft. from the same end a load of 60 lb. placed at A is now sufficient to maintain the beam in a horizontal position.

Find the weight and the length of the beam.

7. Two ships leave a port at the same time; A steams South-East at 14 knots and B steams 20 degrees North of East. If after two hours steaming they are 35 miles apart, calculate the actual speed of B and the relative speed and direction of B to A.

8. What is meant by Centrifugal Force? The magnitude of centrifugal force is given by the expression $C.F. = \frac{Wv^2}{Rg}$. State the units of each term and reduce this expression to a formula in its lowest terms wherein the velocity may be applied in terms of r.p.m.

Use the formula derived to solve the following example. A steam turbine rotor rotates at 6,000 r.p.m. The blades each weigh 1.5 oz., and their centres of gravity are 9 in. from the axis of rotation. Find the centrifugal force due to each blade.

9. A mild steel cylindrical vessel is 22.25 inches in external diameter and 0.25 inch in thickness. The longitudinal joint is vee-welded by an electrical process. The tensile strength of the plate and of the deposited metal is 27 and 25 tons/sq. in. respectively. If the working pressure is 15 lb./sq. in., calculate—

- (a) the intensity of stress at the weld (which may be assumed to be of the same thickness as the plate); and
- (b) the factor of safety of the longitudinal joint.

EKSAMEN VIR INGENIEUROFFISIERS.

WERKSTEKENING.

TWEDE-INGENIEUROFFISIER.

ALGEMENE INSTRUKSIES.

1. Teken die voorwerp duidelik met potlood, maar voeg die maatpyltjies en syfers met inkt in.
2. Werktekenings volgens skaal word vereis en nie afbeeldings nie.
3. Voeg al die mate in wat vir die konstruksie van die voorwerp in die werkplaas nodig is.
4. Mate moet in voet en duim aangegee word.
5. Moenie meer as die gespesifiseerde aantal dele teken nie.
6. Krediet sal vir korrekte projeksies gegee word.
7. Die materiaal waarvan verskillende dele gemaak moet word, moet op die tekening aangedui word.

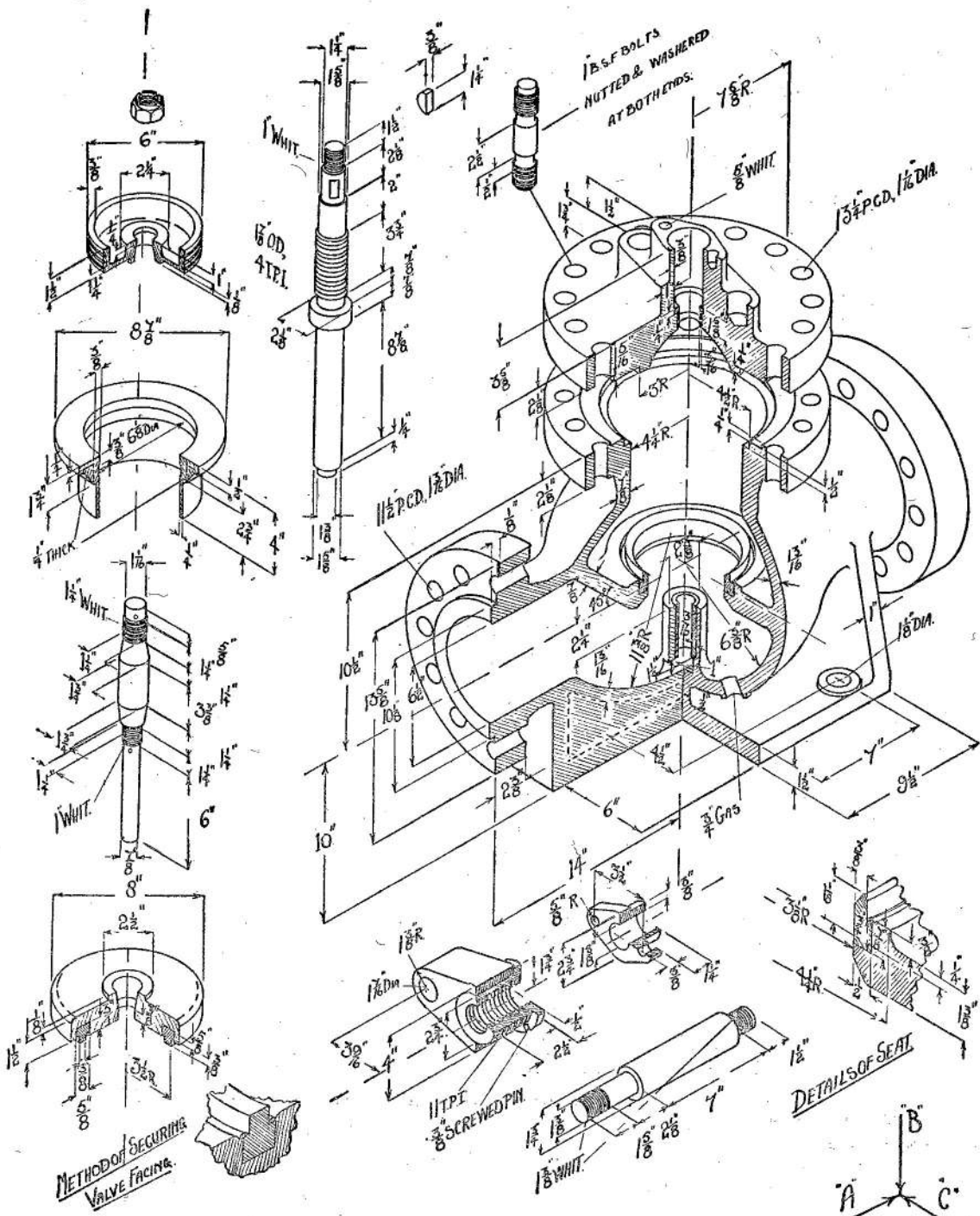
HOËDRUK GEKOMBINEERDE ISOLEER-EN-AFSLUITKLEP.

Teken die volgende aansigte met al die dele inmeekaargesit:—

- (a) 'n vertikale aansig wat in rigting „C” wys en wat die linkerhelfte in profiel deur die vertikale middellyn toon; en
- (b) 'n entaansig in ten volle geprojekteerde vorm (a).

Toon die klep in geslote stand.

Tyd toegelaat: 6 uur.



EXAMINATION OF ENGINEER OFFICERS.

WORKING DRAWING.

SECOND ENGINEER OFFICER.

GENERAL INSTRUCTIONS.

1. Draw the object clearly in pencil but insert the dimension arrowheads and figures in ink.
2. Working drawings to scale are required, and not pictorial representations.
3. Insert all the dimensions necessary for the construction of the object in the workshops.
4. Dimensions should be given in feet and inches.
5. Do not draw more parts than are specified.
6. Credit will be given for correct projection.
7. The material of which different parts are to be made should be be indicated on the drawing.

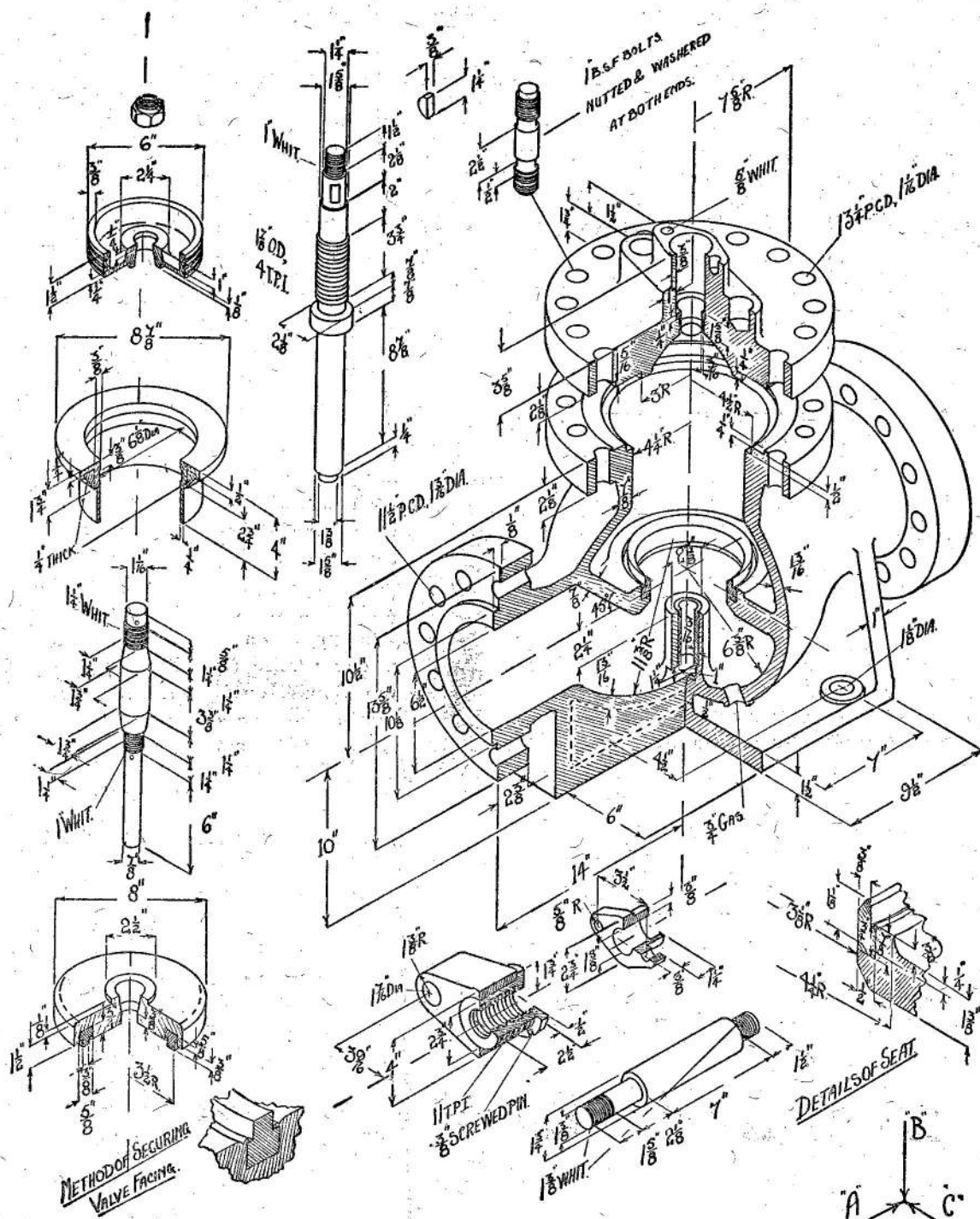
HIGH PRESSURE COMBINED ISOLATING AND STOP VALVE.

Draw the following views with all parts assembled:—

- (a) an elevation looking in direction "C" showing the left-hand half in section through the vertical centre line; and
- (b) an end elevation in full projected from (a).

Show the valve in the closed position.

Time allowed: 6 hours.



EKSAMEN VIR INGENIEUROFFISIERS.

INGENIEURSWESE.

HOOF-INGENIEUROFFISIER.

MIDDAGVRAESTEL—KANDIDATE VIR STOOMMASJINE.

*Moenie hierdie vraestel skend of merke daarop maak nie.**Moenie die vrae afskryf nie.*

BEANTWOORD NET SES VRAE.

(Tyd toegelaat: 3 uur.)

1. Bespreek brandstofbesparing met betrekking tot die volgende:—

- (a) verbrandingslugtemperatuur;
- (b) lekke in lugverwarmerpype;
- (c) lekke in lughulsels;
- (d) temperatuur van gasse wat die skoorsteen verlaat.

2. Met die plat plaat as beginpunt, beskryf die vervaardiging van 'n geriffelde silindriese oond en skets die riefelvorms wat algemeen gebruik word. Noem die metodes van vashegting aan die ketelentplaat en verbrandingskamer.

3. Skets en beskryf die een of ander vorm van roetblaser en beskryf die werking daarvan. Noem die punte wat tydens opknapping miskien aandag sal verg.

4. Skets in hooftrekke die inrigting van 'n Yarrowketel met lugverwarmer en oorverwarmer. Toon duidelik die baan wat die lug en stoom tot by die afsluitklep vir oorverhitte stoom volg. Hoe kan die eindtemperatuur van die stoom beheer word?

5. Bespreek die uitwerking wanneer seewater in die voedingstelsel van 'n silindriese ketelinstallasie inlek en beskryf uitvoerig die gevolge wat dit sal meebring wanneer hierdie fout verontagsaam word en die uitwerking wat dit oor 'n lang tyd op die stoomketels sal hê.

6. Beskryf 'n hoëdruksuier vir 'n drievoudige ekspansie-enjin wat oorverhitte stoom gebruik; sluit die ringsamestel in wat van 'n „beperkte” patroon moet wees en meld die doel van hierdie ringontwerp. Hoe word dit gestel om slytasie op te neem?

7. Watter voordele kan getrek word uit die gebruik van klepwerk met nokwerking vir suierstoommasjinerie? Maak 'n skets wat so 'n inrigting aantoon en verduidelik hoe dit werk. Meld veral watter voorsiening gemaak word vir smering, verstelling en uitskakeling van sydruk van die nok na die klep.

8. Noem die verskillende punte waaraan aandag gegee moet word by die ondersoek en vernuwing van 'n veiligheidsklep met slaghoogte. Meld die voordele wat hierdie besondere ontwerp sou inhou.

9. Beskryf, met sketse, twee metodes vir die aanhegting van turbineblaas aan 'n turbinerotor. Watter faktore beheer die loopvryruimtes tussen die vaste en bewegende blaas en die huls; meld watter vryruimtes verwag word in 'n moderne installasie wat, sê maar, 9,000 asperdekrag ontwikkel.

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1. Discuss fuel economy in relation to the following:—
 - (a) combustion air temperature;
 - (b) leaks in air heater tubes;
 - (c) leaks in air casings;
 - (d) temperature of gases leaving the funnel.
2. Taking the flat plate as a starting point, describe the manufacture of a corrugated cylindrical furnace and sketch the forms of corrugations commonly used. Mention the methods of attachment to the boiler and plate and combustion chamber.
3. Sketch and describe some form of soot blower and describe how it is operated. Mention the points which may require attention during overhaul.
4. Outline the arrangement of a Yarrow boiler with air heater and superheater. Show clearly the path followed by the air and by the steam up to the superheated steam stop valve. How may the final steam temperature be controlled?
5. Consider the effect of sea water leakage into the feed system of a cylindrical boiler installation and describe in detail the result of neglect to deal with the fault and the effects it would have on the boilers over a considerable period.
6. Describe a high-pressure piston for a triple-expansion engine using superheated steam; include the ring assembly which should be of a "restricted" pattern and state the purpose of this ring design. How it is adjusted to take up wear?
7. What advantages are there to be obtained from the use of cam-operated valve gear for reciprocating steam machinery? Make a sketch showing such an arrangement and explain its action; in particular, mention any provisions made for lubrication, adjustment and elimination of side thrust from the cam to the valve.
8. Enumerate the various points to which attention must be given during the examination and reconditioning of a high-lift safety valve. Refer to the advantages claimed for this particular design.
9. Describe, with sketches, two methods of attaching turbine blades to a turbine rotor. What considerations govern the running clearances between the fixed and moving blades and between the blades and casing; state the clearances expected in a modern installation developing say, 9,000 s.h.p.

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