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GOEWERMENTSKENNISGEWING.

DEPARTEMENT VAN VERVOER.

No. R. 471. 22 Maart 1968.

DIE EKSAMENREGULASIES VIR INGENIEUROFFISIERE, 1968.

Die Minister van Vervoer het, kragtens die bepalings van artikel 356 (1) van die Handelskeepvaartwet, 1951 (Wet No. 57 van 1951), soos gewysig, die Regulasies in verband met die Eksamens in Ingenieuroffisiere, 1960 soos afgekondig by Goewermentskennisgewing No. R. 735 gedateer 27 Mei 1960 en gewysig by Goewermentskennisgewing No. R. 974 gedateer 10 November 1961, herroep en kragtens genoemde artikel die regulasies in die Bylae hiervan uitgevaardig met ingang in beide gevalle, vanaf 5 April 1968.

BYLAE.

INHOUDSOPGAWE.

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GOVERNMENT NOTICE.

DEPARTMENT OF TRANSPORT.

No. R. 471. 22 March 1968.

THE EXAMINATION REGULATIONS FOR ENGINEER-OFFICERS, 1968.

The Minister of Transport has, under the provisions of section 356 (1) of the Merchant Shipping Act, 1951 (Act No. 57 of 1951), as amended, repealed the Examination Regulations for Engineer-Officers, 1960 promulgated by Government Notice No. R. 735 dated 27 May 1960 as amended by Government Notice No. R. 974 dated 10 November 1961 and has, in terms of the said section, made the regulations contained in the Schedule hereto, with effect in each case from 5 April 1968.

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15. Voltydse of stapelkursusse aan tegniese skole, tegniese kolleges of universiteite.
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18. Tydperk seediens vereis vir die endossering van 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart).
19. Tipe seediens vereis van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) en endossement.
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23. Tipe seediens vereis van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Kusvaart) en endossement.
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A. *Kandidaat vir 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) en Endossement.*

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28. Studente- of tegniese vakleerlingskappe.
29. Voltydse of stapelkursusse aan tegniese skole, tegniese kolleges of universiteite.
30. Vergoedende diens.
    (2) Seediens.
31. Tydperk seediens vereis van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart).
32. Tydperk seediens vereis vir die endossering van 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart).
33. Tipe seediens vereis van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) en endossement.
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18. Period of sea service required for the endorsement of a certificate of competency as Second Engineer-Officer (coasting).
19. Type of sea service required of a candidate for a certificate of competency as Second Engineer-Officer (coasting) and endorsement.
20. Remission of sea service for a candidate for a certificate of competency as Second Engineer-Officer (coasting).

B. *Candidate for a Certificate of Competency as Chief Engineer-Officer (Coasting) and Endorsement.*

21. Period of sea service required of a candidate for a certificate of competency as Chief Engineer-Officer (coasting).
22. Period of sea service required for the endorsement of a certificate of competency as Chief Engineer-Officer (coasting).
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27. Service as Apprentice Engineer or Journeyman.
28. Student or Technical Apprenticeships.
29. Full-time or Sandwich Technical School, College or University Courses.
30. Compensatory service.
    (2) Sea Service.
31. Period of sea service required of a candidate for a certificate of competency as Second Engineer-Officer (foreign-going).
32. Period of sea service required for the endorsement of a certificate of competency as Second Engineer-Officer (foreign-going).
33. Type of sea service required of a candidate for a certificate of competency as Second Engineer-Officer (foreign-going) and endorsement.
34. Remission of sea service for a candidate for a certificate of competency as Second Engineer-Officer (foreign-going).

B. *Kandidaat vir 'n Sertifikaat van Bekwaamheid as Hoof-Ingenieuroffisier (Vreemde Vaart) en Endossement.*

35. Tydperk seediens vereis van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart).
36. Tydperk seediens vereis vir die endossering van 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart).
37. Tipe seediens vereis van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) en endossement.
38. Kwytskelding van seediens vir 'n kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart).
39. Eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) sonder dat 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) voorgelê word.

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B. *Candidate for a Certificate of Competency as Chief Engineer-Officer (Foreign-going) and Endorsement.*

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36. Period of sea service required for the endorsement of a certificate of competency as Chief Engineer-Officer (foreign-going).
37. Type of sea service required of a candidate for a certificate of competency as Chief Engineer-Officer (foreign-going) and endorsement.
38. Remission of sea service for a candidate for a certificate of competency as Chief Engineer-Officer (foreign-going).
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HOOFSTUK I.

ALGEMEEN.

Titel van hierdie Regulasies.

1. Hierdie regulasies heet die Eksamenregulasies vir Ingenieuroffisiere, 1968.

** Vertolking.*

2. In hierdie regulasies beteken die uitdrukking „die Wet" die Handelskeepvaartwet, 1951 (Wet No. 57 van 1951), en tensy die samehang anders aandui, het enige uitdrukking wat in hierdie regulasies gebruik word en waarvoor in die Wet 'n betekenis aangegee is, die aldus aangegewe betekenis, en beteken—

"goedgekeur" deur die Sekretaris goedgekeur;

"Hoof-ingenieuroffisier (Kusvaart)" 'n Hoof-ingenieuroffisier van 'n kusvaarder;

"Hoof-ingenieuroffisier (Vreemde Vaart)" 'n Hoof-ingenieuroffisier van 'n skip op vreemde vaart;

"dagwerk" ingenieurswerk op 'n skip gedoen deur 'n ingenieuroffisier wat as lid van die bemanning in diens is, uitgesonderd ingenieurswerk op gereelde waghoudiens;

"eksaminator" die persoon wat kragtens artikel 77 (4) van die Wet as sodanige aangestel is;

"perdekrag" onder meer—

(*a*) waar suierstoommasjiene gebruik word, aangegewe perdekrag;

(*b*) waar motorenjins gebruik word, remperdekrag; en

(*c*) waar stoomturbines gebruik word, asperdekrag;

"lang seereis" 'n seereis waarin die uiterste hawens wat die skip in die loop van die seereis besoek, minstens 500 myl uit mekaar is;

"seediens" in die geval van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) of Hoof-ingenieuroffisier (Kusvaart) ook modderskuite, baggerskepe of sleepbote wat in 'n hawe gebruik word;

"Tweede Ingenieuroffisier (Kusvaart)" 'n Tweede Ingenieuroffisier van 'n kusvaarder;

"Tweede Ingenieuroffisier (Vreemde Vaart)" 'n Tweede Ingenieuroffisier van 'n skip op vreemde vaart; en

"kort seereis" 'n seereis waarin die uiterste hawens wat die skip in die loop van die seereis besoek, minder as 500 myl uit mekaar is.

Oorweging van Twyfelagtige Gevalle.

3. In alle gevalle van onsekerheid oor die toepassing of vertolking van hierdie regulasies of in die geval van onsekerheid oor die aanvaarbaarheid van 'n kandidaat se diens- of ander kwalifikasies vir 'n bekwaamheidsertifikaat of vir sy toelating tot 'n eksamen vir so 'n sertifikaat moet die saak, indien dit na die Sekretaris verwys word, deur laasgenoemde uitgemaak word en is dié se beslissing finaal.

* Vir die toepassing van hierdie regulasies het die Minister die volgende beamptes as „bevoegde beamptes" in die Republiek aangewys:—

Te Kaapstad, Durban, Port Elizabeth, Walvisbaai en Saldanhabaai: Die Eerste Beampte van die Marineafdeling.

Te Oos-Londen, Mosselbaai, Port Nolloth en Lüderitz: Die Koopvaardymeester.

(*L.W.*—Leiding in verband met die aflees van die waterpeilglas, 'n lys van voorgestelde handboeke en voorbeelde van eksamenvraestelle kan verkry word deur aansoek te doen by die Sekretaris van Vervoer, Privaatsak 193, Pretoria, of die Eerste Beampte van die Marineafdeling te Kaapstad, Durban, Port Elizabeth, Walvisbaai of Saldanhabaai of die Koopvaardymeester te Oos-Londen, Mosselbaai, Port Nolloth of Lüderitz.)

CHAPTER I.

GENERAL.

Title of These Regulations.

1. These regulations are called the Examination Regulations for Engineer-Officers, 1968.

** Interpretation.*

2. In these regulations the expression "the Act" means the Merchant Shipping Act, 1951 (Act No. 57 of 1951), and unless the context otherwise indicates, any expression used in these regulations to which a meaning has been assigned in the Act, bears the meaning so assigned, and—

"approved" means approved by the Secretary;

"Chief Engineer-Officer (coasting)" means a Chief Engineer-Officer of a coasting ship;

"Chief Engineer-Officer (foreign-going)" means a Chief Engineer-Officer of a foreign-going ship;

"day-work" means engineering work, other than on regular watch, performed in a ship by an Engineer-Officer employed as member of the crew;

"examiner" means the person appointed as such in terms of section 77 (4) of the Act;

"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;

"long voyage" means a voyage in which the distance between the extreme ports visited by the ship in the course of a voyage is not less than 500 miles;

"sea service" includes service in hoppers, dredgers or tugs operating in port, in the case of a candidate for a certificate of competency as Second Engineer-Officer (coasting) or Chief Engineer-Officer (coasting);

"Second Engineer-Officer (coasting)" means a Second Engineer-Officer of a coasting ship;

"Second Engineer-Officer (foreign-going)" means a Second Engineer-Officer of a foreign-going ship; and

"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.

Consideration of Doubtful Cases.

3. In all cases of doubt as to the application or interpretation of these regulations, or, if any doubt arises as to the acceptance of the service or other qualifications of any candidate for a certificate of competency or for his admission to an examination for such a certificate, the matter shall, if referred to the Secretary, be decided by him and his decision shall be final.

* For the purposes of these regulations, the Minister has designated the following officers as "proper officers" in the Republic:—

At Cape Town, Durban, Port Elizabeth, Walvis Bay and Saldanha Bay: The Principal Officer of the Marine Division;

At East London, Mossel Bay, Port Nolloth and Lüderitz: The Shipping Master.

(*N.B.*—Guidance as to the reading of the water gauge, a list of suggested text books and specimen examination papers may be obtained on application to the Secretary for Transport, Private Bag 193, Pretoria, or the Principal Officer of the Marine Division at Cape Town, Durban, Port Elizabeth, Walvis Bay or Saldanha Bay or the Shipping Master at East London, Mossel Bay, Port Nolloth or Lüderitz.)

Plekke waar Eksamens Afgeneem word.

4. Eksamens vir bekwaamheidsertifikate moet in Kaapstad en Durban afgeneem word op tydstippe wat van die bevoegde beampte vasgestel is; met dien verstande dat van tyd tot tyd spesiale reëlings getref kan word om eksamens elders as in Kaapstad en Durban af te neem.

Aansoekvorm.

5. 'n Kandidaat vir 'n bekwaamheidsertifikaat moet vorm T.V. 5/102, soos in Aanhangsel 1 uiteengesit, invul.

Ander Dokumente wat Ingedien moet word.

6. (1) 'n Kandidaat vir 'n ander bekwaamheidsertifikaat as dié van Hoof-ingenieuroffisier—Spesiale Graad—moet seker maak dat die vorm vermeld in regulasie 5, vergesel van sy—

(*a*) geboortesertifikaat of ander aanneemlike ouderdomsbewys;

(*b*) vakleerlingsertifikaat;

(*c*) ontslagsertifikate, indien hy sulke sertifikate het; en

(*d*) getuigskrifte,

by die kantoor van die eksaminator by die hawe waar die kandidaat geëksamineer wil word, ingelewer word of gepos word om genoemde eksaminator te bereik minstens 14 dae voor die datum waarop die kandidaat geëksamineer wil word, of dat vermelde dokumente by die kantoor van die bevoegde beampte by enige ander hawe ingelewer word of gepos word sodat hulle sodanige bevoegde beampte bereik minstens 21 dae voor die datum van die eksamen; met dien verstande dat die eksaminator die kandidaat kan toelaat om eksamen te doen al word vermelde dokumente ook later ingelewer of gepos as wat by hierdie regulasie bepaal word.

(2) Indien 'n kandidaat in besit is van 'n geldige bekwaamheid- of dienssertifikaat, moet hy sodanige sertifikaat aan die eksaminator oorhandig alvorens hy toegelaat word om die eksamen te doen.

Getuigskrifte.

7. (1) Behoudens die bepalings van regulasie 11 moet 'n kandidaat vir 'n ander bekwaamheidsertifikaat as dié van Hoof-ingenieuroffisier—Spesiale Graad—getuigskrifte voorlê wat sy werkwinkeldiens en sy seediens dek.

(2) Elke getuigskrif moet gestel wees in een van die vorms uiteengesit in Aanhangsel 2 of in 'n ander vorm met wesenlik dieselfde strekking.

(3) Die getuigskrifte oor sy werkwinkeldiens moet van die kandidaat se gedrag en bekwaamheid gewag maak en meld watter soort werk hy gedoen en die tydperk wat hy aan elke vertakking, bv. paswerk, oprigtingswerk, draaiwerk, masjienwerk, ens., bestee het. Hierdie getuigskrifte moet deur die werkgewer of sy verteenwoordiger geteken wees.

(4) Die getuigskrifte oor sy bekwamende seediens moet van die kandidaat se matigheid, ervaring, bekwaamheid en algemene goeie gedrag gewag maak en moet meld wat sy werklike rang op waghoudiens is, hoeveel Ingenieuroffisiere gelyktydig by die ketels en/of die hoofaandrywingsmasjinerie waghoudiens verrig en wat die aard is van die werk wat hy gedoen het. Hierdie getuigskrifte moet geteken word deur die Hoof-Ingenieuroffisier onder wie die diens verrig is, en, indien moontlik, moet hulle ook geëndosseer word deur die Ingenieursuperintendent of, waar daar nie so 'n superintendent is nie, deur die gesagvoerder of die verteenwoordiger van die eienaar. Waar die kandidaat 'n Hoof-Ingenieuroffisier is, moet die getuigskrifte deur die Ingenieursuperintendent of besturende eienaar of die sekretaris van die maatskappy onderteken word.

Places of Examination.

4. Examinations for certificates of competency shall be held at Cape Town and Durban at such times as may be ascertained from the proper officer: Provided that special arrangements may be made from time to time for examinations to be held at places other than Cape Town and Durban.

Form of Application.

5. A candidate for a certificate of competency shall complete the form T.V. 5/102 set forth in Annex 1.

Other Documents to be Submitted.

6. (1) A candidate for a certificate of competency, other than as Chief Engineer-Officer—Special Grade, shall ensure that the form mentioned in regulation 5 accompanied by his—

(*a*) birth certificate, or other acceptable proof of age;

(*b*) certificate of apprenticeship;

(*c*) certificates of discharge, if any; and

(*d*) testimonials,

is 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 14 days before the date on which he wishes to be examined, or is handed in at the office, or posted so as to reach, the proper officer at any other port at least 21 days before the date of the examination: Provided that the examiner may allow the candidate to sit even if the said documents are 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, hand in such certificate to the examiner.

Testimonials.

7. (1) Subject to the provisions of regulation 11, a candidate for a certificate of competency, other than Chief Engineer-Officer—Special Grade, shall produce testimonials covering his workshop service and his sea service.

(2) Every testimonial shall be in one of the forms set forth in Annex 2 or in some other form substantially to the like effect.

(3) 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.

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

(5) Indien 'n kandidaat effens hardhorend is of aan 'n ander liggaamsgebrek ly wat van so 'n aard is dat dit die behoorlike vervulling van sy pligte as Ingenieuroffisier op waghoudiens kan belemmer, moet in sy getuigskrifte vermeld word of die gebrek inderdaad die behoorlike vervulling van die kandidaat se pligte op enige wyse belemmer het.

Doofheid en ander Liggaams- of Geestesgebreke.

8. (1) Indien die eksaminator in die loop van 'n eksamen vind dat 'n kandidaat doof is of 'n spraakgebrek het of aan die een of ander liggaamlike of geestelike swakheid ly en sodanige eksaminator daarvan oortuig is dat die mate van doofheid of gebrek of ander swakheid sodanig is dat dit die kandidaat onbekwaam maak vir die vervulling van die gewone pligte van die skeepsrang wat die sertifikaat waarvoor hy geëksamineer word, hom die reg sou gee om te beklee, moet hy die kandidaat, indien dié dit verlang, toelaat om die eksamen te voltooi en moet hy die saak aan die Sekretaris rapporteer met die oog op sodanige stappe as wat laasgenoemde nodig ag.

(2) Ongeag die bepalings van hierdie regulasies mag 'n vorm T.V. 5/106 of 'n bekwaamheidsertifikaat nie uitgereik word aan 'n kandidaat wat in subregulasie (1) vermeld word en die eksamen deurgekom het nie; met dien verstande dat 'n bekwaamheidsertifikaat uitgereik kan word aan 'n kandidaat wat na slaging in die eksamen aan die Sekretaris bevredigende bewys lewer dat sy gehoor, spraak of liggaamlike of geestelike toestand verbeter het of normaal is.

Diens Onvoldoende Bevind.

9. (1) Indien 'n kandidaat die eksamen deurgekom het en daarna ontdek word dat sy diens onvoldoende is om hom geregtig te maak tot die ontvangs van 'n sertifikaat van die graad waarvoor hy geslaag het, mag die sertifikaat behoudens die bepalings van hierdie regulasie nie aan hom toegeken word nie.

(2) Indien die Sekretaris nie daarvan oortuig is dat die fout in die berekening van die kandidaat se diens deur die fout van of deur opsetlike wanvoorstelling deur die kandidaat veroorsaak is nie, moet die sertifikaat teruggehou word tot tyd en wyl bevredigende bewys gelewer is dat al die nodige diens voltooi is, en daarna moet die sertifikaat behoudens die bepalings van hierdie regulasies aan die kandidaat uitgereik word.

(3) As die Sekretaris daarvan oortuig is dat die fout opsetlik gemaak is, moet die sertifikaat teruggehou word tot tyd en wyl die kandidaat al die nodige bekwamende diens en ook sodanig verdere diens as wat die Sekretaris bepaal, voltooi, weer die toepaslike bedrag betaal en weer die eksamen deurgekom het.

(4) Addisionele diens wat ooreenkomstig subregulasie (3) deur 'n kandidaat gelewer is, geld nie as bekwamende diens vir 'n ander sertifikaat nie.

Afskrifte van Verlore Sertifikate.

10. Die aanvraer van 'n gewaarmerkte afskrif van 'n verlore sertifikaat, ongeag of dit 'n bekwaamheid- of 'n dienssertifikaat is, moet die voorgeskrewe aansoekvorm T.V. 5/103, soos uiteengesit in Aanhangsel 1, met verstrekking van die nodige besonderhede invul, sodanige aansoek aan die bevoegde beampte oorhandig en terselfdertyd die bedrag van R2 betaal. Die applikant moet voor die bevoegde beampte 'n verklaring doen oor die omstandighede waarin die sertifikaat verloor is en sodanige beampte moet die aansoek van die Sekretaris deurstuur.

(5) 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 shall be stated in his testimonials whether the defect did in fact interfere in any way with the proper performance of the candidate's duties.

Deafness and Other Physical and Mental Disabilities.

8. (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 the ship which the certificate for which the candidate is being examined would entitle him to hold, he shall if the candidate so desires, allow him to complete the examination and shall report the matter to the Secretary for such action as he may deem necessary.

(2) Notwithstanding the provisions of these regulations, a form T.V. 5/106 or a certificate of competency shall not be issued to a candidate referred to in subregulation (1) who has passed the examination: Provided that a certificate of competency may be issued to a candidate who, after having passed the examination, produces satisfactory evidence to the Secretary to the effect that his hearing, speech or physical or mental condition has improved or is normal.

Service Found to be Insufficient.

9. (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 Secretary 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 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 Secretary 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 Secretary, has again paid the appropriate fee and has again passed the examination.

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

Copies of Lost Certificates.

10. An applicant for a certified copy of a lost certificate, whether of competency or service, shall complete the prescribed form of application T.V. 5/103 set forth in Annex 1, giving the necessary particulars, and shall hand it to the proper officer, paying at the same time the fee of R2. 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 Secretary.

Geen betaling word gevorder as die applikant bewys lewer dat die sertifikaat as gevolg van skipbreuk of 'n brand aan boord verloor is nie.

Wangedrag van Kandidate.

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

(*a*) na ondertekening van die ooreenkoms met die bemanning nagelaat het om hom by sy skip aan te meld;

(*b*) van sy skip gedros het nadat hy hom daar aangemeld het;

(*c*) deur 'n wettige regsprekende liggaam skuldig bevind is aan 'n misdryf waarvoor hy tot gevangenisstraf sonder boete as keuse gevonnis is of wat na die oordeel van die eksaminator van 'n ernstige aard is; of

(*d*) skuldig bevind is aan 'n misdryf ten opsigte waarvan ooreenkomstig artikel 183 (*b*) van die Wet 'n inskrywing in die amptelike skeepsjoernaal aangebring en wat na die mening van die eksaminator van 'n ernstige aard is,

moet die getuigskrifte wat by regulasie 7 (4) vereis word, die tydperk van 2 jaar na sodanige wangedrag dek; met dien verstande dat die Sekretaris die tydperk na eie oordeel op versoek van die kandidaat kan verkort nadat hy die saak ondersoek het.

(2) Indien ooit aan die Sekretaris gerapporteer word dat 'n kandidaat 'n eksaminator of iemand anders wat kragtens die Wet werksaam is, 'n som geld of iets anders hoegenaamd aangebied het met die doel om hom op enige wyse met betrekking tot 'n eksamen te beïnvloed, moet die Sekretaris na die saak ondersoek instel en indien hy daarvan oortuig is dat die kandidaat so 'n aanbod vir vermelde doel gedoen het, kan hy weier om toe te laat dat die kandidaat geëksamineer word of, indien die eksamen reeds begin het, kan hy die eksaminator gelas om nie met die eksamen voort te gaan nie, of, indien die eksamen reeds voltooi is, kan hy die uitslag daarvan nietig verklaar, en hy kan die geld wat deur die kandidaat betaal is, verbeurd verklaar en weier om toe te laat dat sodanige kandidaat hom binne 'n tydperk van hoogstens 12 maande met ingang van die datum waarop sodanige aanbod gedoen is, vir 'n eksamen in die Republiek aanmeld.

HOOFSTUK II.

KWALIFIKASIES VEREIS VAN 'N KANDIDAAT VIR 'N SERTIFIKAAT VAN BEKWAAMHEID AS TWEEDE INGENIEUROFFISIER (KUSVAART) EN ENDOSSEMENT OF HOOF-INGENIEUROFFISIER (KUSVAART) EN ENDOSSEMENT.

A. *Kandidaat vir 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) en Endossement.*

Ouderdom van Kandidaat.

12. 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) moet minstens 21 jaar oud wees.

(1) *Werkwinkeldiens.*

Diens as Leerlingingenieur of Ambagsgesel.

13. (1) 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) moet bewys dat hy sedert bereiking van die leeftyd van 15 jaar minstens 4 jaar lank as leerlingingenieur of ambagsgesel bevredigende diens gelewer het in werk wat vir die opleiding van 'n skeepswerktuigkundige in die vervaardiging of onderhoud van masjinerie geskik is.

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

Misconduct by Candidates.

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

(*a*) after having signed the agreement with the crew, has neglected to join his ship;

(*b*) after having joined, has deserted his ship;

(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 logbook in terms of section 183 (*b*) of the Act and which the examiner considers to be of a serious nature,

the testimonials required in terms of regulation 7 (4) shall cover the period of 2 years subsequent to such misconduct: Provided that upon the application of the candidate the Secretary, after having investigated the matter, may in his discretion reduce the period.

(2) If at any time it is reported to the Secretary 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 Secretary 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 Republic for a period not exceeding 12 months from the date of making such offer.

CHAPTER II.

QUALIFICATIONS REQUIRED OF A CANDIDATE FOR A CERTIFICATE OF COMPETENCY AS SECOND ENGINEER-OFFICER (COASTING) AND ENDORSEMENT, OR CHIEF ENGINEER-OFFICER (COASTING) AND ENDORSEMENT.

A. *Candidate for a Certificate of Competency as Second Engineer-Officer (Coasting) and Endorsement.*

Age of Candidate.

12. A candidate for a certificate of competency as Second Engineer-Officer (coasting), shall be not less than 21 years of age.

(1) *Workshop Service.*

Service as Apprentice Engineer or Journeyman.

13. (1) A candidate for a certificate of competency as Second Engineer-Officer (coasting), shall prove that since reaching the age of 15 years he has served satisfactorily for not less than 4 years as apprentice engineer or journeyman on work suitable for the training of a marine engineer in the manufacture or maintenance of machinery.

(2) Die tydperk van 4 jaar werkwinkeldiens wat by subregulasie (1) vereis word, moet bestee gewees het—

(*a*) aan die montering, oprigting of herstel van masjinerie van geskikte grootte of beskrywing (bv. werk aan skeepsmasjiene en taamlike groot hulpmasjiene van 'n tipe wat in skepe geïnstalleer word, of aan aandrywingsmasjiene van dergelike waarde in die opleiding van skeepswerktuigkundiges), hetsy in of buite die werkwinkel; of

(*b*) gedeeltelik aan die tipe werk genoem in paragraaf (*a*) en gedeeltelik aan ander geskikte werk of uitsluitlik aan ander geskikte werk, onderworpe daaraan dat tydsbesteding aan sekere gespesialiseerde tipes werk op die volgende grondslag geskied:—

Herstel en onderhoud van swaardiensdieselmasjiene	Voltyds tot hoogstens 3 jaar.
Herstel en onderhoud van petrolmasjiene	Voltyds tot hoogstens 1 jaar.
Metaaldraaiwerk.....	Voltyds tot hoogstens 2 jaar.
Geelkoperafwerking.....	Voltyds tot hoogstens 1 jaar.
Maak of herstel van ketels.....	Voltyds tot hoogstens 1 jaar.
Modelmakery.....	Voltyds tot hoogstens 1 jaar.
Skaafwerk, gleufwerk, sterk armskaafwerk en freeswerk	Voltyds tot hoogstens 1 jaar.
Gereedskapkamer.....	Voltyds tot hoogstens 1 jaar.
Goedgekeurde skemas vir opleiding in die gebruik van handgereedskap en klein masjiengereedskap.	Voltyds tot hoogstens 1 jaar.
Smidswerk.....	Voltyds tot hoogstens 6 maande.
Kopersmidswerk.....	Voltyds tot hoogstens 6 maande.
Sweiswerk.....	Voltyds tot hoogstens 6 maande.
Werk in tekenkantoor as tekenaar of ingenieur werksaam in verband met samestelling, detail of ontwerp	Voltyds tot 1 jaar. Indien meer as 1 jaar in die tekenkantoor deurgebring is, tel net die helfte van die addisionele tyd.
Elektriese winkel of herstelwerk nie reeds hierbo gedek nie, uitgesonderd werk van minderwaardige aard	Voltyds tot 1 jaar, en daarbo tel net die helfte. Die totaal is onderworpe aan 'n maksimum van 18 maande.

Studente- of Tegniese Vakleerlingskappe.

14. As alternatief van die bepalings van regulasie 13 kan die Sekretaris na eie oordeel iemand as kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) toelaat wat minstens 4 jaar lank bevredigende diens gelewer het in 'n georganiseerde studente- of tegniese vakleerlingskap goedgekeur deur die Sekretaris; met dien verstande dat die kandidaat 'n gepaste tegniese kwalifikasie verwerf het en minstens 1 jaar bestee het aan die tipe werkwinkeldiens waarvan in regulasie 13 (2) melding gemaak word.

Voltydse of Stapelkursusse aan Tegniese Skole, Tegniese Kolleges of Universiteite.

15. (1) As verdere alternatief van die bepalings van regulasie 13 kan die Sekretaris na eie oordeel iemand as kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) toelaat wat 'n goedgekeurde voltydse of stapelkursus van minstens 3 jaar in meganiese ingenieurswese aan 'n goedgekeurde tegniese skool, tegniese kollege of universiteit op bevredigende wyse voltooi het en minstens 24 maande lank in werkwinkels werk verrig het wat vir die opleiding van 'n skeepswerktuigkundige geskik is; met dien verstande dat daar van die 24 maande wat by hierdie regulasie vereis word, minstens 6 agtereenvolgende maande bestee is aan die tipe werkwinkeldiens waarvan in regulasie 13 (2) melding gemaak word.

(2) The period of 4 years' workshop service required in terms of subregulation (1) shall have been spent—

(*a*) on the fitting, erecting or repairing of machinery of suitable size or description (e.g. work on marine engines and substantial auxiliary machinery of a type fitted in ships, or on motive power machinery which has a similar value in the training of marine engineers) either in the works or outside; or

(*b*) partly on the type of work specified in paragraph (*a*), and partly or entirely on other suitable work, subject to a time allowance for certain specialized types of work on the following basis:—

Repair and maintenance of heavy duty diesel engines	Full time up to a maximum of 3 years.
Repair and maintenance of petrol engines	Full time up to a maximum of 1 year.
Metal turning.....	Full time up to a maximum of 2 years.
Brass finishing.....	Full time up to a maximum of 1 year.
Boiler making or repairing of boilers	Full time up to a maximum of 1 year.
Pattern making.....	Full time up to a maximum of 1 year.
Planing, slotting, shaping and milling	Full time up to a maximum of 1 year.
Tool room.....	Full time up to a maximum of 1 year.
Approved schemes of training in the use of hand and small machine tools	Full time up to a maximum of 1 year.
Smith work.....	Full time up to a maximum of 6 months.
Coppersmith work.....	Full time up to a maximum of 6 months.
Welding.....	Full time up to a maximum of 6 months.
Work in drawing office as draughtsman or engineer engaged on arrangement, detail or design	Full time up to 1 year. When more than 1 year has been spent in the drawing office, only half the additional time will count.
Electrical shop or repair work not already covered above, excluding work of a minor nature	Full time up to 1 year; additional at half rate. Maximum total 18 months.

Student or Technical Apprenticeships.

14. As an alternative to the requirements of regulation 13, the Secretary may in his discretion admit a candidate for a certificate of competency as Second Engineer-Officer (coasting) who has performed satisfactory service for not less than 4 years in an organised student or technical apprenticeship approved by the Secretary: Provided that the candidate has obtained an appropriate technical qualification and has spent not less than 1 year on the type of workshop service referred to in regulation 13 (2).

Full-time or Sandwich Technical School, College or University Courses.

15. (1) As a further alternative to the requirements of regulation 13, the Secretary may in his discretion admit a candidate for a certificate of competency as Second Engineer-Officer (coasting) who has satisfactorily completed at an approved technical school, college or university an approved full-time or sandwich course of study of at least 3 years in mechanical engineering, and has served for not less than 24 months in workshops on suitable work for the training of a marine engineer: Provided that of the 24 months required by this regulation at least 6 consecutive months shall have been spent on the type of workshop service referred to in regulation 13 (2).

(2) Geskikte werkwinkelopleiding gedurende vakansies van die tegniese skool, tegniese kollege of universiteit en tydperke van altesaam hoogstens 6 maande bestee aan die werkwinkel se vakleerlingopleidingskemas vir passers en draaiers of aan dergelike opleiding in die werkwinkels van 'n tegniese skool, tegniese kollege of universiteit kan deel uitmaak van die 24 maande diens wat by hierdie regulasie vereis word, maar is onderworpe aan 'n gesamentlike maksimum van 9 maande. Afsonderlike tydperke van opleiding mag nie korter as 1 maand wees nie.

Vergoedende Diens.

16. (1) Waar 'n kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) werkwinkeldiens verrig oor die tydperk voorgeskryf in regulasie 13, 14 of 15, kan vir tekorte in sodanige diens vergoed word deur verdere werkwinkeldiens van 'n geskikte aard of deur vergoedende diens op gereelde waghoudiens of deur dagwerk.

(2) Vergoedende diens moet verrig word—

(*a*) òf by wyse van dagwerk ter see as Ingenieuroffisier op 'n skip wat kort of lang seereise onderneem;

(*b*) òf by wyse van dagwerk as Ingenieuroffisier op 'n modderskuit, baggerskip of sleepboot wat in 'n hawe optree of die see kort afstande invaar;

(*c*) òf by wyse van gereelde waghoudiens op so 'n skip.

Van die tyd aldus deurgebring op 'n skip wat lang seereise onderneem, kan twee-derdes en van die tyd aldus deurgebring op 'n skip wat kort seereise onderneem of op 'n modderskuit, baggerskip of sleepboot wat in 'n hawe optree of die see kort afstande invaar, kan vier-negendes as bekwamende werkwinkeldiens gereken word; met dien verstande dat sulke werk wat voor die ouderdom van 20 jaar verrig is, nie aldus gereken mag word nie.

(2) *Seediens.*

Tydperk Seediens vereis van 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Tweede Igenieuroffisier (Kusvaart).

17. 'n Kandidaat vir 'n sertifikaat van bekwaamheid (stoom of motor of stoom en motor) as Tweede Ingenieuroffisier (Kusvaart) moet na voltooiing van die werkwinkeldiens vereis by regulasie 13, gelees met regulasies 14, 15 en 16, en na voltooiing van die vergoedende diens (as daar is) wat kragtens regulasie 16 in plaas van werkwinkeldiens aanvaar word, bewys lewer dat hy die volgende tydperk seediens verrig het:—

(*a*) Indien 'n sertifikaat van bekwaamheid (stoom) vereis word, 21 maande, waarvan minstens 9 maande aan die ketels en hoofaandrywingsmasjinerie van 'n stoomskip bestee is. Hierdie tydperk van minstens 9 maande moet minstens 6 maande diens in verband met die ketels en 6 maande diens in verband met die hoofaandrywingsmasjinerie insluit; met dien verstande dat die diens in verband met die ketels en die diens in verband met die hoofaandrywingsmasjinerie gelyktydig mag wees. Die oorblywende 12 maande of deel van 12 maande kan bestee gewees het aan die ketels van 'n stoomskip of aan die hoofaandrywingsmasjinerie van 'n stoomskip of motorskip of aan geskikte hulpmasjiene van 'n stoomskip of motorskip of aan dagwerk;

(*b*) indien 'n sertifikaat van bekwaamheid (motor) vereis word, 21 maande, waarvan minstens 6 maande aan die hoofaandrywngsmasjinerie van 'n motorskip bestee is. Die oorblywende 15 maande of deel van 15 maande kan bestee gewees het aan die hoofaandrywingsmasjinerie van

(2) Suitable workshop training carried out during technical school, college or university vacations and periods totalling not more than 6 months spent in works apprentice training schemes for fitters and turners or on similar training in technical school, college or university workshops shall count towards the 24 months' service required by this regulation up to an overall maximum of 9 months. Separate periods of training shall be of not less than 1 month's duration.

Compensatory Service.

16. (1) Where a candidate for a certificate of competency as Second Engineer-Officer (coasting) performs workshop service for the period of time prescribed in regulation 13, 14 or 15, deficiencies in such service may be made up by further workshop service of a suitable character or by compensatory service on regular watch or on day work.

(2) Compensatory service shall be performed either—

(*a*) on day-work at sea as Engineer-Officer in a ship making short or long voyages;

(*b*) on day-work as Engineer-Officer in a hopper, dredger or tug operating in port or proceeding to sea for short distances; or

(*c*) on regular watch in such a ship.

Two-thirds of the time so spent in a ship making long voyages and four-ninths of the time so spent in a ship making short voyages or in a hopper, dredger or tug operating in port or proceeding to sea for short distances, shall be counted towards the period of qualifying workshop service: Provided that no such work performed before the age of 20 years shall be so counted.

(2) *Sea Service.*

Period of Sea Service Required of a Candidate for a Certificate of Competency as Second Engineer-Officer (Coasting).

17. A candidate for a certificate of competency (steam, motor or combined steam and motor) as Second Engineer-Officer (coasting) shall, after completing the workshop service required in terms of regulation 13 read with regulations 14, 15 and 16 and after completing the compensatory service (if any) accepted in lieu of workshop service under regulation 16, produce proof of having performed the following period of sea service:—

(*a*) If a certificate of competency (steam) is required, 21 months, of which at least 9 months shall have been spent on the boilers and main propelling machinery of a steamship. This period of at least 9 months shall include at least 6 months' service on the boilers and 6 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. The remaining 12 months, or balance of 12 months, may have been spent on the boilers of a steamship or on the main propelling machinery of a steamship or motor-ship, or on suitable auxiliaries of a steamship or motor-ship, or on day-work;

(*b*) if a certificate of competency (motor) is required, 21 months, of which at least 6 months shall have been spent on the main propelling machinery of a motor-ship. The remaining 15 months, or balance of 15 months, may have been spent on the main propelling machinery of a

'n stoomskip of motorskip of aan geskikte hulpmasjiene van 'n stoomskip of motorskip, of hoogstens 6 maande daarvan kan aan die ketels van 'n stoomskip, of aan dagwerk bestee gewees het;

(*c*) indien 'n gekombineerde sertifikaat van bekwaamheid (stoom en motor) vereis word, 24 maande, waarvan minstens—

(i) 9 maande aan die ketels en hoofaandrywingsmasjinerie van 'n stoomskip bestee is. Hierdie tydperk van minstens 9 maande moet minstens 6 maande diens in verband met die ketels en 6 maande diens in verband met die hoofaandrywingsmasjinerie insluit; met dien verstande dat die diens in verband met die ketels en die diens in verband met die hoofaandrywingsmasjinerie gelyktydig mag wees; en

(ii) 6 maande aan die hoofaandrywingsmasjinerie van 'n motorskip bestee is. Die oorblywende 9 maande of deel van 9 maande kan aan die ketels van 'n stoomskip of aan die hoofaandrywingsmasjinerie van 'n stoomskip of motorskip of aan geskikte hulpmasjiene van 'n stoomskip of motorskip of aan dagwerk bestee gewees het.

Tydperk Seediens Vereis vir die Endossering van 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Kusvaart).

18. 'n Kandidaat vir die Endossering van 'n sertifikaat van bekwaamheid (stoom of motor) as Tweede Ingenieuroffisier (Kusvaart) moet bewys lewer dat hy die volgende tydperk seediens verrig het:—

(*a*) Indien die motorendossement van 'n sertifikaat van bekwaamheid (stoom) vereis word, 3 maande benewens die seediens wat by regulasie 17 (*a*) vereis word; met dien verstande dat altesaam minstens 6 maande diens in verband met die hoofaandrywingsmasjinerie van 'n motorskip verrig moet wees;

(*b*) indien die stoomendossement van 'n sertifikaat van bekwaamheid (motor) vereis word, 6 maande benewens die seediens wat by regulasie 17 (*b*) vereis word; met dien verstande dat altesaam minstens 9 maande diens in verband met die ketels en hoofaandrywingsmasjinerie van 'n stoomskip verrig moet wees. Hierdie tydperk van minstens 9 maande moet minstens 6 maande diens in verband met die ketels en 6 maande diens in veband met die hoofaandrywingsmasjinerie insluit; met dien verstande dat die diens in verband met die ketels en in verband met die hoofaandrywingsmasjinerie gelyktydig mag wees.

Tipe Seediens Vereis van 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) en Endossement.

19. (1) Die seediens wat ooreenkomstig regulasies 17 en 18 van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) en endossement vereis word, moet verrig geword het op gereelde waghoudiens van altesaam minstens 8 uur uit elke 24 uur diens waarop aanspraak gemaak word as—

(*a*) Ingenieuroffisier ter see op 'n skip wat kort of lang seereise onderneem; of

(*b*) Ingenieuroffisier op 'n modderskuit, baggerskip of sleepboot wat in 'n hawe optree of die see kort afstande invaar.

(2) Diens op 'n skip vermeld in subregulasie (1) (*a*) word alles as diens gereken, terwyl twee-derdes van die diens op 'n skip vermeld in subregulasie (1) (*b*) as diens gereken word.

steamship or motorship, or on suitable auxiliaries of a steamship or motor-ship, or to the extent of not more than 6 months on the boilers of a steamship, or on day-work;

(*c*) if a combined certificate of competency (steam and motor) is required 24 months, of which at least—

(i) 9 months shall have been spent on the boilers and main propelling machinery of a steamship. This period of at least 9 months shall include at least 6 months' service on the boilers and 6 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

(ii) 6 months shall have been spent on the main propelling machinery of a motor-ship. The remaining 9 months, or balance of 9 months, may have been spent on the boilers of a steamship or on the main propelling machinery of a steamship or motor-ship, or on suitable auxiliaries of a steamship or motor-ship, or on day-work.

Period of Sea Service Required for the Endorsement of a Certificate of Competency as Second Engineer-Officer (Coasting).

18. A candidate for the endorsement of a certificate of competency (steam or motor) as Second Engineer-Officer (coasting), shall produce proof of having performed the following period of sea service:—

(*a*) If the motor endorsement of a certificate of competency (steam) is required, 3 months in addition to the sea service required in terms of regulation 17 (*a*): Provided that not less than 6 months' service in all shall have been served on the main propelling machinery of a motorship;

(*b*) if the steam endorsement of a certificate of competency (motor) is required, 6 months in addition to the sea service required in terms of regulation 17 (*b*): Provided that not less than 9 months' service in all shall have been served on the boilers and main propelling machinery of a steamship. This period of at least 9 months shall include at least 6 months service on the boilers and 6 months' service on the main propelling machinery: Provided that the service on the boilers and on the main propelling machinery may have been simultaneous.

Type of Sea Service Required of a Candidate for a Certificate of Competency as Second Engineer-Officer (Coasting) and Endorsement.

19. (1) The sea service required in terms of regulations 17 and 18 of a candidate for a certificate of competency as Second Engineer-Officer (coasting) and endorsement, shall have been performed on regular watch totalling at least 8 hours out of every 24 hours' service claimed, as—

(*a*) Engineer-Officer at sea in a ship making short or long voyages; or

(*b*) Engineer-Officer in a hopper, dredger or tug operating in port or proceeding to sea for short distances.

(2) Service in a ship mentioned in subregulation (1) (*a*) shall be counted at full rate, whereas service in a ship mentioned in subregulation (1) (*b*) shall be counted at two-thirds rate.

(3) Dagwerk ter see binne die masjien- of ketelruime van 'n skip vermeld in paragraaf (*a*) en dagwerk binne die masjien- of ketelruime van 'n skip vermeld in paragraaf (*b*) van subregulasie (1) kan ingereken word as deel van die bekwamende diens op gereelde waghoudiens waarvan in daardie subregulasie melding gemaak word, dog hoogstens die helfte van sodanige dagwerk, onderworpe aan 'n maksimum van 6 maande, kan aldus ingereken word.

Kwytskelding van Seediens vir 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Kusvaart).

20. 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) kan hoogstens 3 maande seediens kwytgeskel word as hy, alvorens hy met sy bekwamende seediens begin het, in die vakke "Algemene Ingenieurswetenskap" en "Hitte en Hittewerktuie" van die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) geslaag het of as hy Deel A van die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) deurgekom het of as hy 'n sertifikaat, diploma of graad verwerf het wat deur die Sekretaris as kwalifikasie vir algehele of gedeeltelike vrystelling van Deel A van die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) erken word.

B. *Kandidaat vir 'n Sertifikaat van Bekwaamheid as Hoofingenieuroffisier (Kusvaart) en Endossement.*

Tydperk Seediens Vereis van 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Hoof-Ingenieuroffisier (Kusvaart).

21. 'n Kandidaat vir 'n sertifikaat van bekwaamheid (stoom of motor of stoom en motor) as Hoof-ingenieuroffisier (Kusvaart) moet die houer wees van 'n geldige sertifikaat van bekwaamheid (stoom of motor of stoom en motor) as Tweede Ingenieuroffisier (Kusvaart) en moet, terwyl hy die houer van so 'n sertifikaat was, die tydperk toepaslike seediens voltooi het wat by regulasie 17 vereis word.

Tydperk Seediens Vereis vir die Endossering van 'n Sertifikaat van Bekwaamheid as Hoof-Ingenieuroffisier (Kusvaart).

22. 'n Kandidaat vir die endossering van 'n sertifikaat van bekwaamheid as Hoof-Ingenieuroffisier (Kusvaart) moet die tydperk seediens voltooi het wat by regulasie 18 vir die endossering van 'n sertifikaat van bekwaamheid (stoom of motor, na gelang van die geval) as Tweede Ingenieuroffisier (Kusvaart) vereis word.

Tipe Seediens Vereis van 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Hoof-Ingenieuroffisier (Kusvaart) en Endossement.

23. (1) Die seediens wat by regulasies 21 en 22 van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Hoofingenieur-offisier (Kusvaart) en endossement vereis word, moet verrig geword het terwyl hy in die hoedanigheid van—

(*a*) Ingenieuroffisier ter see op 'n skip wat kort of lang seereise onderneem; of

(*b*) Ingenieuroffisier op 'n modderskuit, baggerskip of sleepboot wat in 'n hawe optree of die see kort afstande invaar,

minstens 8 uit elke 24 uur diens waarop aanspraak gemaak word, volle beheer oor 'n gereelde waghoudiens gehad het.

(2) Diens op 'n skip vermeld in subregulasie (1) (*a*) tel alles, maar van diens op 'n skip vermeld in subregulasie (1) (*b*) tel net twee-derdes.

(3) Day work at sea carried out within the engine or boiler spaces of a ship mentioned in paragraph (*a*) and day-work carried out within the engine or boiler spaces of a ship mentioned in paragraph (*b*) of subregulation (1), may be accepted towards the qualifying service on regular watch referred to in that subregulation, and shall be counted at half rate subject to a maxinum allowance of 6 months.

Remission of Sea Service for a Candidate for a Certificate of Competency as Second Engineer-Officer (Coasting).

20. A candidate for a certificate of competency as Second Engineer-Officer (coasting) who, before commencing his qualifying sea service, has passed in the subjects "General Engineering Science" and "Heat and Heat Engines" of the examination for a certificate of competency as Second Engineer-Officer (coasting) or who has passed Part A of the examination for a certificate of competency as Second Engineer-Officer (foreign-going) or who has obtained a certificate, diploma or degree recognized by the Secretary as conferring full or partial exemption from Part A of the examination for a certificate of competency as Second Engineer-Officer (foreign-going), may be granted a remission of sea service not exceeding 3 months.

B. *Candidate for a Certificate of Competency as Chief Engineer-Officer (Coasting) and Endorsement.*

Period of Sea Service Required of a Candidate for a Certificate of Competency as Chief Engineer-Officer (Coasting).

21. A candidate for a certificate of competency (steam, motor or combined steam and motor), as Chief Engineer-Officer (coasting), shall hold a valid certificate of competency (steam, motor or combined steam and motor), as Second Engineer-Officer (coasting) and, whilst holding such a certificate shall have completed the period of appropriate sea service required in terms of regulation 17.

Period of Sea Service Required for the Endorsement of a Certificate of Competency as Chief Engineer-Officer (Coasting).

22. A candidate for the endorsement of a certificate of competency as Chief Enginer-Officer (coasting), shall have completed the period of sea service required in terms of regulation 18 for the endorsement of a certificate of competency (steam or motor, as the case may be) as Second Enginer-Officer (coasting).

Type of Sea Service Required of a Candidate for a Certificate of Competency as Chief Engineer-Officer (Coasting) and Endorsement.

23. (1) The sea service required in terms of regulations 21 and 22 of a candidate for a certificate of competency as Chief Enginer-Officer (coasting) and endorsement, shall have been performed in full charge of a regular watch totalling at least 8 hours out of every 24 hours' service claimed, as—

(*a*) Engineer-Officer at sea in a ship making short or long voyages; or

(*b*) Engineer-Officer in a hopper, dredger or tug operating in port or proceeding to sea for short distances.

(2) Service in a ship mentioned in subregulation (1) (*a*) shall be counted at full rate, whereas service in a ship mentioned in subregulation (1) (*b*) shall be counted at two-thirds rate.

(3) Dagwerk word nie aanvaar nie.

Kwytskelding van Seediens vir 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Hoof-Ingenieuroffisier (Kusvaart).

24. 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Kusvaart) kan hoogstens 3 maande seediens kwytgeskel word as hy, alvorens hy met sy bekwamende seediens begin het, in die vakke "Algemene Ingenieurswetenskap" en "Hitte en Hittewerktuie" van die eksamen vir 'n sertifikaat van bekwaamheid as Hoof-Ingenieuroffisier (Kusvaart) geslaag het of as hy Deel A van die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) of Hoof-ingenieuroffisier (Vreemde Vaart) deurgekom het of as hy 'n sertifikaat, diploma of graad verwerf het wat deur die Sekretaris as kwalifikasie vir algehele of gedeeltelike vrystelling van Deel A van die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) erken word.

Eksamen vir 'n Sertifikaat van Bekwaamheid as Hoof-Ingenieur-offisier (Kusvaart) sonder dat 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) Voorgelê word.

25. (1) 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Kusvaart) wat geen geleentheid gehad het om 'n geldige sertifikaat van bekwaamheid as Tweede Ingenieuroffiser (Kusvaart) te verwerf nie, kan behoudens die bepalings van subregulasie (2) tot die eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Kusvaart) toegelaat word; met dien verstande dat die Sekretaris daarvan oortuig is dat die kandidaat se diens, vakleerlingskap of tegniese studies, met inbegrip van werkwinkeldiens, nie van 'n laer gehalte is as wat vir die toekenning van 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Kusvaart) kragtens hierdie regulasies vereis word nie.

(2) 'n Kandidaat vermeld in subregulasie (1) moet bewys lewer dat hy minstens 4 jaar ter see op 'n stoomskip of motorskip wat kort of lang seereise onderneem, of minstens 6 jaar op 'n modderskuit, baggerskip of sleepboot wat in 'n hawe opgetree of die see kort afstande ingevaar het, as Ingenieuroffisier diens gedoen het, en van die tydperk van 4 jaar moet hy minstens 18 maande en van die tydperk van 6 jaar minstens 27 maande lank volle beheer oor 'n gereelde waghoudiens van altesaam minstens 8 uur uit elke 24 uur diens waarop aanspraak gemaak word, by die ketels en hoofaandrywingsmasjinerie van 'n stoomskip of by die hoofaandrywingsmasjinerie van 'n motorskip gehad het; met dien verstande dat die diens wat by hierdie subregulasie voorgeskryf word, in die geval van 'n kandidaat wat al of 'n deel van sodanige diens op 'n Suid-Afrikaanse skip verrig het, voor die inwerkingtredingsdatum van hierdie regulasies voltooi is.

(3) Indien 'n kandidaat wat in subregulasie (1) vermeld word, nie die eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Kusvaart) deurkom nie, maar toon dat hy die standaard bereik het wat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) vereis word, kan die Minister so 'n sertifikaat aan hom toeken; met dien verstande dat geen deel van die eksamengeld aan hom terugbetaal word nie.

(3) Day-work shall not be accepted.

Remission of Sea Service for a Candidate for a Certificate of Competency as Chief Engineer-Officer (Coasting).

24. A candidate for a certificate of competency as Chief Engineer-Officer (coasting) who, before commencing his qualifying sea service, has passed in the subjects "General Engineering Science" and "Heat and Heat Engines" of the examination for a certificate of competency as Chief Enginer-Officer (coasting) or who has passed Part A of the examination for a certificate of competency as Second Engineer-Officer (foreign-going) or Chief Engineer-Officer (foreign-going) or who has obtained a certificate, diploma or degree recognized by the Secretary as conferring full or partial exemption from Part A of the examination for a certificate of competency as Second Engineer-Officer (foreign-going), may be granted a remission of sea service not exceeding 3 months.

Examination for a Certificate of Competency as Chief Engineer-Officer (Coasting) without the production of a Certificate of Competency as Second Enginer-Officer (Coasting).

25. (1) A candidate for a certificate of competency as Chief Engineer-Officer (coasting) who has had no opportunity to obtain a valid certificate of competency as Second Engineer-Officer (coasting) may, subject to the provisions of subreguation (2), be admitted to the examination for a certificate of competency as Chief Engineer-Officer (coasting): Provided the Secretary is satisfied that the character of the candidate's service, apprenticeship or technical studies, including workshop service, is of a standard not lower than that required for the grant under these regulations of a certificate of competency as Chief Engineer-Officer (coasting).

(2) A candidate referred to in subregulation (1) shall produce proof of having served for at least 4 years as Engineer-Officer at sea in a steamship or motor-ship making short or long voyages or at least 6 years as Engineer-Officer in a hopper, dredger or tug which operated in port or which proceeded to sea for short distances; of the period of 4 years at least 18 months and of the period of 6 years at least 27 months, shall have spent in full charge of a regular watch, totalling at least 8 hours out of every 24 hours' service claimed, on the boilers and main propelling machinery of a steamship or on the main propelling machinery of a motor-ship: Provided that the service prescribed in this subregulation shall, in the case of a candidate who has performed all or part thereof in a South African ship, have been completed before the date of coming into force of these regulations.

(3) If a candidate referred to in subregulation (1), fails to pass the examination for a certificate of competency as Chief Engineer-Officer (coasting), but shows that he has reached the standard required for a certificate of competency as Second Engineer-Officer (coasting), the Minister may grant him such certificate: Provided that no part of the examination fee shall be refunded to him.

HOOFSTUK III.

KWALIFIKASIES VEREIS VAN 'N KANDIDAAT VIR 'N SERTIFIKAAT VAN BEKWAAMHEID AS TWEEDE INGENIEUROFFISIER (VREEMDE VAART) EN ENDOSSEMENT OF HOOF-INGENIEUROFFISIER (VREEMDE VAART) EN ENDOSSEMENT.

A. *Kandidaat vir 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) en Endossement.*

Ouderdom van Kandidaat.

26. 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) moet minstens 21 jaar oud wees.

(1) *Werkwinkeldiens.*

Diens as Leerlingingenieur of Ambagsgesel.

27. (1) 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) moet bewys lewer dat hy sedert bereiking van die leeftyd van 15 jaar minstens 4 jaar lank as leerlingingenieur of ambagsgesel bevredigende diens gelewer het in werk wat vir die opleiding van 'n skeepswerktuigkundige in die vervaardiging of onderhoud van masjinerie geskik is.

(2) Minstens 1 uit die 4 jaar werkwinkeldiens wat by subregulasie (1) vereis word, moet bestee gewees het aan die montering, oprigting of herstel van masjinerie van 'n geskikte grootte of beskrywing (bv. 'n werk aan skeepsmasjiene en taamlik groot hulpmasjiene van 'n tipe wat in skepe geïnstalleer word, of aan aandrywingsmasjiene van dergelike waarde in die opleiding van skeepswerktuigkundiges), hetsy in of buite die werkwinkel.

(3) Die oorblywende 3 jaar kan bestee gewees het aan werk van die aard voorgeskryf in subregulasie (2) of aan ander geskikte werk, onderworpe daaraan dat tydsbesteding aan sekere gespesialiseerde tipes werk op die volgende grondslag geskied:—

Metaaldraaiwerk.....	Voltyds tot hoogstens 2 jaar.
Geelkoperafwerking.....	Voltyds tot hoogstens 1 jaar.
Maak of herstel van ketels.....	Voltyds tot hoogstens 1 jaar.
Modelmakery.....	Voltyds tot hoogstens 1 jaar.
Skaafwerk, gleufwerk, sterkarmskaafwerk en freeswerk	Voltyds tot hoogstens 1 jaar.
Gereedskapkamer.....	Voltyds tot hoogstens 1 jaar.
Goedgekeurde skemas vir opleiding in die gebruik van handgereedskap en klein masjiengereedskap	Voltyds tot hoogstens 1 jaar.
Smidswerk.....	Voltyds tot hoogstens 6 maande.
Kopersmidswerk.....	Voltyds tot hoogstens 6 maande.
Sweiswerk.....	Voltyds tot hoogstens 6 maande.
Werk in tekenkantoor as tekenaar of ingenieur werksaam in verband met samestelling, detail of ontwerp	Voltyds tot 1 jaar. Indien meer as 1 jaar in die tekenkantoor deurgebring is, tel net die helfte van die addisionele tyd.
Elektriese winkel of herstelwerk nie reeds hierbo gedek nie, uitgesonderd werk van minderwaardige aard.	Voltyds tot 1 jaar en daarbo tel net die helfte. Die totaal is onderworpe aan 'n maksimum van 18 maande.

Studente- of Tegniese Vakleerlingskappe.

28. As alternatief van die bepalings van regulasie 27 kan die Sekretaris na eie oordeel iemand as kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) toelaat wat minstens 4 jaar lank bevredigende diens gelewer het in 'n georganiseerde studente- of tegniese vakleerlingskap goedgekeur deur die Sekretaris; met dien verstande dat die kandidaat 'n

CHAPTER III.

QUALIFICATIONS REQUIRED OF A CANDIDATE FOR A CERTIFICATE OF COMPETENCY AS SECOND ENGINEER-OFFICER (FOREIGN-GOING) AND ENDORSEMENT, OR CHIEF ENGINEER-OFFICER (FOREIGN-GOING) AND ENDORSEMENT.

A. *Candidate for a Certificate of Competency as Second Engineer-Officer (Foreign-going) and Endorsement.*

Age of Candidate.

26. A candidate for a certificate of competency as Second Engineer-Officer (foreign-going), shall not be less than 21 years of age.

(1) *Workshop Service.*

Service as Apprentice Engineer or Journeyman.

27. (1) A candidate for a certificate of competency as Second Engineer-Officer (foreign-going), shall prove that since reaching the age of 15 years he has served satisfactorily for not less than 4 years as apprentice engineer or joureyman on work suitable for the training of a marine engineer in the manufacture or maintenance of machinery.

(2) Not less than 1 of the 4 years' workshop service required in terms of subregulation (1), shall have been devoted to fitting, erecting or repairing machinery of a suitable size or description (e.g. work on marine engines and substantial auxiliary machinery of a type fitted in ships, or on motive power machinery which has a similar value in the training of marine engineers) either in the works or outside.

(3) The remaining 3 years may have been spent on work of the nature prescribed in subregulation (2) or on other suitable work, subject to a time allowance for certain specialized types of work on the following basis:—

Metal turning.....	Full time up to a maximum of 2 years.
Brass finishing.....	Full time up to a maximum of 1 year.
Boiler making or repairing of boilers	Full time up to a maximum of 1 year.
Pattern making.....	Full time up to a maximum of 1 year.
Planing, slotting, shaping and milling	Full time up to a maximum of 1 year.
Tool room.....	Full time up to a maximum of 1 year.
Approved schemes of training in the use of hand and small machine tools	Full time up to a maximum of 1 year.
Smith work.....	Full time up to a maximum of 6 months.
Coppersmith work.....	Full time up to a maximum of 6 months.
Welding.....	Full time up to a maximum of 6 months.
Work in drawing office as draughtsman or engineer engaged on arrangement, detail or design	Full time up to 1 year. When more than 1 year has been spent in the drawing office only half the additional time will count.
Electrical shop or repair work not already covered above, excluding work of a minor nature	Full time up to 1 year; additional at half-rate. Maximum total 18 months.

Student or Technical Apprenticeships.

28. As an alternative to the requirements of regulation 27, the Secretary may in his discretion admit a candidate for a certificate of competency as Second Engineer-Officer (foreign-going) who has performed satisfactory service for not less than 4 years in an organised student or technical apprenticeship approved by the Secretary: Provided that

gepaste tegniese kwalifikasie verwerf het en minstens 1 jaar bestee het aan die montering, oprigting of herstel van die tipe masjinerie waarvan in regulasie 27 (2) melding gemaak word.

Voltydse of Stapelkursusse aan Tegniese Skole, Tegniese Kolleges of Universiteite.

29 (1) As verdere alternatief van die bepalings van regulasie 27 kan die Sekretaris na eie oordeel iemand as kandidaat vir 'n sertifikaat van bekwaamheid as Tweede ingenieuroffisier (Vreemde Vaart) toelaat wat 'n goedgekeurde voltydse of stapelkursus van minstens 3 jaar in meganiese ingenieurswese aan 'n goedgekeurde tegniese skool, tegniese kollege of universiteit op bevredigende wyse voltooi het en minstens 24 maande lank in werkwinkels werk verrig het wat vir die opleiding van 'n skeepswerktuigkundige geskik is; met dien verstande dat daar van die 24 maande wat by hierdie regulasie vereis word, minstens 6 agtereenvolgende maande bestee is aan die montering, oprigting of herstel van die tipe masjinerie waarvan in regulasie 27 (2) melding gemaak word.

(2) Geskikte werkwinkelopleiding gedurende vakansies van die tegniese skool, tegniese kollege of universiteit en tydperke van altesaam hoogstens 6 maande bestee aan die werkwinkel se vakleerlingopleidingskemas vir passers en draaiers of aan dergelike opleiding in die werkwinkels van 'n tegniese skool, tegniese kollege of universiteit kan deel uitmaak van die 24 maande diens wat by hierdie regulasie vereis word, maar is onderworpe aan 'n gesamentlike maksimum van 9 maande. Afsonderlike tydperke van opleiding mag nie korter as 1 maand wees nie.

Vergoedende Diens.

30. (1) Waar 'n kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) werkwinkeldiens verrig oor die tydperk voorgeskryf in regulasie 27, 28 of 29, kan vir tekorte in sodanige diens vergoed word deur verdere werkwinkeldiens van 'n geskikte aard of deur vergoedende diens op gereelde waghoudiens of deur dagwerk ter see.

(2) Vergoedende seediens moet verrig word òf—

(*a*) by wyse van dagwerk as Ingenieuroffisier op 'n skip van minstens 375 perdekrag wat kort of lang seereise onderneem, òf

(*b*) by wyse van gereelde waghoudiens op so 'n skip.

Van die tyd aldus deurgebring op 'n skip wat lang seereise onderneem, kan twee-derdes en van die tyd aldus deurgebring op 'n skip wat kort seereise onderneem, kan vier-negendes as bekwamende werkwinkeldiens gereken word; met dien verstande dat sulke werk wat voor die ouderdom van 20 jaar verrig is, nie aldus gereken mag word nie.

(2) *Seediens.*

Tydperk Seediens Vereis van 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart).

31. 'n Kandidaat vir 'n sertifikaat van bekwaamheid (stoom of motor of stoom en motor) as Tweede Ingenieuroffisier (Vreemde Vaart) moet na voltooiing van die werkwinkeldiens vereis by regulasie 27, gelees met regulasies 28, 29 en 30, en na voltooiing van die seediens (as daar is) wat kragtens regulasie 30 in plaas van werkwinkeldiens aanvaar word, bewys lewer dat hy die volgende tydperk seediens verrig het:

(*a*) Indien 'n sertifikaat van bekwaamheid (stoom) vereis word, 21 maande, waarvan minstens 9 maande aan die ketels en hoofaandrywingsmasjinerie van 'n stoomskip bestee is. Hierdie tydperk van minstens 9 maande moet minstens 6 maande diens in verband met die ketels en 6

the candidate has obtained an appropriate technical qualification and his devoted not less than 1 year to the fitting, erecting or repairing the type of machinery referred to in regulation 27 (2).

Full-time or Sandwich Technical School, College or University Courses.

29. (1) As a further alternative to the requirements of regulation 27, the Secretary may in his discretion admit a candidate for a certificate of competency as Second Engineer-Officer (foreign-going) who has satisfactorily completed at an approved technical school, college or university an approved full-time or sandwich course of study of at least 3 years in mechanical engineering, and has served for not less than 24 months in workshops on suitable work for the training of a marine engineer: Provided that of the 24 months required by this regulation at least 6 consecutive months shall have been devoted to the fitting, erecting or repairing the type of machinery referred to in regulation 27 (2).

(2) Suitable workshop training carried out during technical school, college or university vacations and periods totalling not more than 6 months spent in works apprentice training schemes for fitters and turners or on similar training in technical school, college or university workshops shall count towards the 24 months' service required by this regulation up to an overall maximum of 9 months. Separate periods of training shall be of not less than 1 month's duration.

Compensatory Service.

30. (1) Where a candidate for a certificate of competency as Second Engineer-Officer (foreign-going) performs workshop service for the period of time prescribed in regulation 27, 28 or 29, deficiencies in any of the types of service may be made up by further workshop service of a suitable character or by compensatory service on regular watch or on day-work at sea.

(2) Compensatory sea service shall be performed either—

(*a*) on day work as Engineer-Officer in a ship of not less than 375 horsepower making short or long voyages; or

(*b*) on regular watch in such a ship.

Two-thirds of the time so spent in a ship making long voyages and four-ninths of the time so spent in a ship making short voyages, shall be counted towards the period of qualifying workshop service: Provided that no such work performed before the age of 20 years shall be so counted.

(2) *Sea service.*

Period of Sea Service required of a Candidate for a Certificate of Competency as Second Engineer-Officer (Foreign-going).

31. A candidate for a certificate of competency (steam, motor or combined steam and motor) as Second Engineer-Officer (foreign-going) shall, after completing the workshop service required in terms of regulation 27 read with regulations 28, 29 and 30, and after completing the sea service (if any) accepted in lieu of workshop service under regulation 30, produce proof of having performed the following period of sea service:—

(*a*) If a certificate of competency (steam) is required, 21 months, of which at least 9 months shall have been spent on the boilers and main propelling machinery of a steamship. This period of at least 9 months shall include at least 6 months' service on the boilers and 6 months'

maande diens in verband met die hoofaandrywingsmasjinerie insluit; met dien verstande dat die diens in verband met die ketels en die diens in verband met die hoofaandrywingsmasjinerie gelyktydig mag wees. Die oorblywende 12 maande of deel van 12 maande kan bestee gewees het aan die ketels van 'n stoomskip of aan die hoofaandrywingsmasjinerie van 'n stoomskip of motorskip of aan geskikte hulpmasjiene van 'n stoomskip of motorskip of aan dagwerk;

(*b*) indien 'n sertifikaat van bekwaamheid (motor) vereis word, 21 maande, waarvan minstens 6 maande aan die hoofaandrywingsmasjinerie van 'n motorskip bestee is. Die oorblywende 15 maande of deel van 15 maande kan bestee gewees het aan die hoofaandrywingsmasjinerie van 'n stoomskip of motorskip of aan geskikte hulpmasjiene van 'n stoomskip of motorskip, of hoogstens 6 maande daarvan kan aan die ketels van 'n stoomskip, of aan dagwerk bestee gewees het;

(*c*) indien 'n gekombineerde sertifikaat van bekwaamheid (stoom en motor) vereis word, 24 maande, waarvan minstens—

(i) 9 maande aan die ketels en hoofaandrywingsmasjinerie van 'n stoomskip bestee is. Hierdie tydperk van minstens 9 maande moet minstens 6 maande diens in verband met die ketels en 6 maande diens in verband met die hoofaandrywingsmasjinerie insluit; met dien verstande dat die diens in verband met die ketels en die diens in verband met die hoofaandrywingsmasjinerie gelyktydig mag wees; en

(ii) 6 maande aan die hoofaandrywingsmasjinerie van 'n motorskip bestee is. Die oorblywende 9 maande of deel van 9 maande kan aan die ketels van 'n stoomskip of aan die hoofaandrywingsmasjinerie van 'n stoomskip of motorskip of aan geskikte hulpmasjiene van 'n stoomskip of motorskip of aan dagwerk bestee gewees het.

Tydperk Seediens Vereis vir die Endossering van 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart).

32. 'n Kandidaat vir die endossering van 'n sertifikaat van bekwaamheid (stoom of motor) as Tweede Igenieuroffisier (Vreemde Vaart) moet bewys lewer dat hy die volgende tydperk seediens verrig het:—

(*a*) Indien die motorendossement van 'n sertifikaat van bekwaamheid (stoom) vereis word, 3 maande benewens die seediens wat by regulasie 31 (*a*) vereis word; met dien verstande dat altesaam minstens 6 maande diens in verband met die hoofaandrywingsmasjinerie van 'n motorskip verrig moet wees;

(*b*) indien die stoomendossement van 'n sertifikaat van bekwaamheid (motor) vereis word, 6 maande benewens die seediens wat by regulasie 31 (*b*) vereis word; met dien verstande dat altesaam minstens 9 maande diens in verband met die ketels en hoofaandrywingsmasjinerie van 'n stoomskip verrig moet wees. Hierdie tydperk van minstens 9 maande moet minstens 6 maande diens in verband met die ketels en 6 maande diens in verband met die hoofaandrywingsmasjinerie insluit; met dien verstande dat die diens in verband met die ketels en in verband met die hoofaandrywingsmasjinerie gelyktydig mag wees.

Tipe Seediens Vereis van 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) en Endossement.

33. (1) Die seediens wat by regulasies 31 en 32 vereis word van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) en endossement, moet deur die kandidaat in die hoedanigheid van

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. The remaining 12 months, or balance of 12 months, may have been spent on the boilers of a steamship or on the main propelling machinery of a steamship or motor-ship, or on suitable auxiliaries of a steamship or motor-ship, or on daywork;

(*b*) if a certificate of competency (motor) is required, 21 months, of which at least 6 months shall have been spent on the main propelling machinery of a motor-ship. The remaining 15 months, or balance of 15 months, may have been spent on the main propelling machinery of a steamship or motor-ship, or on suitable auxiliaries of a steamship or motor-ship, or to the extent of not more than 6 months on the boilers of a steamship, or on day-work;

(*c*) if a combined certificate of competency (steam and motor) is required, 24 months, of which at least—

(i) 9 months shall have been spent on the boilers and main propelling machinery of a steamship. This period of at least 9 months shall include at least 6 months' service on the boilers and 6 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

(ii) 6 months shall have been spent on the main propelling machinery of a motor-ship. The remaining 9 months, or balance of 9 months, may have been spent on the boilers of a steamship or on the main propelling machinery of a steamship or motor-ship, or on suitable auxiliaries of a steamship or motor-ship, or on daywork.

Period of Sea Service required for the Endorsement of a Certificate of Competency as Second Engineer-Officer (Foreign-going).

32. A candidate for the endorsement of a certificate of competency (steam or motor) as Second Engineer-Officer (foreign-going), shall produce proof of having performed the following period of sea service:—

(*a*) If the motor endorsement of a certificate of competency (steam) is required, 3 months in addition to the sea service required in terms of regulation 31 (*a*): Provided that not less than 6 months' service in all shall have been served on the main propelling machinery of a motor-ship;

(*b*) if the steam endorsement of a certificate of competency (motor) is required, 6 months in addition to the sea service required in terms of regulation 31 (*b*): Provided that not less than 9 months' service in all shall have been served on the boilers and main propelling machinery of a steamship. This period of at least 9 months shall include at least 6 months' service on the boilers and 6 months' service on the main propelling machinery: Provided that the service on the boilers and on the main propelling machinery may have been simultaneous.

Type of Sea Service required of a Candidate for a Certificate of Competency as Second Engineer-Officer (Foreign-going) and Endorsement.

33. (1) The sea service required in terms of regulations 31 and 32 of a candidate for a certificate of competency as Second Engineer-Officer (foreign-going) and endorsement, shall have been performed in a ship of not less than

Ingenieuroffisier ter see op 'n skip van minstens 375 perdekrag wat kort of lang seereise onderneem, verrig geword het op gereelde waghoudiens van altesaam minstens 8 uur uit elke 24 uur diens waarop aanspraak gemaak word. Diens op so 'n skip wat lang seereise onderneem, tel alles maar van diens op so 'n skip wat kort seereise onderneem, tel net twee-derdes.

(2) Dagwerk ter see binne die masjien- of ketelruime van 'n skip vermeld in subregulasie (1) kan ingereken word as deel van die bekwamende diens op gereelde waghoudiens waarvan in daardie subregulasie melding gemaak word, dog hoogstens die helfte van sodanige dagwerk, onderworpe aan 'n maksimum van 6 maande, kan aldus ingereken word.

Kwytskelding van Seediens vir 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart).

34. 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) kan hoogstens 3 maande seediens kwytgeskel word as hy, alvorens hy met sy bekwamende seediens begin het, Deel A van die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) deurgekom het of as hy 'n sertifikaat, diploma of graad verwerf het wat deur die Sekretaris as kwalifikasie vir algehele of gedeeltelike vrystelling van Deel A van die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) erken word.

B. *Kandidaat vir 'n Sertifikaat van Bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) en Endossement.*

Tydperk Seediens Vereis van 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart).

35. 'n Kandidaat vir 'n sertifikaat van bekwaamheid (stoom of motor of stoom en motor) as Hoof-ingenieuroffisier (Vreemde Vaart) moet behoudens die bepalings van regulasie 39 die houer wees van 'n geldige sertifikaat van bekwaamheid (stoom of motor of stoom en motor) as Tweede Ingenieuroffisier (Vreemde Vaart) en moet terwyl hy die houer van so 'n sertifikaat was, die tydperk toepaslike seediens voltooi het wat by regulasie 31 vereis word.

Tydperk Seediens Vereis vir die Endossering van 'n Sertifikaat van Bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart).

36. 'n Kandidaat vir die endossering van 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) moet die tydperk seediens voltooi het wat by regulasie 32 vir die endossering van 'n sertifikaat van bekwaamheid (stoom of motor, na gelang van die geval) as Tweede Ingenieuroffisier (Vreemde Vaart) vereis word.

Tipe Seediens Vereis van 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) en Endossement.

37. (1) Die seediens wat by regulasies 35 en 36 van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) en endossement vereis word, moet deur die kandidaat in die hoedanigheid van Ingenieuroffisier ter see op 'n skip van minstens 560 perdekrag wat lang of kort seereise onderneem, verrig geword het op gereelde waghoudiens van minstens 8 uur uit elke 24 uur diens waarop aanspraak gemaak word.

375 horse power making short or long voyages, as an Engineer-Officer at sea on regular watch totalling at least 8 hours out of every 24 hours' service claimed. Service in such a ship making long voyages shall be counted at full rate whereas service in such a ship making short voyages shall be counted at two-thirds rate.

(2) Day-work at sea carried out within the engine or boiler spaces of any ship mentioned in subregulation (1), may be accepted towards the qualifying service on regular watch referred to in that subregulation, and shall be counted at half rate subject to a maximum allowance of 6 months.

Remission of Sea Service for a Candidate for a Certificate of Competency as Second Engineer-Officer (Foreign-going).

34. A candidate for a certificate of competency as Second Engineer-Officer (foreign-going) who, before commencing his qualifying sea service, has passed Part A of the examination for a certificate of competency as Second Engineer-Officer (foreign-going) or who has obtained a certificate, diploma or degree recognized by the Secretary as conferring full or partial exemption from Part A of the examination for a certificate of competency as Second Engineer-Officer (foreign-going), may be granted a remission of sea service not exceeding 3 months.

B. *Candidate for a Certificate of Competency as Chief Engineer-Officer (Foreign-going) and Endorsement.*

Period of Sea Service required of a Candidate for a Certificate of Competency as Chief Engineer-Officer (Foreign-going.)

35. A candidate for a certificate of competency (steam, motor or combined steam and motor) as Chief Engineer-Officer (foreign-going) shall, subject to the provisions of regulation 39, hold a valid certificate of competency (steam, motor or combined steam and motor) as Second Engineer-Officer (foreign-going) and, whilst holding such a certificate, shall have completed the period of appropriate sea service required in terms of regulation 31.

Period of Sea Service required for the Endorsement of a Certificate of Competency as Chief Engineer-Officer (Foreign-going).

36. A candidate for the endorsement of a certificate of competency as Chief Engineer-Officer (foreign-going), shall have completed the period of sea service required in terms of regulation 32 for the endorsement of a certificate of competency (steam or motor, as the case may be) as Second Engineer-Officer (foreign-going).

Type of Sea Service required of a Candidate for a Certificate of Competency as Chief Engineer-Officer (Foreign-going) and Endorsement.

37. (1) The sea service required in terms of regulations 35 and 36 of a candidate for a certificate of competency as Chief Engineer-Officer (foreign-going) and endorsement, shall have been performed in a ship of not less than 560 horsepower making long or short voyages, as an engineer-officer at sea on regular watch for not less than 8 hours out of every 24 hours' service claimed.

(2) Behoudens die bepalings van subregulasie (3) moet die diens waarvan in subregulasie (1) melding gemaak word, deur die kandidaat verrig geword het as Senior Ingenieur met bevel oor die hele wag, of as tweede in die senioriteitsvolgorde op 'n skip aangedryf deur 2 of meer stelle masjiene of op 'n groot eenskroefskip waar daar terselfdertyd drie of meer Ingenieuroffisiere op gereëlde waghoudiens is. Waar sodanige diens aldus verrig word op 'n skip wat lang seereise onderneem, tel alles, maar van sulke diens op 'n skip wat kort seereise onderneem, tel net twee-derdes.

(3) Die diens waarvan in subregulasie (1) melding gemaak word, kan ook in die geval van 'n skip aangedryf deur 2 of meer stelle masjiene of op 'n groot eenskroefskip verrig geword het in range laer as die wat in subregulasie (2) vermeld word. As hierdie diens aldus verrig is op 'n skip wat lang seereise onderneem, tel net die helfte daarvan, en as dit aldus verrig is op 'n skip wat kort seereise onderneem, tel net 'n kwart daarvan.

(4) Dagwerk word nie aanvaar nie.

Kwytskelding van Seediens vir 'n Kandidaat vir 'n Sertifikaat van Bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart).

38. 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) kan hoogstens 3 maande seediens kwytgeskel word as hy, alvorens hy met sy bekwamende seediens begin het, Deel A van die eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) deurgekom het of as hy 'n sertifikaat, diploma of graad verwerf het wat deur die Sekretaris as kwalifikasie vir algehele of gedeeltelike vrystelling van Deel A van die eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) erken word.

Eksamen vir 'n Sertifikaat van Bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) sonder dat 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) Voorgelê word.

39. (1) 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) wat weens diens in die buiteland geen geleentheid gehad het om 'n geldige sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) te verwerf nie, kan behoudens die bepalings van subregulasie (2) tot die eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) toegelaat word: met dien verstande dat die Sekretaris daarvan oortuig is dat die kandidaat se diens, vakleerlingskap of tegniese studies, met inbegrip van werkwinkeldiens, nie van 'n laer gehalte is as wat vir die toekenning van 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) kragtens hierdie regulasies vereis word nie.

(2) 'n Kandidaat vermeld in subregulasie (1) moet bewys lewer dat hy minstens 4 jaar op 'n stoomskip of motorskip van minstens 560 perdekrag wat lang seereise onderneem, diens gedoen het, van welke tydperk hy minstens 18 maande lank beheer oor die hele waghoudiens by die ketels en hoofaandrywingsmasjinerie van 'n stoomskip of by die hoofaandrywingsmasjinerie van 'n motorskip moet gehad het, en hy moet slaag in die eksamen in Wiskunde en Tekene wat by regulasie 51 (2) (*c*) en (*d*) voorgeskryf word.

(3) Indien 'n kandidaat wat in subregulasie (1) vermeld word, nie die eksamen vir die sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) deur kom nie, maar toon dat hy die standaard bereik het wat vir

(2) Subject to the provisions of subregulation (3), the service referred to in subregulation (1) shall have been performed as senior engineer in charge of the entire watch, or as second in seniority in a ship propelled by 2 or more sets of engines or in a large single screw ship where there are 3 or more Engineer-Officers on regular watch at the same time. Such service so performed in a ship making long voyages shall be counted at full rate, whereas such service so performed in a ship making short voyages shall be counted at two-thirds rate.

(3) The service referred to in subregulation (1) may also have been performed in ranks below those mentioned in subregulation (2) in a ship propelled by 2 or more sets of engines or in a large single screw ship. This service so performed in a ship making long voyages shall be counted at half rate, whereas such service so performed in a ship making short voyages shall be counted at quarter rate.

(4) Day-work shall not be accepted.

Remission of Sea Service for a Candidate for a Certificate of Competency as Chief Engineer-Officer (Foreign-going).

38. A candidate for a certificate of competency as Chief Engineer-Officer (foreign-going) who, before commencing his qualifying sea service, has passed Part A of the examination for a certificate of competency as Chief Engineer-Officer (foreign-going) or, who has obtained a certificate, diploma or degree recognized by the Secretary as conferring full or partial exemption from Part A of the examination for a certificate of competency as Chief Engineer-Officer (foreign-going), may be granted a remission of sea service not exceeding 3 months.

Examination for a Certificate of Competency as Chief Engineer-Officer (Foreign-going) without production of a Certificate of Competency as Second Engineer-Officer (Foreign-going).

39. (1) A candidate for a certificate of competency as Chief Engineer-Officer (foreign-going) who, in consequence of service abroad, has had no opportunity to obtain a valid certificate of competency as Second Engineer-Officer (foreign-going) may, subject to the provisions of subregulation (2), be admitted to the examination for a certificate of competency as Chief Engineer-Officer (foreign-going): Provided the Secretary is satisfied that the character of the candidate's service, apprenticeship or technical studies, including workshop service, is of a standard not lower than that required for the grant under these regulations of a certificate of competency as Chief Engineer-Officer (foreign-going).

(2) A candidate referred to in subregulation (1) shall produce proof of having served for at least 4 years in a steamship or motor-ship of not less than 560 horse power making long voyages, of which at least 18 months shall have been spent in charge of the entire watch on the boilers and main propelling machinery of a steamship or on the main propelling machinery of a motor-ship, and shall pass the examination in Mathematics and Drawing prescribed in regulation 51 (2) (*c*) and (*d*).

(3) If a candidate referred to in subregulation (1), fails to pass the examination for a certificate of competency as Chief Engineer-Officer (foreign-going), but shows that he has reached the standard required for a certificate of

'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) vereis word, kan die Minister so 'n sertifikaat aan hom toeken; met dien verstande dat geen deel van die eksamengeld aan hom terugbetaal word nie.

HOOFSTUK IV.

KWALIFIKASIES VEREIS VAN 'N KANDIDAAT VIR 'N SERTIFIKAAT VAN BEKWAAMHEID AS HOOF-INGENIEUROFFISIER — SPESIALE GRAAD.

Algemeen.

40. (1) 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier—Spesiale Graad—moet die houer wees van óf 'n geldige gekombineerde sertifikaat van bekwaamheid (stoom en motor) as Hoof-ingenieuroffisier (Vreemde Vaart) óf 'n geldige sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) ten opsigte van die een aandryfkrag geëndosseer vir die ander.

(2) Geen seediens word van die kandidaat vereis benewens die diens wat hy vir sy sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) of endossement verrig het nie.

HOOFSTUK V.

ALGEMENE BEPALINGS BETREFFENDE AANVAARBAARHEID. (NIE OP 'N KANDIDAAT VIR 'N SERTIFIKAAT VAN BEKWAAMHEID AS HOOF-INGENIEUROFFISIER — SPESIALE GRAAD—VAN TOEPASSING NIE).

Algemeen.

41. (1) Die las om aanvaarbare bewys van seediens te lewer, rus op die kandidaat wat op sodanige diens aanspraak maak.

(2) As 'n kandidaat op seediens op 'n skip wat nie in die Republiek geregistreer is nie, aanspraak maak en sodanige diens nie deur die Sekretaris geverifieer kan word nie, moet die diens bevestig word deur 'n amptelike owerheid van die land waaraan die skip behoort het waarop die kandidaat gedien het. As daar enigsins getwyfel word aan die afdoendheid van die gelewerde bewyse, moet alle dokumente met die oog op beslissing na die Sekretaris verwys word.

(3) Alleen seediens—

(*a*) ingevolge 'n ooreenkoms met die bemanning; of

(*b*) gestaaf deur 'n sertifikaat van seediens verstrek deur die bestuurder of eienaar van 'n skip genoem in 'n kennisgewing uitgereik ooreenkomstig artikel 3 (3) van die Wet,

word as seediens gereken.

(4) Indien 'n deel van of al die bekwamende diens deur 'n kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) of Hoof-ingenieuroffisier (Vreemde Vaart) verrig is op 'n skip wat oor aansienlike tydperke nie ter see was nie, moet die kandidaat 'n sertifikaat van die eienaar van die skip voorlê waarin gemeld word watter deel van die tyd werklik ter see deurgebring is. As hierdie tyd minstens tweederdes bedra van die seediens wat nodig is om vir die eksamen te kwalifiseer, kan al die diens aanvaar word, maar as die werklike diens ter see minder as sodanige deel is, moet die kandidaat die tekort aanvul deur addisionele seediens te verrig.

competency as Second Engineer-Officer (foreign-going), the Minister may grant him such a certificate: Provided that no part of the examination fee shall be refunded to him.

CHAPTER IV.

QUALIFICATIONS REQUIRED OF A CANDIDATE FOR A CERTIFICATE OF COMPETENCY AS CHIEF ENGINEER-OFFICER—SPECIAL GRADE.

General.

40. (1) A candidate for a certificate of competency as Chief Engineer-Officer—Special Grade, shall hold either a valid combined certificate of competency (steam and motor) as Chief Engineer-Officer (foreign-going) or a valid certificate of competency as Chief Engineer-Officer (foreign-going) for the one motive power endorsed for the other.

(2) Sea service additional to the service which he performed for his certificate of competency as Chief Engineer-Officer (foreign-going) or endorsement, shall not be required of the candidate.

CHAPTER V.

GENERAL PROVISIONS AS TO ELIGIBILITY (NOT APPLICABLE TO A CANDIDATE FOR A CERTIFICATE OF COMPETENCY AS CHIEF ENGINEER-OFFICER—SPECIAL GRADE).

General.

41. (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 a ship not registered in the Republic and such service cannot be verified by the Secretary, 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 Secretary for decision.

(3) Only sea service—

(*a*) performed in terms of an agreement with the crew; or

(*b*) proved by a certificate of sea service furnished by the manager or owner of any ship named in a notice issued in terms of section 3 (3) of the Act,

shall be reckoned as sea service.

(4) When part or whole of the qualifying service has been performed by a candidate for a certificate of competency as Second Engineer-Officer (foreign-going) or Chief Engineer-Officer (foreign-going) in a ship which for considerable periods has not been at sea, the candidate shall produce a certificate from the owner 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) Diens op 'n skip waar 'n waghoudende Ingenieuroffisier as deel van sy gereëlde pligte stook- of ander werk moet verrig wat nie gewoonlik deur 'n Ingenieuroffisier gedoen word nie, word nie as bekwamende diens aanvaar nie.

(6) In die geval van diens waarvoor nie in hierdie regulasies voorsiening gemaak word nie, moet die Sekretaris beslis of sodanige diens as bekwamende diens aanvaar kan word.

Hoe Seediens bereken word.

42. Die kandidaat se diens soos op sy ontslagsertifikate of sertifikate van seediens aangetoon, word bereken volgens kalendermaande, d.w.s. die tyd tussen enige bepaalde dag in 'n maand en die voorafgaande dag van die volgende maand, albei inbegrepe. Die getal volle maande vanaf die begin van die tydperk wat aldus vasgestel is, word bereken en daarna word die getal oorblywende dae getel. Die dag waarop die ooreenkoms in werking tree en die dag waarop hy eindig, word albei ingesluit en al die los dae word bymekaar getel en teen 30 dae per maand bereken.

Diens by Hulpmasjiene.

43. (1) Behoudens regulasies 17 en 31 se bepalings betreffende die minimum diens by ketels en hoofmasjiene tel diens by hulpmasjinerie wat saam met die hoofaandrywingsmasjinerie gebruik word (d.w.s. by hulpmasjiene wat vir die werking van die hoofaandrywingsmasjinerie of ketels noodsaaklik is) alles in mindering van die bekwamende tydperk seediens.

(2) Van diens by geskikte hulpmasjiene wat onafhanklik van die hoofaandrywingsmasjinerie gebruik word, tel net die helfte.

HOOFSTUK VI.

EKSAMENGELDE (ALLE KANDIDATE).

Wanneer om Gelde te Betaal.

44. 'n Kandidaat wat 'n eksamen vir 'n bekwaamheidsertifikaat wil aflê, moet die eksamengeld voor die datum van die eksamen betaal, en geen kandidaat mag toegelaat word om die eksamen te doen nie tensy hy die kwitansie vir die betaalde eksamengeld aan die eksaminator toon.

Waar om Gelde te Betaal.

45. Die eksamengeld moet aan die naaste bevoegde beampte betaal word en dié moet 'n kwitansie uitreik waarop vermeld word—

(*a*) die naam van die kandidaat;
(*b*) die betaalde bedrag; en
(*c*) die graad van die eksamen.

Tabel van Eksamengelde.

46. Die betaalbare eksamengelde is as volg:—

(*a*) Eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) of endossement:—

	R
(i) Die volle eksamen vir 'n sertifikaat (stoom, motor of stoom en motor)	8.00
(ii) Deel van die eksamen	4.00
(iii) Eksamen vir endossement (stoom of motor)	4.00

(*b*) Eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Kusvaart) of endossement:—

	R
(i) Die volle eksamen vir 'n sertifikaat (stoom, motor of stoom en motor)	12.00
(ii) Deel van die eksamen	6.00
(iii) Eksamen vir endossement (stoom of motor)	6.00

(5) Service in a ship 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 acceptance as qualifying service, of service which is not provided for in these regulations, shall be decided by the Secretary.

How Sea Service is Calculated.

42. The candidate's service as shown on his discharges or certificates of sea service, 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.

Service on Auxiliary Machinery.

43. (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 or boilers) shall, subject to the provisions regarding the minimum service on boilers and main engines set out in regulations 17 and 31, 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.

CHAPTER VI.

EXAMINATION FEES (ALL CANDIDATES).

When to Pay Fees.

44. 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 fee paid.

Where to Pay Fees.

45. 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 Examination Fees.

46. The fees payable shall be as follows:—

(*a*) Examination for a certificate of competency as Second Engineer-Officer (coasting) or endorsement:—

	R
(i) The full examination for a certificate (steam, motor or combined steam and motor)	8.00
(ii) Part of the examination	4.00
(iii) The endorsement (steam or motor) examination	4.00

(*b*) Examination for a certificate of competency as Chief Engineer-Officer (coasting) or endorsement:—

	R
(i) The full examination for a certificate (steam, motor or combined steam and motor)	12.00
(ii) Part of the examination	6.00
(iii) The endorsement (steam or motor) examination	6.00

(*c*) Eksamen vir 'n sertifikaat van bekwaamheid as Tweee Ingenieuroffisier (Vreemde Vaart) of endossement:—

	R
(i) Die volle eksamen vir 'n sertifikaat (stoom, motor of stoom en motor)	12.00
(ii) Deel A of Deel B of 'n gedeelte van een van hierdie dele, of vir vrystelling van die hele Deel A	6.00
(iii) Eksamen vir endossement (stoom of motor)	6.00

(*d*) Eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) of endossement:—

	R
(i) Die volle eksamen vir 'n sertifikaat (stoom, motor of stoom en motor)	20.00
(ii) Deel A of Deel B of 'n gedeelte van enige deel	10.00
(iii) Eksamen vir endossement (stoom of motor)	10.00

(*e*) Eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier—Spesiale Graad:—

	R
(i) Die volle eksamen vir 'n sertifikaat	32.00
(ii) Deel A of Deel B	16.00

Terugbetaling van Eksamengelde.

47. (1) Indien 'n kandidaat weens omstandighede buite sy beheer nie in staat is om die eksamen af te lê waarvoor hy eksamengeld betaal het nie, kan hy skriftelik by die bevoegde beampte om terugbetaling van sodanige eksamengeld aansoek doen. Indien die bevoegde beampte van mening is dat die aansoek op redelike gronde berus, moet hy die aansoek deurstuur aan die Sekretaris, wat die terugbetaling kan magtig.

(2) Indien 'n kandidaat nie 'n eksamen ooreenkomstig regulasie 8 voltooi nie, kan hy skriftelik by die bevoegde beampte aansoek doen om terugbetaling van die eksamengeld wat deur hom betaal is, en sodanige geld moet aan hom terugbetaal word.

(3) Indien 'n kandidaat in enige deel van die eksamen druip, word behoudens die bepalings van subregulasie (2) geen deel van die eksamengeld aan hom terugbetaal nie.

HOOFSTUK VII.

EKSAMENS: SERTIFIKAAT VAN BEKWAAMHEID AS TWEEDE INGENIEUROFFISIER (KUSVAART) EN ENDOSSEMENT, OF HOOF-INGENIEUROFFISIER (KUSVAART) EN ENDOSSEMENT.

Eksamen vir 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) of Hoof-Ingenieuroffisier (Kusvaart).

48. (1) Die leerplanne vir die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) of Hoof-ingenieuroffisier (Kusvaart) word in Aanhangsel 3 uiteengesit.

(2) Die eksamen moet die volgende dek:—

(*a*) Algemene Ingenieurswetenskap (1 vraestel van 3 uur).

(*b*) Hitte en Hittewerktuie (1 vraestel van 3 uur).

(*c*) (i) Ingenieurswese (twee vraestelle van 3 uur elk).

(ii) 'n Mondelinge eksamen.

(3) 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) kan hom te eniger tyd tussen voltooiing van sy werkwinkeldiens en voltooiing van sy bekwamende seediens aanmeld om in die vakke Algemene Ingenieurswetenskap, en Hitte en Hittewerktuie geëksamineer te word.

(4) 'n Kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Kusvaart) kan hom te eniger tyd na slaging in die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) aanmeld om in die vakke Algemene Ingenieurswetenskap, en Hitte en Hittewerktuie geëksamineer te word.

(*c*) Examination for a certificate of competency as Second Engineer-Officer (foreign-going) or endorsement:—

	R
(i) The full examination for a certificate (steam, motor or combined steam and motor)	12.00
(ii) Part A or Part B or a portion of either Part, or for exemption from all of Part A	6.00
(iii) The endorsement (steam or motor) examination.	6.00

(*d*) Examination for a certificate of competency as Chief Engineer-Officer (foreign-going) or endorsement:—

	R
(i) The full examination for a certificate (steam, motor or combined steam and motor)	20.00
(ii) Part A or Part B or a portion of either Part	10.00
(iii) The endorsement (steam or motor) examination.	10.00

(*e*) Examination for a certificate of competency as Chief Engineer-Officer—Special Grade:—

	R
(i) The full examination for a certificate	32.00
(ii) Part A or Part B	16.00

Refund of Examination Fees.

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

(2) If a candidate does not, in terms of regulation 8 complete an examination, he may apply in writing to the proper officer for a refund of the fee paid by him, and such fee shall be refunded to him.

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

CHAPTER VII.

EXAMINATIONS: CERTIFICATE OF COMPETENCY AS SECOND ENGINEER-OFFICER (COASTING) AND ENDORSEMENT, OR CHIEF ENGINEER-OFFICER (COASTING) AND ENDORSEMENT.

Examination for a Certificate of Competency as Second Engineer-Officer (Coasting) or Chief Engineer-Officer (Coasting).

48. (1) The syllabuses for the examination for a certificate of competency as Second Engineer-Officer (coasting) or Chief Engineer-Officer (coasting) are set out in Annex 3.

(2) The examination shall cover:—

(*a*) General Engineering Science (1 paper of 3 hours).

(*b*) Heat and Heat Engines (1 paper of 3 hours).

(*c*) (i) Engineering Knowledge (2 papers, each of 3 hours).

(ii) Oral.

(3) A candidate for a certificate of competency as Second Enginer-Officer (coasting) may present himself for examination in the subjects " General Engineering Science " and " Heat and Heat Engines " at any time between the completion of his workshop service and the completion of his qualifying sea service.

(4) A candidate for a certificate of competency as Chief Engineer-Officer (coasting) may present himself for examination in the subjects " General Engineering Science " and " Heat and Heat Engines " at any time after he has passed the examination for a certificate of competency as Second Engineer-Officer (coasting).

(5) 'n Kandidaat wat 1 of 2 vakke deurkom, hoef nie daardie vakke weer te neem nie en kan hom behoudens die bepalings van regulasie 56 aanmeld om in die oorblywende vak of vakke hereksamineer te word.

Eksamen vir Endossering van 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) of Hoof-ingenieuroffisier (Kusvaart).

49. Die eksamen vir die endossering van 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) of Hoofingenieuroffisier (Kusvaart) moet uit die volgende bestaan:—

(*a*) Een skriftelike vraestel van 3 uur in Ingenieurswese.

(*b*) Mondelinge eksamen.

Die leerplanne vir hierdie eksamens word in Aanhangsel 3 uiteengesit.

Punte Vereis vir Slaging.

50. (1) Ten einde die skriftelike deel van die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart) en endossement of Hoof-ingenieuroffisier (Kusvaart) en endossement deur te kom, moet 'n kandidaat vir elke vak 'n minimum puntetal en ook vir al die vakke saam minstens die helfte van die totale puntetal behaal. In die mondelinge eksamen word 'n hoër standaard vereis.

(2) Die uitslag van die eksamen sal deur die eksaminator aan die kandidaat meegedeel word.

HOOFSTUK VIII.

EKSAMENS: SERTIFIKAAT VAN BEKWAAMHEID AS TWEEDE INGENIEUROFFISIER (VREEMDE VAART) EN ENDOSSEMENT, OF HOOF-INGENIEUROFFISIER (VREEMDE VAART) EN ENDOSSEMENT.

Eksamen vir Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart).

51. (1) Die leerplanne vir die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) word in Aanhangsel 4 uiteengesit.

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

Deel A.

(*a*) Toegepaste Meganika (1 vraestel van 3 uur).
(*b*) Hitte en Hittewerktuie (1 vraestel van 3 uur).
(*c*) *Wiskunde* (1 *vraestel van* 3 *uur*).
(*d*) Tekene (1 vraestel van 6 uur).

Deel B.

(*a*) (i) Elektrotegnologie (1 vraestel van 3 uur).
(ii) Elementêre Skeepsboukunde (1 vraestel van 3 uur).

(*b*) (i) Ingenieurswese (2 vraestelle van 3 uur elk).
(ii) Mondelinge eksamen.

(3) 'n Kandidaat kan, behoudens 'n minimum van 2 vakke, vrygestel word van die hele of 'n deel van Deel A en kan die eksamen in afsonderlike dele aflê, as volg:—

(*a*) As 'n kandidaat 'n goedgekeurde onderrigkursus wat minstens 2 uit die 4 vakke inbegrepe in Deel A dek, gevolg en 'n sertifikaat verwerf het wat meld dat hy die toepaslike eksamen aan die einde van die kursus deurgekom het, word hy vrygestel van die vakke in Deel A wat deur die sertifikaat gedek word. Die Nasionale Tegniese Sertifikaat, Deel V (voorheen bekend as G.T.S.

(5) A candidate who passes in 1 or 2 subjects, shall not be required to take those subjects again and, subject to the provisions of regulation 56, may present himself for re-examination in the remaining subject or subjects.

Examination for Endorsement of a Certificate of Competency as Second Engineer-Officer (Coasting) or Chief-Engineer-Officer (Coasting).

49. The examination for the endorsement of a certificate of competency as Second Engineer-Officer (coasting) or Chief Engineer-Officer (coasting), shall consist of:—

(*a*) One written paper of 3 hours in Engineering knowledge.

(*b*) Oral.

The syllabuses for these examinations are set out in Annex 3.

Marks Required for Pass.

50. (1) The secure a pass in the written portion of the examination for a certificate of competency as Second Engineer-Officer (coasting) and endorsement or Chief Engineer-Officer (coasting) and endorsement, 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.

CHAPTER VIII.

EXAMINATIONS: CERTIFICATE OF COMPETENCY AS SECOND ENGINEER-OFFICER (FOREIGN-GOING) AND ENDORSEMENT, OR CHIEF ENGINEER-OFFICER (FOREIGN-GOING) AND ENDORSEMENT.

Examination for a Certificate of Competency as Second Engineer-Officer (Foreign-going).

51. (1) The syllabuses for the examination for a certificate of competency as Second Engineer-Officer (foreign-going) are set out in Annex 4.

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

Part A.

(*a*) Applied Mechanics (1 paper of 3 hours).
(*b*) Heat and Heat Engines (1 paper of 3 hours).
(*c*) Mathematics (1 paper of 3 hours).
(*d*) Drawing (1 paper of 6 hours).

Part B.

(*a*) (i) Electrotechnology (1 paper of 3 hours).
(ii) Elementary Naval Architecture (1 paper of 3 hours).

(*b*) (i) Engineering Knowledge (2 papers, each of 3 hours).
(ii) Oral.

(3) A candidate may be exempted from Part A or a portion of it, subject to a minimum of 2 subjects, 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 2 of the 4 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 subjects in Part A covered by the certificate. The National Technical Certificate, Part V (previously known as A.T.C. II), the National Technical

II), die Nasionale Tegniese Diploma (voorheen bekend as die Nasionale Diploma in Ingenieurswese), die Nasionale Diploma (Skeepsingenieurswese), die Nasionale Diplomas (Werktuigkundige of Elektriese Ingenieurswese) (voorheen bekend as die Nasionale Diplomas vir Tegnici) of die Hoër Nasionale Diplomas, Deel I of Deel II (Werktuigkundige of Elektriese Ingenieurswese), kan aanvaar word ten einde die kandidaat van die hele Deel A van die eksamen op 'n vak-vir-vak-grondslag vrystelling te verleen.

(*b*) 'n Kandidaat kan hom te eniger tyd na voltooiing van die nodige werkwinkeldiens óf vir die hele Deel A van die eksamen óf, indien kragtens paragraaf (*a*) gedeeltelike vrystelling aan hom verleen is, vir die oorblywende vak of vakke aanmeld.

(*c*) 'n Kandidaat wat nie geheel en al of gedeeltelik kragtens paragraaf (*a*) vrygestel is nie en wat net 1 vak deurkom wanneer hy Deel A van die eksamen aandurf, moet by hereksamen weer die hele Deel A aflê. As hy 2 of 3 vakke deurkom, hoef hy nie daardie vakke te herhaal nie en kan hy hom behoudens die bepalings van regulasie 56 vir hereksamen in die oorblywende vak of vakke aanmeld.

(*d*) 'n Kandidaat kan Deel B te eniger tyd na voltooiing van die nodige tydperke bekwamende werkwinkel- en seediens aflê; met dien verstande dat hy ook terselfdertyd die hele Deel A van die eksamen aflê of eksamen doen in diè vakke (as daar is) van daardie deel waarin hy nie reeds geslaag het of waarvan hy nie kragtens paragraaf (*a*) vrygestel is nie.

(*e*) 'n Kandidaat mag nie 'n slaagpunt in Deel B of in enige afdeling van Deel B gegee word nie tensy hy Deel A terselfdertyd as Deel B voltooi of reeds tevore voltooi het of van Deel A vrygestel is.

(*f*) 'n Kandidaat wat Deel A voltooi of voltooi het en wanneer hy Deel B van die eksamen aflê, in afdeling (*a*) (Elektrotegnologie en Elementêre Skeepsboukunde) slaag maar in afdeling (*b*) (Ingenieurswese en Mondeling) druip, moet 'n slaagpunt vir afdeling (*a*) gegee word en kan behoudens die bepalings van regulasie 56 'n hereksamen in afdeling (*b*) aflê.

(*g*) 'n Kandidaat wat Deel A voltooi of voltooi het en wanneer hy Deel B van die eksamen aflê, in afdeling (*b*) (Ingenieurswese en Mondeling) slaag maar in afdeling (*a*) (Elektrotegnologie en Elementêre Skeepsboukunde) druip, moet 'n slaagpunt vir afdeling (*b*) gegee word en kan behoudens die bepalings van regulasie 56 'n hereksamen in afdeling (*a*) aflê.

Eksamen vir 'n Sertifikaat van Bekwaamheid as Hoof-Ingenieuroffisier (Vreemde Vaart).

52. (1) Die leerplanne vir die eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier (Vreemde Vaart) word in aanhangsel 4 uiteengesit.

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

Deel A.

(*a*) Toegepaste Meganika (1 vraestel van 3 uur).
(*b*) Hitte en Hittewerktuie (1 vraestel van 3 uur).

Deel B.

(*a*) (i) Elektrotegnologie (1 vraestel van 3 uur).
(ii) Elementêre Skeepsboukunde (1 vraestel van 3 uur).
(*b*) (i) Ingenieurswese [2 vraestelle van 3 uur elk); met dien verstande dat daar in die geval van die eksamen vir 'n gekombineerde sertifikaat (stoom en motor) 'n derde vraestel van 3 uur gestel word].
(ii) Mondelinge eksamen.

Diploma (previously known as the National Engineering Diploma), the National Diploma (Marine Engineers), the National Diplomas (Mechanical or Electrical Engineering) (previously known as the National Technicians Diplomas) or the Higher National Diplomas, Part I or Part II (Mechanical or Electrical Engineering), may be accepted for the purpose of granting a candidate exemption from the whole of Part A of the examination on a subject-for-subject basis.

(*b*) A candidate may present himself either for the whole of Part A of the examination, or, if he has been granted partial exemption under paragraph (*a*), for the remaining subject or subjects at any time after he has completed the necessary workshop service.

(*c*) A candidate who has not been exempted wholly or partially under paragraph (*a*) and who, when attempting Part A of the examination, passes in 1 subject only, must take the whole of Part A again on re-examination. If he passes in 2 or 3 subjects, he shall not be required to take those subjects again and, subject to the provisions of regulation 56, may present himself for re-examination in the remaining subject or subjects.

(*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 paragraph (*a*).

(*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, or has been exempted from 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 subject to the provisions of regulation 56, may sit for re-examination in section (*b*).

(*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, subject to the provisions of regulation 56, may sit for re-examination in section (*a*).

Examination for a Certificate of Competency as Chief Engineer-Officer (Foreign-going).

52. (1) The syllabuses for the examination for a certificate of competency as Chief Engineer-Officer (foreign-going) are set out in Annex 4.

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

Part A.

(*a*) Applied Mechanics (1 paper of 3 hours).
(*b*) Heat and Heat Engines (1 paper of 3 hours).

Part B.

(*a*) (i) Electrotechnology (1 paper of 3 hours).
(ii) Elementary Naval Architecture (1 paper of 3 hours).
(*b*) (i) Engineering Knowledge [2 papers, each of 3 hours: Provided that in the examination for a combined certificate (steam and motor) a third paper of 3 hours is set].
(ii) Oral.

(3) 'n Kandidaat kan van die hele of 'n deel van Deel A vrygestel word en kan die eksamen in afsonderlike dele aflê, as volg:—

(*a*) 'n Kandidaat wat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) van eksamen in Toegepaste Meganika en/of Hitte en Hittewerktuie vrygestel is, word ook van een of albei van bogemelde vakke vrygestel in die eksamen vir 'n sertifikaat van bekwaamheid as Hoofingenieuroffisier (Vreemde Vaart).

(*b*) 'n Kandidaat kan hom te eniger tyd na slaging in die eksamen vir die sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) óf vir die hele Deel A van die eksamen óf, indien kragtens paragraaf (*a*) gedeeltelike vrystelling aan hom verleen is, vir die oorblywende vak aanmeld.

(*c*) 'n Kandidaat wat nie geheel en al of gedeeltelik kragtens paragraaf (*a*) vrygestel is nie en wat net een vak deurkom wanneer hy Deel A van die eksamen aandurf, hoef nie weer die eksamen in daardie vak af te lê nie en kan hom behoudens die bepalings van regulasie 56 vir hereksamen in die oorblywende vak aanmeld.

(*d*) 'n Kandidaat kan Deel B te eniger tyd aflê mits hy die houer van 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) is en die nodige tydperk bekwamende seediens voltooi het en mits hy ook terselfdertyd die hele Deel A van die eksamen aflê of eksamen doen in dié vak (as daar is) van daardie deel waarin hy nie reeds geslaag het of waarvan hy nie kragtens paragraaf (*a*) vrygestel is nie.

(*e*) 'n Kandidaat mag nie 'n slaagpunt in Deel B of in enige afdeling van Deel B gegee word nie tensy hy Deel A terselfdertyd as Deel B voltooi of reeds tevore voltooi het of van Deel A vrygestel is.

(*f*) 'n Kandidaat wat Deel A voltooi of voltooi het en wanneer hy Deel B van die eksamen aflê, in afdeling (*a*) (Elektrotegnologie en Elementêre Skeepsboukunde) slaag maar in afdeling (*b*) (Ingenieurswese en Mondeling) druip, moet 'n slaagpunt vir afdeling (*a*) gegee word en kan behoudens die bepalings van regulasie 56 'n hereksamen in afdeling (*b*) aflê.

(*g*) 'n Kandidaat wat Deel A voltooi of voltooi het en wanneer hy Deel B van die eksamen aflê, in afdeling (*b*) (Ingenieurswese en Mondeling) slaag maar in afdeling (*a*) (Elektrotegnologie en Elementêre Skeepsboukunde) druip, moet 'n slaagpunt vir afdeling (*b*) gegee word en kan behoudens die bepalings van regulasie 56 te eniger tyd 'n hereksamen in afdeling (*a*) aflê.

Eksamen vir Endossering van 'n Sertifikaat van Bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) of Hoof-ingenieuroffisier (Vreemde Vaart).

53. Die eksamen vir die endossering van 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) of Hoof-ingenieuroffisier (Vreemde Vaart) moet uit die volgende bestaan:—

(*a*) Een skriftelike vraestel van 3 uur in Ingenieurswese.

(*b*) Mondelinge eksamen.

Die leerplanne vir hierdie eksamens word in Aanhangsel 4 uiteengesit.

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

(*a*) A candidate who, for a certificate of competency as Second Engineer-Officer (foreign-going), has been exempted from examination in Applied Mechanics or Heat and Heat Engines, or both shall also, in the examination for a certificate of competency as Chief Engineer-Officer (foreign-going), be exempted from either or both of the above-mentioned subjects.

(*b*) A candidate may present himself either for the whole of Part A of the examination, or if he has been granted partial exemption under paragraph (*a*), for the remaining subject at any time after he has passed the examination for a certificate of competency as Second Engineer-Officer (foreign-going).

(*c*) A candidate who has not been exempted wholly or partially under paragraph (*a*) and who, when attempting Part A of the examination, passes in 1 subject only, shall not be required to take that subject again and, subject to the provisions of regulation 56, may present himself for re-examination in the remaining subject.

(*d*) A candidate may take Part B at any time provided he holds a certificate of competency as Second Engineer-Officer (foreign-going) 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 paragraph (*a*).

(*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, or has been exempted from 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, subject to the provisions of regulation 56, may sit for re-examination in section (*b*).

(*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, subject to the provisions of regulation 56, may sit for re-examination in section (*a*) at any time.

Examination for Endorsement of a Certificate of Competency as Second Engineer-Officer (foreign-going) or Chief Engineer-Officer (foreign-going).

53. The examination for the endorsement of a certificate of competency as Second Engineer-Officer (foreign-going) or Chief Engineer-Officer (foreign-going) shall consist of—

(*a*) One written paper of 3 hours in Engineering Knowledge.

(*b*) Oral.

The syllabuses for these examinations are set out in Annex 4.

Punte Vereis vir Slaging.

54. (1) Ten einde die skriftelike deel van die eksamen vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) en endossement of Hoof-ingenieuroffisier (Vreemde Vaart) en endossement deur te kom, moet 'n kandidaat vir elke vak 'n minimum puntetal en ook vir al die vakke saam minstens die helfte van die totale puntetal behaal. In die mondelinge eksamen word 'n hoër standaard vereis.

(2) Die uitslag van die eksamen sal deur die eksaminator aan die kandidaat meegedeel word.

HOOFSTUK IX.

EKSAMENS: SERTIFIKAAT VAN BEKWAAMHEID AS HOOF-INGENIEUROFFISIER—SPESIALE GRAAD.

Algemeen.

55. (1) Die eksamen vir 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier—Spesiale Graad—dek die leerplanne vir die eksamens vir sertifikate van bekwaamheid as Tweede Ingenieuroffisier (Vreemde Vaart) en Hoof-ingenieuroffisier (Vreemde Vaart) soos uiteengesit in Aanhangsel 4, asook die leerplan uiteengesit in Aanhangsel 5.

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

Deel A.

(*a*) Masjienleer (Hidromeganika) (1 vraestel van 3 uur).

(*b*) Sterkteleer en eienskappe van materiale (1 vraestel van 3 uur).

(*c*) Toegepaste Termodinamika (1 vraestel van 3 uur).

(*d*) Skeepshittewerktuie (1 vraestel van 3 uur).

Deel B.

(*a*) Ingenieurswese (1 vraestel van 3 uur).

(*b*) Opstel (tyd toegelaat: 3 uur).

(*c*) Elektrotegnologie (1 vraestel van 3 uur).

(*d*) Skeepsboukunde (1 vraestel van 3 uur).

(*e*) Masjienontwerp (Tekene) (tyd toegelaat: 6 uur).

(3) Geen vrystelling van vakke gedek deur die eksamen word verleen nie.

(4) 'n Kandidaat kan hom vir die hele eksamen op dieselfde tydstip of vir die 2 dele by afsonderlike eksamens aanmeld, en in laasgenoemde geval moet die kandidaat eers Deel A deurkom ten einde vir toelating tot Deel B te kwalifiseer.

(5) Indien 'n kandidaat kies om die hele eksamen meteen af te lê en net in Deel B slaag, kan hy by 'n verdere eksamen net Deel A aflê en word hy van verdere eksamen in Deel B vrygestel.

(6) 'n Kandidaat moet vir elke vraestel 'n minimum puntetal en vir al die vraestelle saam, hetsy vir die hele eksamen of vir Deel A of Deel B indien hulle afsonderlik afgelê word, minstens 60 persent van die totale punte behaal.

Marks Required for Pass.

54. (1) To secure a pass in the written portion of the examination for a certificate of competency as Second Engineer-Officer (foreign-going) and endorsement or Chief Engineer-Officer (foreign-going) and endorsement, 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.

CHAPTER IX.

EXAMINATIONS CERTIFICATE OF COMPETENCY AS CHIEF ENGINEER-OFFICER—SPECIAL GRADE.

General.

55. (1) The examination for a certificate of competency as Chief Engineer-Officer—Special Grade, covers the syllabuses for the examinations for certificates of competency as Second Engineer-Officer (foreign-going) and Chief Engineer-Officer (foreign-going) set out in Annex 4 as well as the syllabus set out in Annex 5.

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

Part A.

(*a*) Theory of Machines (Mechanics of Fluids) (1 paper of 3 hours).

(*b*) Strength and Properties of Materials (1 paper of 3 hours).

(*c*) Applied Thermodynamics (1 paper of 3 hours).

(*d*) Marine Heat Engines (1 paper of 3 hours).

Part B.

(*a*) Engineering Knowledge (1 paper of 3 hours).

(*b*) Essay (time allowed 3 hours).

(*c*) Electrotechnology (1 paper of 3 hours).

(*d*) Naval Architecture (1 paper of 3 hours).

(*e*) Machine Design (Drawing) (time allowed 6 hours).

(3) No exemption from any of the subjects covered by the examination is granted.

(4) A candidate may present himself either for the whole examination at one time, or for the 2 parts at separate examinations, and in the latter case the candidate shall first pass in Part A to qualify for entrance to Part B.

(5) If a candidate who chooses to take the whole examination at one time passes only in Part B, he shall be eligible to sit for Part A at any further examination and shall be exempt from future examination in Part B.

(6) A candidate shall obtain a minimum number of marks in each paper, and not less than 60 per cent of the total marks throughout the examination, either for the whole examination or for Part A or Part B if taken separately.

HOOFSTUK X.

DRUIPING IN EKSAMEN VIR 'N ANDER SERTIFIKAAT VAN BEKWAAMHEID AS DIE AS HOOF-INGENIEUROFFISIER—SPESIALE GRAAD.

Algemeen.

56. (1) As daar in 'n eksamen vir 'n sertifikaat van bekwaamheid, uitgesonderd 'n sertifikaat van bekwaamheid as Hoof-ingenieuroffisier—Spesiale Graad—gedruip word in 'n vak waarvan onkundigheid daartoe kan lei dat 'n Ingenieuroffisier in die behartiging van enige deel van 'n skip se masjinerie iets doen wat werklik onveilig is of nalaat om iets te doen wat met die oog op veiligheid noodsaaklik is (bv. druiping in vrae oor manipulasie en die aflees van die waterpeilglas, die gevaar van brand en ontploffings in stoom- en motorskepe), word dit as druiping in praktiese kennis beskou en mag 'n kandidaat wat aldus gedruip het, hom nie vir hereksamen aanmeld alvorens hy bewys van verdere seediens in 'n bekwamende hoedanigheid lewer nie.

(2) 'n Kandidaat wat weens onkunde omtrent grondbeginsels of weens algemene tekortskieting in die eksamen druip, mag hom vir 'n tydperk wat deur die eksaminator bepaal moet word maar wat nie 3 maande te bowe gaan nie, nie vir hereksamen aanmeld nie; met dien verstande dat die Sekretaris behoudens die bepalings van subregulasie (5) na eise oordeel 'n langer tydperk as 3 maande mag bepaal.

(3) 'n Kandidaat wat onder ander omstandighede in 'n eksamen druip as wat in subregulasies (1) en (2) uiteengesit word, kan hom te eniger tyd na verstryking van 1 maand sedert sy jongste poging vir eksamen aanmeld, maar as hy binne 'n tydperk van 3 maande 3 maal in Deel A of 3 maal in Deel B druip, mag hy vir 'n tydperk wat deur die eksaminator bepaal moet word maar wat nie 3 maande te bowe gaan nie, nie weer geëksamineer word nie; met dien verstande dat die Sekretaris behoudens die bepalings van subregulasie (5) na eie oordeel 'n tydperk van langer as 3 maande mag bepaal.

(4) Die tydperk verdere seediens wat by subregulasie (1) vereis word, moet deur die eksaminator bepaal word en mag nie 3 maande te bowe gaan nie tensy die voorafgaande goedkeuring van die Sekretaris verkry is in 'n geval waar die eksaminator van mening is dat langer diens as 3 maande geregverdig is.

(5) Die tydperk wat moet verstryk alvorens 'n kandidaat hom weer vir eksamen mag aanmeld en wat ooreenkomstig subregulasie (2) of (3) deur die Sekretaris bepaal word, of die tydperk verdere seediens wat by subregulasie (4) vereis word, mag in geen geval 6 maande te bowe gaan nie.

HOOFSTUK XI.

AFNEEM VAN EKSAMENS (ALLE KANDIDATE).

Kandidate moet op Tyd wees.

57. 'n Kandidaat moet stip op die bepaalde tyd by die eksamenkamer wees.

Vreemdelinge nie Toegelaat nie.

58. Afgesien van iemand wie se pligte dit van hom vereis om aanwesig te wees, word niemand gedurende die eksamen in die kamer toegelaat nie. Geen instrukteur word op die perseel toegelaat terwyl 'n eksamen aan die gang is nie.

CHAPTER X.

FAILURE IN EXAMINATION FOR A CERTIFICATE OF COMPETENCY OTHER THAN AS CHIEF ENGINEER-OFFCER—SPECIAL GRADE.

General.

56. (1) Failure in a subject in an examination for a certificate of competency other than as Chief Engineer-Officer—Special Grade, 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 watergauge, the danger of fire and explosion in steamships and motor-ships), 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 3 months, to be determined by the examiner: Provided that the Secretary in his discretion may, subject to the provisions of subregulation (5), fix a period in excess of 3 months.

(3) A candidate who fails in an examination in circumstances other than those set out in subregulations (1) and (2) may present himself for examination at any time after 1 month has elapsed since his previous attempt, but if he fails 3 times in Part A or 3 times in Part B within any period of 3 months he shall not be examined for a period of up to 3 months, to be determined by the examiner: Provided that the Secretary in his discretion may, subject to the provisions of subregulation (5), fix a period in excess of 3 months.

(4) The period of further sea service required in terms of subregulation (1) shall be determined by the examiner and shall not exceed 3 months, unless, in a case where the examiner is of the opinion that a period of service in excess of 3 months is warrented, the prior approval of the Secretary has been obtaind.

(5) The period of time which must elapse before a candidate may again present himself for examination and which is fixed by the Secretary in terms of subregulation (2) or (3), or the period of further sea service required in terms of subregulation (4), shall in no case exceed 6 months.

CHAPTER XI.

CONDUCT OF EXAMINATIONS (ALL CANDIDATES).

Candidates to be Punctual.

57. A candidate shall appear at the examination room punctually at the time appointed.

No Strangers Admitted.

58. No person other than a person whose duties require him to be present shall be allowed in the room during examination. No instructor shall be allowed on the premises while an examination is in progress.

Stilte.

59. Terwyl 'n skriftelike eksamen aan die gang is, moet stilte in die eksamenkamer bewaar word.

Los Velle Papier en Boeke.

60. Voordat die eksamen begin, moet alle ander stukkies papier en boeke as dié wat kragtens hierdie regulasies in die eksamenkamer toegelaat word, van die tafels of lessenaars verwyder word.

Gebruik van Wiskundetafels.

61. 'n Kandidaat mag nie sonder die eksaminator se voorafgaande toestemming ander wiskundetafels gebruik as wat deur die eksaminator verskaf is nie.

Gebruik van Instrumente.

62. (1) Tekenborde en tekenhake wat vir gebruik in die eksamen nodig is, sal deur die eksaminator verskaf word, maar 'n kandidaat moet self sy tekeninstrumente verskaf.

(2) 'n Kandidaat wat vir sy berekenings van rekenliniale gebruik maak, moet met ink in die eksamenskrif 'n volledige uiteensetting gee van die stappe wat nodig is om die antwoorde te verkry. As die uiteensetting nie aldus gegee word nie, word geen punte ten opsigte van die betrokke antwoorde toegeken nie.

Ongeoorloofde Boeke en Papier Streng Verbode.

63. 'n Kandidaat mag nie ander boeke, aantekeninge, memorandums of papiere by hom hê as wat vir gebruik in die eksamen verskaf is nie. Indien 'n kandidaat boeke, aantekeninge, memorandums of papiere met hom saamgebring het, moet hy hulle aan die eksaminator oorhandig voordat hy met die eksamen begin.

Beskadiging van Boeke, Instrumente, ens.

64. Indien '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 anders die skade vergoed.

Verlating van Kamer.

65. 'n Kandidaat mag nie sy sitplek of die eksamenkamer sonder die toestemming van die eksaminator verlaat nie. Indien hy die kamer verlaat, mag hy nie sonder die toestemming van die eksaminator aangaan met 'n vraestel of probleem waarmee hy besig was nie.

Alle Werk moet Getoon word.

66. (1) 'n Kandidaat moet net op die een kant van die papier werk of skryf. Hy moet duidelik en leesbaar skryf en sy naam onderaan elke vel teken.

(2) 'n Kandidaat moet nie sy probleme op skeurpapier uitwerk en mag ook nie op die vloeipapier skryf wat aan hom vir gebruik in die eksamen verskaf is nie.

(3) Alle werk, uitgesonderd sketse en tekeninge, moet met ink gedoen word.

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

Straf vir Afskryf, ens.

67. 'n Kandidaat wat gedurende die eksamen 'n ongeoorloofde boek of papier raadpleeg of van iemand anders afskryf of aan iemand anders hulp verleen of inligting verstrek of op enige wyse met iemand anders in verbinding tree, of wat enige deel van die probleme afskryf met die doel om hulle uit die eksamenkamer te neem, word geag in die eksamen te gedruip het en mag 6 maande lank nie vir hereksamen aangeneem word nie. 'n

Silence.

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

Loose Papers and Books.

60. 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.

61. A candidate shall not without the examiner's prior permission, use any mathematical tables other than those provided by the examiner.

Use of Instruments.

62. (1) Drawing boards and T. squares necessary for use in the examination will be supplied by the examiner, but a candidate shall provide his own drawing instruments.

(2) A candidate who uses slide rules for his calculations shall show in ink on the answer paper 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.

63. A candidate shall not have with him any books, notes, memoranda or papers other than those supplied for use at the examination. If a 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.

64. 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.

65. 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.

66. (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 work 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.

67. A 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 them out of the examination room, shall be regarded as having failed the examination, and shall not be accepted for re-examination for a period of 6 months. A candidate

Kandidaat wat aan 'n tweede oortreding skuldig is, mag nie toegelaat word om binne 12 maande na sodanige tweede oortreding eksamen te doen nie. Elke oortreding moet deur die eksaminator by die Sekretaris aangemeld word.

Kandidate kan van eie Metodes gebruik maak.

68. 'n Kandidaat kan die verskillende probleme uitwerk volgens enige metode waaraan hy gewoond is, mits die beginsel van sodanige metode reg is. Vir duidelike stellings, beredenering en berekening in die oplossing van die probleme sal gepaste erkenning verleen word.

Straf vir Oortreding van Regulasies.

69. Indien 'n kandidaat van hierdie regulasies oortree en daar nie by hierdie regulasies vir sodanige oortreding 'n ander straf voorgeskryf word nie, of indien 'n kandidaat onbeskof is teenoor 'n eksaminator of hom in of by die eksamenkamer onordelik of onbehoorlik gedra, kan die eksaminator hom behandel asof hy in die eksamen gedruip het, en indien hy aldus behandel word, kan hy 3 maande lank nie as kandidaat vir 'n hereksamen aanvaar word nie.

HOOFSTUK XII.

UITREIKING VAN SERTIFIKATE.

Magtiging vir Lewering van Bekwaamheidsertifikate.

70. 'n Kandidaat wat die eksamen deurkom, moet van die eksaminator 'n behoorlik ingevulde vorm T.V. 5/106, soos in Aanhangsel 1 uiteengesit, ontvang welke vorm sy geadresseerde magtig om die sertifikaat uit te reik. 'n Kandidaat wat gedeeltelik in die eksamen slaag of wat druip, moet van die eksaminator 'n behoorlik ingevulde vorm T.V. 5/111, soos in Aanhangsel 1 uiteengesit, ontvang en dié moet behou en aan die eksaminator getoon word wanneer hy hom weer vir eksamen aanmeld.

Vorm van Bekwaamheidsertifikaat en Dienssertifikaat.

71. Behoudens die bepalings van regulasie 73 moet elke bekwaamheidsertifikaat in een van die toepaslike vorms wees soos in Aanhangsel 6 uiteengesit, en moet elke dienssertifikaat in die vorm wees soos in Aanhangsel 7 uiteengesit.

Uitreiking van 'n Sertifikaat van Bekwaamheid as Tweede Ingenieursoffisier (Kusvaart), Hoofingenieursoffisier (Kusvaart), Tweede Ingenieursoffisier (Vreemde Vaart) of Hoof-ingenieursoffisier (Vreemde Vaart).

72. As 'n kandidaat vir 'n sertifikaat van bekwaamheid as Tweede Ingenieuroffisier (Kusvaart), Hoofingenieuroffisier (Kusvaart), Tweede Ingnieuroffisier (Vreemde Vaart) of Hoof-ingenieuroffisier (Vreemde Vaart) die ervaring opgedoen, die toepaslike werkwinkel- en seediens verrig en die toepaslike eksamen voorgeksryf by hierdie regulasies deurgekom het, moet die sertifikaat behoudens die bepalings van hierdie regulasies aan hom uitgereik word; met dien verstande dat indien dit ooreenkomstig hierdie regulasies vir die kandidaat nodig is om 'n bekwaamheidsertifikaat te hou ten einde die eksamen te kan aflê, hy laasgenoemde sertifikaat aan die eksaminator moet afgee.

Endossering van 'n Bekwaamheidsertifikaat.

73. (1) Indien 'n kandidaat die houer is van 'n bekwaamheidsertifikaat wat hom die reg gee om in 'n bepaalde graad of hoedanigheid op te tree op 'n skip wat met 'n sekere soort aandrywingsmasjinerie (stoom of

guilty of a second offence shall not be allowed to be examined until 12 months have elapsed after such second offence. Each offence shall be reported to the Secretary by the examiner.

Candidates may use Own Method.

68. A candidate may work out the various problems according to any method he has 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.

69. 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 3 months.

CHAPTER XII.

ISSUE OF CERTIFICATES.

Authority for Delivery of Certificates of Competency.

70. A candidate who passes the examination shall receive from the examiner a form T.V. 5/106 set forth in Annex 1, 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 T.V. 5/111, set forth in Annex 1, duly completed, which must be retained and produced to the examiner when he next presents himself for examination.

Form of Certificate of Competency and Certificate of Service.

71. Subject to the provisions of regulation 73, every certificate of competency shall be in one of the appropriate forms set forth in Annex 6 and every certificate of service shall be in the form set forth in Annex 7.

Issue of Certificate of Competency as Second Engineer-Officer (Coasting), Chief Engineer-Officer (Coasting), Second Engineer-Officer (Foreign-Going) or Chief Engineer-Officer (Foreign-Going).

72. If a candidate for a certificate of competency as Second Engineer-Officer (coasting), Chief Engineer-Officer (coasting), Second Engineer-Officer (foreign-going) or Chief Engineer-Officer (foreign-going), has gained the experience and performed the appropriate workshop and sea service and has passed the appropriate examination prescribed by these regulations, 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 in order that he may be qualified to sit for the examination, he shall surrender the last-mentioned certificate to the examiner.

Endorsement of a Certificate of Competency.

73. (1) If a candidate holds a certificate of competency which entitles him to act in a particular grade or capacity in a ship fitted with a certain kind of propelling machinery

motor) toegerus is, en indien sodanige kandidaat op grond van die verrigting van die voorgeskrewe seediens en slaging in die voorgeskrewe eksamen kwalifiseer vir 'n bekwaamheidsertifikaat wat hom die reg gee om in 'n bepaalde graad of hoedanigheid op te tree op 'n skip wat met 'n ander soort aandrywingsmasjinerie (motor of stoom) toegerus is, kan laasgenoemde sertifikaat waarvoor hy aldus gekwalifiseer het, die vorm aanneem van 'n endossement op die sertifikaat waarvan hy reeds die houer is, welke endossement die graad of hoedanigheid waarin sy verdere kwalifikasie hom die reg gee om op te tree, asook die soort aandrywingsmasjinerie van die skip moet meld.

(2) Indien 'n kandidaat die houer is van 'n bekwaamheidsertifikaat (stoom of motor) wat hom die reg gee om in 'n bepaalde graad of hoedanigheid op te tree en hy kwalifiseer vir 'n bekwaamheidsertifikaat (stoom of motor) wat hom die reg gee om in 'n hoër graad of hoedanigheid op te tree, kan op laasgenoemde sertifikaat waarvoor hy aldus gekwalifiseer het, 'n verdere sertifikaat geëndosseer word waarin verklaar word dat hy geregtig is om ook op 'n skip toegerus met stoom- of motoraandryfmasjinerie, na gelang van die geval, op te tree in die graad op hoedanigheid vermeld in eersgenoemde sertifikaat.

(3) Indien 'n kandidaat die houer is van 'n bekwaamheidsertifikaat wat hom die reg gee om in 'n bepaalde graad of hoedanigheid op 'n skip op vreemde vaart op te tree en hy kwalifiseer vir 'n bekwaamheidsertifikaat wat hom die reg gee om in 'n bepaalde graad of hoedanigheid op 'n kusvaarder op te tree, kan laasgenoemde sertifikaat waarvoor hy aldus gekwalifiseer het, die vorm aanneem van 'n endossement op die sertifikaat waarvan hy reeds die hour is en sodanige endossement moet die graad of hoedanigheid op die kusvaarder meld waarin sy verdere kwalifikasie hom die reg gee om op te tree.

(4) Aan iemand wat die houer is van 'n bekwaamheidsertifikaat wat hom die reg gee om in 'n bepaalde graad of hoedanigheid op 'n skip op vreemde vaart op te tree, kan 'n ander sertifikaat uitgereik word wat hom magtig om op 'n kusvaarder op te tree in die graad of hoedanigheid waarin hy kragtens die sertifikaat waarvan hy reeds die houer is, mag optree, en sodanige latere sertifikaat kan die vorm aanneem van 'n endossement op sodanige vroeëre sertifikaat.

Uitreiking van Sertifikaat van Bekwaamheid as Hoof-ingenieuroffisier—Spesiale Graad.

74. 'n Sertifikaat van bekwaamheid as Hoof-ingenieuroffisier—Spesiale Graad—moet uitgereik word aan 'n kandidaat wat kragtens die bepalings van die Wet daartoe geregtig is of behoudens die bepalings van hierdie regulasies die voorgeskrewe eksamen deurgekom het; met dien verstande dat 'n kandidaat wat die voorgeskrewe eksamen deurgekom het, sy sertifikaat van bekwaamheid waarvan in regulasie 40 (1) melding gemaak word, aan die eksaminator moet afgee.

Dienssertifikaat.

75. (1) 'n Applikant om 'n dienssertifikaat ooreenkomstig artikel 80 van die Wet moet die aansoekvorm T.V. 5/105, soos in Aanhangsel 1 uiteengesit, met vermelding van al die nodige besonderhede invul en dit saam met die bedrag van R4 aan die bevoegde beampte oorhandig of pos. Die bevoegde beampte moet die aansoek aan die Sekretaris deurstuur.

(2) Indien 'n aansoek om 'n dienssertifikaat nie slaag nie, moet die bedrag van R4 aan die applikant terugbetaal word.

(steam or motor), and by having performed the prescribed sea service and having passed the prescribed examination, qualifies for a certificate of competency entitling him to act in a particular grade or capacity in a ship fitted with another kind of propelling machinery (motor or steam), the latter certificate for which he has so qualified may be in the form of an endorsement on the certificate which he already holds stating the grade or capacity in which his further qualification entitles him to act as well as the kind of propelling machinery of the ship.

(2) If a candidate holds a cerificate of competency (steam or motor) which entitles him to act in a particular grade or capacity, and qualifies for a certificate of competency (steam or motor) which will entitle him to act in a higher grade or capacity, the latter certificate for which he has so qualified may be endorsed with a further certificate stating that he is also entitled to act in the grade or capacity specified in the former certificate in a ship fitted with steamdriven or motor propelling machinery, as the case may be.

(3) If a candidate holds a certificate of competency which entitles him to act in a particular grade or capacity in a foreign-going ship and qualifies for a certificate of competency entitling him to act in a particular grade or capacity in a coasting ship, the latter certificate for which he has so qualified may be in the form of an endorsement on the certificate which he already holds stating the grade or capacity in the coasting ship in which his further qualification entitles him to act.

(4) A person who holds a certificate of competency which entitles him to act in a particular grade or capacity in a foreign-going ship, may be issued with another certificate authorising him to act in the grade or capacity in a coasting ship in which he, on the strength of the certificate which he already holds, is authorised to act, and such latter certificate may be in the form of an endorsement on such former certificate.

Issue of Certificate of Competency as Chief Engineer-Officer—Special Grade.

74. A certificate of competency as Chief Engineer-Officer—Special Grade, shall be issued to a candidate who is entitled thereto in accordance with the provisions of the Act, or, subject to the provisions of these regulations, who has passed the prescribed examination: Provided that a candidate who has passed the prescribed examination, shall surrender his certificate of competency referred to in regulation 40 (1) to the examiner.

Certificate of Service.

75. (1) An applicant for a certificate of service in terms of section 80 of the Act shall complete the form of application T.V. 5/105 set forth in Annex 1, giving the necessary particulars, and shall hand or post it to the proper officer together with the fee of R4. The proper officer shall forward the application to the Secretary.

(2) If an applicant is unsuccessful in his application for a certificate of service, the fee of R4 shall be refunded to him.

AANHANGSEL 1.

LYS VAN VORMS WAT IN HIERDIE REGULASIES VERSKYN.

Regulasie 5.....	Aansoek om geëksamineer te word vir 'n sertifikaat van bekwaamheid as.....	T.V. 5/102.
Regulasie 10.....	Aansoek om gewaarmerkte afskrif van 'n bekwaamheid- of bevoegdheidsertifikaat of 'n diensertifikaat.....	T.V. 5/103.
Regulasie 70.....	(*a*) Magtiging vir lewering van 'n bekwaamheidsertfikaat of bevoegdheidsertifikaat.....	T.V. 5/106.
	(*b*) Eksamenuitslae.....	T.V. 5/111.
Regulasie 75.....	Aansoek om 'n diensertifikaat.....	T.V. 5/105.

T.V. 5/102.

(Republiekwapen.)

REPUBLIEK VAN SUID-AFRIKA. Volgno.....

DEPARTEMENT VAN VERVOER—MARINE-AFDELING.

[Handelskeepvaartwet, 1951 (Wet No. 57 van 1951), soos gewysig.]

AANSOEK OM GEËKSAMINEER TE WORD VIR 'N SERTIFIKAAT VAN BEKWAAMHEID AS.....

*(Vermeld hier graad van sertifikaat, ens., verlang.)

* Hierdie vorm is bedoel vir gebruik wanneer die verlangde sertifikaat tot een van die volgende grade behoort of waar 'n sertifikaat geëndosseer moet word:—

(1) Hoof-ingenieuroffisier—Spesiale graad;
(2) Hoof-ingenieuroffisier (Vreemde Vaart);
(3) Tweede Ingenieuroffisier (Vreemde Vaart);
(4) Hoof-ingenieuroffisier (Kusvaart);
(5) Tweede Ingenieuroffisier (Kusvaart);
(6) Seemasjinis; of
(7) Assistent-seemasjinis.

A.—Naam van applikant, ens. Hawe.....

Voorname voluit (blokletters).	Familienaam (blokletters).	Permanente adres, met vermelding van stad, straat, huisnommer en naam van persoon (indien enige) by wie woonagtig.

Geboortedatum.			Geboorteplek.	Nasionaliteit. (Indien 'n burger ingevolge registrasie of naturalisasie, moet daardie feit hier vermeld en die nommer van die sertifikaat verstrek word.)
Dag.	Maand.	Jaar.	Stad en land.	

B.—Besonderhede van alle vorige sertifikate, ongeag of hulle in die Republiek van Suid-Afrika of elders uitgereik is. Indien geen sertfikate nie, moet aldus oor hierdie afdeling geskryf word.

No.	Stoom, motor, stoom en motor saam, endossement, Assistent-seemasjinis (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, stoom en motor saam, endossement, alleen Deel A, alleen Deel B, Seemasjinis of Assistent-seemasjinis.	Klas.	Hawe waar en datum waarop applikant geëksamineer wil word.	Kantoor waarheen sertifikaat gestuur moet word (nie vir Deel A alleen nie).

ANNEX 1.

LIST OF FORMS APPEARING IN THESE REGULATIONS.

Regulation 5.....	Application to be examined for a certificate of competency as.....	T.5. 5/102.
Regulation 10.....	Application for certified copy of a certificate of competency or qualification or a certificate of service	T.V. 5/103.
Regulation 70.....	(*a*) Authority for delivery of a certificate of competency or qualification.....	T.V. 5/106.
	(*b*) Results of examination.....	T.V. 5/111.
Regulation 75.....	Application for a certificate of service.....	T.V. 5/105.

(Coat of Arms.) T.V. 5/102.

REPUBLIC OF SOUTH AFRICA. Rotation No._____

DEPARTMENT OF TRANSPORT—MARINE DIVISION.
[Merchant Shipping Act, 1951 (Act No. 57 of 1951), as amended.]

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:—

(1) Chief Engineer-Officer—Special Grade;
(2) Chief Engineer-Officer (Foreign-going);
(3) Second Engineer-Officer (Foreign-going);
(4) Chief Engineer-Officer (Coasting);
(5) Second Engineer-Officer (Coasting);
(6) Marine-Engineman; or
(7) 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. (If a citizen by registration or naturalization, this should be stated here and the number of the certificate given.)
Day.	Month.	Year.	Town and country.	

B.—Particulars of all previous certificates whether issued in the Republic 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.)

D.—Besonderhede van alle vorige uitslae van eksamens vir die sertifikaat wat nou verlang word, of 'n verklaring dat geen vorige eksamen aangedurf is nie. As die vorige eksamen afgelê is vir 'n sertifikaat van bekwaamheid as Seemasjinis of Assistent-seemasjinis, moet die kandidaat in die kolomme onder die opskrif „ Vakke waarin geëksamineer en uitslag " die uitslae van die eksamen (bv. „ Gedruip ") aandui en meld of 'n boete opgelê is. In die geval van 'n kandidaat vir 'n sertifikaat van bekwaamheid as Hoof-ingenieur-Offisier—Spesiale Graad—moet, waar nodig, 'n afsonderlike vel ingevoeg word wat die vakke waarin hy geëksamineer is, en die uitslae aantoon.

Waar op vrystelling aanspraak gemaak word, moet die aard van die vrystellingskwalifikasie vermeld word.....

Dag.	Maand.	Jaar.	Hawe.	Vakke waarin geëksamineer en uitslae.						
				Toegepaste-Meganika of Algemene Ingenieurswetenskap.	Hitte en Hittewerktuie.	Wiskunde.	Tekene.	Elektrotegnologie en Skeepsboukunde.	Ingenieurswese en Mondeling.	Tydboete (indien opgelê).

E.—Opgawe van diens op land en ter see, en lys van getuigskrifte.

[*N.B.*—Kandidate vir sertifikate van Seemasjinis of Assistentseemasjinis hoef nie onderafdelings (1) en (2) van hierdie Afdeling in te vul nie.]

(1) Skeepswerktuigkunde en Meganiese Ingenieurswese.

Naam en adres van firma en werkwinkel.	Aard van die saak waarvoor die werkwinkel bestaan.	Aard van werk deur applikant verrig (sien „Werkwinkeldiens " in regulasies).	Datums.		Tydperk.		
			Van.	Tot.	Jare.	Maande.	Dae.
		Netto bekwamende diens.....					

(2) Werkwinkels aanvullend van skeepswerktuigkunde of meganiese ingenieurswese.

Naam en adres van firma en werkwinkel.	Aard van saak waarvoor die werkwinkel bestaan.	Aard van werk deur applikant verrig (sien „Werkwinkel diens " in regulasies).	Datums.		Tydperk.		
			Van.	Tot.	Jare.	Maande.	Dae.
		Netto bekwamende diens.....					

(3) Tegniese onderwys.

Naam van skool.	Kursusse gevolg.	Tydperke van bywoning.	Sertifikate verwerf.

D.—Particulars of all previous results of examinations for the certificate now required or statement that no previous examination has been attempted. Where the previous examination was for a certificate of competency as marine engineman or assistant marine engineman, the candidate should indicate in the columns below the heading "Subjects in which examined and results" the results of the examination (e.g. "Failed") and whether any penalty was imposed. In the case of a candidate for a certificate of competency as chief engineer-officer—special grade, a separate sheet must, where necessary, be inserted indicating the subjects in which he was examined and the results.

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

Day.	Month.	Year.	Port.	Subjects in which examined and results.						
				Applied Mechanics or general engineering science.	Heat and heat engines.	Mathematics.	Drawing.	Electro-technology and naval architecture.	Engineering knowledge and orals.	Time penalty (if any).

E. Statement of service on shore and at sea, and list of testimonials.

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

(1) Marine or Mechanical Engineering.

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.....					

(2) Works supplementary to marine or mechanical engineering.

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.....					

(3) Technical education.

Name of school.	Courses attended.	Periods of attendance.	Certificates obtained.

(4) Seediens.
Besonderhede van seediens moet waar moontlik uit die seemansverslagboek en ontslagsertifikate verkry word.

Naam van skip en of dit 'n stoomskip (ss.) is of 'n motorvaartuig (mv.)	Amptelike No.	Perdekrag.	Handel: Vreemde vaart, kusvaart of vissery.	Rang en getal offisiere op waghoudiens.	Aard van diens (sien voetnoot*).

Datums.		Tydperk.		
Van.	Tot.	Jare.	Maande.	Dae.
Netto bekwamende diens.....				

* Meld of diens verrig is—
(i) by wyse van monteurswerk, hetsy bedags of op wag op dek of in masjien- of ketelruim;
(ii) op gereelde waghoudiens by hulpmasjiene of koelmasjien;
(iii) op gereelde waghoudiens by hoofmasjiene;
(iv) op gereelde waghoudiens by hoofketels;
(v) op gereelde waghoudiens by beide hoofmasjiene en ketels gelyktydig.

Die gebruik van die toepaslike Romeinse syfers sal voldoende wees.
Verwysing na korrespondensie (as daar is).....

F.—Sertifikaat van bevoegde beampte.
Die verklaring G is in my teenwoordigheid geteken en die bedrag van..... (Kwitansie No.....)
is ontvang op hede die.....dag van.....19.....

Handtekening en ampstitel van bevoegde beampte.

Datumstempel.

G.—Verklaring deur kandidaat.
(Moet in die teenwoordigheid van die bevoegde beampte of eksaminator geteken word.)

N.B.—Die aandag van die kandidaat word gevestig op die feit dat 'n wanvoorstelling kragtens artikel 315 van Wet 57/1951 strafbaar is.
Ek verklaar hierby dat die besonderhede in Afdelings A, B, C, D en E van hierdie vorm na my beste wete en oortuiging korrek en juis is en dat die dokumente wat in Afdeling E genoem word en hierdie vorm vergesel, ware en egte dokumente is wat uitgereik en geteken is deur die persone wie se name op hulle voorkom. Ek verklaar voorts dat die opgawe van diens in Afdeling E sonder uitsondering 'n juiste weergawe van al my diens bevat.
En ek doen hierdie verklaring in die opregte geloof dat dit juis is.

Gedateer te.....hierdie.....dag van.....19.....

Huidige adres.....

Handtekening van kandidaat.

Handtekening van getuie.

H.—Sertifikaat van eksaminator.
(Skrap na gelang nodig.)

Vreemde vaart.				Kusvaart.		Vissery.
Deel A. (Meld of vrygestel, voorheen geslaag, geslaag of gedruip).		Deel B. (Meld of geslaag, gedruip of nie aangeslaan nie).		(Meld of voorheen geslaag, geslaag of gedruip).		(Meld of geslaag of gedruip).
Afdeling.	Uitslag (soos hierbo).	Afdeling.	Uitslag (soos hierbo).	Afdeling.	Uitslag (soos hierbo).	Uitslag (soos hierbo).
(*a*) (*b*) (*c*) (*d*)		(*a*) (*b*)		(*a*) (*b*) (*c*)		

Datum van Eksamen.	Plek van Eksamen.	Tydboete (as daar is).

(4) Sea service.

Particulars of sea service should, when possible, be taken from the Seamen's Record Book and Certificates of Discharge.

Name of ship and whether steam (s.s.) or motor (m.v.).	Official No.	Horse-power.	Trade: Foreign-going, coasting or fishing.	Rank and number of officers on watch.	Nature of service (see footnote*).

Dates.		Period.		
From.	To.	Years.	Months.	Days.
Net qualifying service.....				

*State whether service performed—

(i) on fitters' work, either by day or on watches on deck or in engine or boiler room;
(ii) on regular watch on auxiliaries or refrigerator;
(iii) on regular watch on main engines;
(iv) on regular watch on main boilers;
(v) on regular watch on both main engines and boilers simultaneously.

The use of the appropriate Roman numerals will be sufficient.

Reference to corresppndence (if any).....

F. Certificate of proper officer.

The Declaration G was signed in my presence and the fee of.....(Receipt No.....)

received this.....day of.....19.....

Date Stamp.

Signature and designation of proper office.

G. Declaration by candidate.

(To be signed in the presence of the proper officer or examiner.)

N.B.—The attention of the candidate is drawn to the fact that any false representation is punishable under section 315 of Act 57/1951.

I hereby declare that the particulars contained in Divisions A, B, C, D and E of this form are correct and true to the best of my knowledge and belief; and that the papers enumerated in Division E and accompanying this form are true and genuine documents given and signed by the persons whose names appear on them. I further declare that the statement of service set out in Divison E contains a true and correct account of the whole of my service without exception.

And I make this declaration conscientiously, believing the same to be true.

Dated at..... this.....day of.....19.....

Present address.....

Signature of candidate.

Signature of witness.

H.—Certificate of examiner.

(Delete as necessary).

Foreign-going.				Coasting.		Fishing.
Part A. (Exempt, previously passed, passed or failed.)		Part B. (Passed, failed or not assessed.)		(Previously passed, passed or failed.)		(Passed or failed.)
Section.	Result (as above).	Section.	Result (as above).	Section.	Result (as above).	Result (as above).
(a) *(b)* *(c)* *(d)*		*(a)* *(b)*		*(a)* *(b)* *(c)*		

Date of examination.	Place of examination.	Time penalty (if any).

BESONDERHEDE VAN SERTIFIKAAT WAT UITGEREIK MOET WORD:

I.—Persoonsbeskrywing van kandidaat.

Lengte.		Kleur van		Ras.	Persoonlike merke of eienaardighede (as daar is).
Voet.	Duim.	Oë.	Hare.		

Hierby sertifiseer ek dat die besonderhede in Afdelings H en I juis is en dat werkwinkel- en seediens deur raadpleging van ontslagsertifikate en getuigskrifte gekontroleer is.

Datum.....

Eksaminator.

T.V. 5/103.

(Republiekwapen.)

REPUBLIEK VAN SUID-AFRIKA.

DEPARTEMENT VAN VERVOER—MARINE-AFDELING.

HANDELSKEEPVAARTWET, 1951 (WET NO. 57 VAN 1951), SOOS GEWYSIG.

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

No. van verlore sertifikaat.	Graad van verlore sertifikaat.

Hawe.....

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

Naam. (1)	Adres. (2)	Geboortedatum. (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 op laaste skip. (7)	Beskrywing van laaste seereis.			
			Van. (8)	Tot. (9)	Begin. (10)	Eindig. (11)

Besonderhede aangaande vaartuie waarop applikant diens gedoen het voor- en nadat die tans verlore sertifikaat aan hom uitgereik is.

Naam van skip. (12)	Registrasiehawe en amptelike No. (13)	Rang of gradering op skip. (14)	Indien vreemde vaart, in kushandel of in vissersbedryf. (15)	Diens.	
				Begin. (16)	Eindig. (17)

AFDELING C.—BESTEMMING VAN SERTIFIKAAT.

(Moet deur applikant ingevul word.)

Ek versoek dat die gewaarmerkte afskrif van my sertifikaat aan my gelewer word te.....

Handtekening van applikant.

PARTICULARS OF CERTIFICATE TO BE ISSUED:

I. Personal description of candidate.

Height.		Colour of		Race.	Personal marks or peculiarities (if any).
Feet.	Inches.	Eyes.	Hair.		

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

Date.....

.....
Examiner.

T.V. 5/103.

(Coat of Arms.)

REPUBLIC OF SOUTH AFRICA.

DEPARTMENT OF TRANSPORT—MARINE DIVISION.

MERCHANT SHIPPING ACT, 1951 (ACT No. 57 OF 1951), AS AMENDED.

APPLICATION FOR A 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)

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-going 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 be delivered to me at.....

.....

.....
Signature of applicant.

AFDELING D.—VERKLARING WAT DEUR DIE APPLIKANT VOOR DIE BEVOEGDE BEAMPTE AFGELÊ MOET WORD.

Ek,..... van.....

Verklaar hierby—

(1) dat my sertifikaat 'n sertifikaat was van*..... as..... en genommer was.....

(2) dat genoemde sertifikaat onder die volgende omstandighede verloor of vernietig is:—

†.....

.....

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

.....
Handtekening van applikant.

Verklaar voor my te.....

en die hernuwingsgeld van..... (kwitansie No.....) ontvang hierdie..... dag van..... 19.....

.....
Handtekening en ampstitel van bevoegde beampte.

Die Sekretaris van Vervoer,
Pretoria.

* Voeg in die woord " Bekwaamheid ", " Bevoegdheid ", of " Diens " en die graad.
† Meld hier die plek, datum en oorsaak van die verlies van die sertifikaat.

T.V. 5/106.

MAGTIGING VIR LEWERING VAN 'N BEKWAAMHEIDSERTIFIKAAT OF BEVOEGDHEIDSERTIFIKAAT.

Naam van applikant.....

Volgnommer.....

Graad waarin geslaag.....

Magtiging aan bogemelde kandidaat verleen om sy *bekwaamheidsertifikaat/bevoegdheidsertifikaat te ontvang van die bevoegde beampte by die hawe.

.....

Datum.....

Eksaminator.....

* Skrap die woord wat nie van toepassing is nie.

(Republiekwapen.) T.V. 5/106.

REPUBLIEK VAN SUID-AFRIKA.

DEPARTEMENT VAN VERVOER—MARINE-AFDELING.

HANDELSKEEPVAARTWET, 1951 (WET NO. 57 VAN 1951), SOOS GEWYSIG.

MAGTIGING VIR LEWERING VAN 'N BEKWAAMHEIDSERTIFIKAAT OF BEVOEGDHEIDSERTIFIKAAT.

(*L.W.*—Hierdie magtiging is onderworpe aan die goedkeuring van die Sekretaris van Vervoer, Pretoria.)

Naam van applikant..... Graad waarin geslaag.....

Lengte:..... Voet..... Duim. Kleur van: Oë..... Hare.....

Ras:.....

.....
Handtekening van applikant.

Lewer asb. aan bogemelde persoon die *bekwaamheidsertifikaat/bevoegdheidsertifikaat nadat hy die besonderhede wat daarin vereis word, ingevul het, asook getuigskrifte of ander dokumente wat namens hom deur die Sekretaris van Vervoer, Pretoria, aan u gestuur is.

Hawe..... Datum.....19.....

.....
Handtekening van eksaminator.

Aan.....

* Skrap die woord wat nie van toepassing is nie.

T.V 5/111.

UITSLAE VAN EKSAMEN VAN INGENIEUROFFISIERE.

Hawe.....

Naam van kandidaat.....

Eksamen.....

Datum van eksamen.....

Verwysing na korrespondensie (as daar is).....

Seediens.....

Uitslae:

Wiskunde*

Toegepaste* Meganika of Algemene Ingenieurswetenskap

Hitte en Hittewerktuie*

Tekene*

Elektrotegnologie en Skeepsboukunde*

Ingenieurswese en Mondeling*

Tydperk wat voor hereksamen moet verstryk

Voorletters van eksaminator

(Republiekwapen.) T.V. 5/111.

REPUBLIEK VAN SUID-AFRIKA. Volgno.....

DEPARTEMENT VAN VERVOER—MARINE-AFDELING.
[Handelskeepvaartwet, 1951 (Wet No. 57 van 1951), soos gewysig.]

UITSLAG VAN EKSAMEN VIR INGENIEUROFFISIERE.

L.W.—Hierdie vorm moet die kandidaat by 'n latere eksamen saam met sy dokumente inlewer.

Naam van kandidaat.....

Graad van sertifikaat.....

Verwysing na korrespondensie (as daar is).....

Datum.	Hawe.	†Bekwamende seediens ten tyde van eksamen.			Stoom, motor, stoom en motor saam, endossement (stoom of motor).	Wiskunde.*
		J	M	D		

Kantoorstempel.

† Bekwamende seediens wat die applikant te goed het (na enige aanwending om vir te min bekwamende werkwinkeldiens te vergoed).

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.

The Secretary for Transport,
Pretoria.

* Insert the word competency, qualification or service and grade.
† Here state the place, date and cause of the loss of the certificate.

T.V. 5/106.

AUTHORITY FOR DELIVERY OF A CERTIFICATE OF COMPETENCY OR QUALIFICATION.

Name of applicant_____
Rotation number_____
Grade for which passed_____

Authority given to the above candidate to obtain his certificate of *competency/qualification from the proper officer at the port of

_____

Date_____

Examiner _____

_____

* Delete the word which does not apply.

(Coat of Arms.)
REPUBLIC OF SOUTH AFRICA.

T.V. 5/106.

DEPARTMENT OF TRANSPORT—MARINE DIVISION.

MERCHANT SHIPPING ACT, 1951 (ACT No. 57 OF 1951), AS AMENDED.
AUTHORITY FOR DELIVERY OF A CERTIFICATE OF COMPETENCY OR QUALIFICATION.

(*N.B.*—This authority is subject to the approval of the Secretary for Transport, Pretoria.)

Name of applicant_____Grade for which passed_____
Height: _____feet_____inches. Colour of: Eyes_____Hair_____
Race_____

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 Secretary for Transport, Pretoria.

Port_____ Date_____19____
To_____

Signature of examiner.

* Delete the word which does not apply.

T.V. 5/111.

RESULTS OF EXAMINATION OF ENGINEER-OFFICERS.

Port_____
Name of candidate_____
Examination_____
Date of examination_____
Reference to correspondence (if any)

_____

Sea service_____
Results:

Mathematics*

Applied* Mechanics or General Engineering Science.

H. and H.E.*

Drawing*

E. and N.A.*

E.K. and Orals*

Interval to elapse before re-examination

Initials of examiner

T.V. 5/111.

(Coat of Arms.)
REPUBLIC OF SOUTH AFRICA.

Rotation No._____

DEPARTMENT OF TRANSPORT—MARINE DIVISION.
[Merchant Shipping Act, 1951 (Act No. 57 of 1951), as amended].

RESULTS OF EXAMINATION OF ENGINEER-OFFICERS.

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

Name of candidate_____Grade of certificate_____
Reference to correspondence (if any)_____

Date.	Port.	Qualifying† Sea Service at time of examination.			Steam, motor, combined S. and M., endorsement (S. or M.).	Mathematics. *
		Y.	M.	D.		

Office Stamp.

† Qualifying sea service standing to applicant's credit (after any appropriation to compensate for a deficiency in qualifying workshop service).

*Toegepaste Meganika of Algemene Ingenieurswetenskap.	*Hitte en Hittewerktuie.	*Tekene.	*Elektrotegnologie en Skeepsboukunde.	*Ingenieurswese en Mondeling.	Tydperk wat voor hereksamen moet verstryk.	Voorletters van eksaminator.

Handtekening van Kandidaat..... Handtekening van Eksaminator.....

* Vul in „Vrygestel", „Geslaag", „Gedruip" of „Nie aangeslaan nie".

N.B.—In die geval van 'n kandidaat wat vir 'n sertifikaat as Hoof-ingenieuroffisier—Spesiale Graad—geëksamineer word, moet die eksaminator desnoods agter op hierdie vorm 'n vel papier plak waarop die nodige besonderhede verstrek word.

(Republiekwapen.) T.V. 5/105.

REPUBLIEK VAN SUID-AFRIKA.

DEPARTEMENT VAN VERVOER—MARINE-AFDELING.

HANDELSKEEPVAARTWET, 1951 (WET NO. 57 VAN 1951), SOOS GEWYSIG.

AANSOEK OM 'N DIENSSERTIFIKAAT.

(Artikel 80 van Wet 57/1951, soos gewysig).

A. BESONDERHEDE VAN APPLIKANT.

Familienaam (met blokletters).	Voorname (met blokletters).	Geboortedatum.	Geboorteplek.	Nasionaliteit.	Adres.

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

B. BESONDERHEDE VAN SEEDIENS.

Besonderhede van vaartuig.

Naam van vaartuig.	Stoom, motor, ander.	Bruto tonnemaat.	Perdekrag van masjiene.	Registrasiehawe en amptelike No.; of registrasie No. van vaartuig.	Soort handel waarin gebesig (meld of visserbedryf, kushandel, ander).

Besonderhede van applikant se seediens.

Hoedanigheid.	Van.	Tot.	Dienstermyn.			Opmerkings.
			Jaar.	Maande.	Dae.	
Totale seediens.....						
Dienstyd waarvoor bewys nou voorgelê is.....						
Dienstyd waarvoor geen bewys voorgelê is nie.....						

C. VERKLARING WAT DEUR APPLIKANT AFGELÊ MOET WORD.

Ek, die ondergetekende,.....verklaar hierby—

(1) dat die besonderhede in afdelings A en B van hierdie vorm na my beste wete en oortuiging waar en juis 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.....hierdie.....dag van.....19.....

Handtekening en ampstitel van bevoegbeampte of kommissaris van ede.

Die bedrag van..... (kwitansie No.....) ontvang hierdie .....dag van.....19.....

Handtekening en ampstitel van bevoegde beampte.

* Skrap wat nie van toepassing is nie.

*Applied Mechanics or General Engineering Science.	* Heat and Heat Engines.	*Drawing.	*Electro-technology and Naval Architecture.	*Engineering Knowledge and Orals.	Interval to elapse before re-examination.	Examiner's initials.

Signature of candidate.....

Signature of examiner.....

* Insert " Exempt ", " Passed ", " Failed ", or " Not assessed ".

Note.—In the case of a candidate examined for a certificate as Chief Engineer-Officer—Special Grade, the examiner must, if necessary, paste a sheet to the back of this form giving the necessary details.

T.V. 5/105.

(Coat of arms.)

REPUBLIC OF SOUTH AFRICA.

DEPARTMENT OF TRANSPORT—MARINE DIVISION.

MERCHANT SHIPPING ACT, 1951 (ACT No. 57 OF 1951), AS AMENDED.

APPLICATION FOR A CERTIFICATE OF SERVICE.

(Section 80 of Act 57/1951, as amended).

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.

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).

Particulars of applicant's sea service.

Capacity.	From.	To.	Length of service.			Remarks.
			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.

The fee of.....(receipt No.....) recieved this.....day of.....19.....

.....

Signature and designation of proper officer.

* Delete whatever is inapplicable.

D. SERTIFIKAAT VAN EKSAMINATOR.

Datum en plek van gesigstoetse vir kleur en vorm.		Uitslag.		Persoonsbeskrywing van kandidaat.					
				Lengte.		Kleur van—		Ras.	Persoonlike merke of eienaardighede (indien enige).
Datum.	Plek.	Letter-toets.	Lantern-toets.	Voet.	Duim.	Oë.	Hare.		

Hierby sertifiseer ek dat die besonderhede in afdeling D na my beste wete en oortuiging juis is, en 'n dienssertifikaat as..... behoort na my mening uitgereik te word.

Gedateer te.....hierdie.....dag van.....19.....

Datumstempel.

Handtekeninging van eksaminator.

AAN DIE SEKRETARIS VAN VERVOER,
PRETORIA.

E. SLEGS VIR AMPTELIKE GEBRUIK.

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

D.—CERTIFICATE OF EXAMINER.

Date and place of colour and form vision tests.		Result.		Personal description of candidate.					
				Height.		Colour of—		Race.	Personal marks or peculiarities (if any).
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.

TO THE SECRETARY FOR TRANSPORT,
PRETORIA.

E.—FOR OFFICIAL USE ONLY.

Grade and No. of certificate issued.	Date and place of issue.	Previous certificates surrendered.

AANHANGSEL 2.

(1) VOORBEELD VAN VORM VIR GETUIGSKRIF OOR WERKWINKELDIENS.

Naam en adres van ingenieurswerkwinkel.....

Ek sertifiseer dat die volgende 'n volledige en juiste opgawe is van die werkwinkeldiens wat deur..... onder my toesig by bovermelde werkwinkel verrig is.

Dienstydperk: Datums.		Totale. tydperk.	Aard van pligte (kyk hieronder vir gepaste beskrywing).	Besonderhede van tydperke wat vakleerling weekliks vrygehad het om aan tegniese studie te bestee.
Van.	Tot.			

Verslag oor bekwaamheid.....
Verslag oor gedrag.....
Opmerkings (as daar is).....
Handtekening van werkgewer of sy verteenwoordiger.....

Beskrywing van Pligte.

I. Monteer- en/of oprigtingswerk in die vervaardiging en/of onderhoud van groot masjiene (bv. masjiene met 'n hoofas van dikker as 6 duim).
II. Ander monteerwerk as in verband met groot masjinerie.
III. Metaaldraaiwerk (goeie swaar werk).
IV. Masjienwerk (uitgesonderd draaibankwerk).
V. Werk in tekenkantoor as tekenaar of ingenieur.
VI. Ander werk, waarvan die aard gespesifiseer moet word.
Behalwe in die geval van VI is dit voldoende om die toepaslike syfer te gebruik.

(2) VOORBEELD VAN VORM VIR GETUIGSKRIF OOR SEEDIENS.

Naam en adres van skeepseienaar of maatskappy.....
Ek sertifiseer dat die volgende 'n volledige en juiste opgawe is van die seediens wat deur mnr.....onder my toesig verrig is aan boord van die *.....

Tydperk van diens: Datums.		Rang van Offisier en werklike senioriteit op waghoudiens.	Tipe van hoofmasjiene en ketels: Een of twee skroewe.	Aard van pligte (kyk hieronder vir toepaslike beskrywing).
Van.	Tot.			

Verslag oor bekwaamheid.....
Verslag oor gedrag.....
Verslag oor matigheid.....
Handtekening van Hoofingenieur.....
Opmerkings (as daar is).....

Handtekening van { Ingenieursuperintendent..... of Gesagvoerder of ander verteenwoordiger van eienaars.....

Beskrywing van Pligte.

I. Monteerwerk hetsy bedags of op gereëlde waghoudiens:—
(*a*) Binne hoofmasjien- en -ketelruime.
(*b*) Buite hoofmasjien- en -ketelruime.

II. (*a*) Koel- of ander masjiene wat nie vir die aandrywing van die vaartuig noodsaaklik is nie.
(*b*) Hulpmasjiene geskei van hoofaandrywingseenhede maar saam met sulke eenhede gebruik.

III. Gereëlde waghoudiens by die hoofmasjiene as:—
(*a*) Eerste Masjienruimassistent onder die senior beampte met volle bevel.
(*b*) Tweede Masjienruimassistent.
(*c*) Junior Masjienruimassistent.

* Vermeld naam van skip, amptelike nommer en of dit 'n stoomskip of 'n motorvaartuig is.

ANNEX 2.

(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 the case of 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 owner.....

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.

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

IV. Gereëlde waghoudiens by hoofketels:—

(*a*) In bevel van alle stookruime.
(*b*) In bevel van net 'n afdeling of van 1 stookruim.
(*c*) As Ketelruimassistent.

V. Gereëlde waghoudiens gelyktydig by hoofmasjiene en ketels:—

(*a*) In volle bevel van die hele wag.
(*b*) As Eerste Assistent van die senior beampte in volle bevel.
(*c*) As Junior Assistent.

N.B.—Daar word aanbeveel dat hierdie vorm gebruik word wanneer die ingenieur oor wie verslag gedoen word, of die Hoofingenieur die skip verlaat.

AANHANGSEL 3.

LEERPLANNE VIR DIE EKSAMENS VAN TWEEDE INGENIEUROFFISIER (KUSVAART) EN HOOF-INGENIEUROFFISIER (KUSVAART).

Opmerkings.

(1) Die probleme mag kennis van die cgs- en mks-stelsel vereis maar sal sodanige wees dat hulle met 'n kennis van elementêre Algebra, Meetkunde en Vlakdriehoeksmeting opgelos kan word.

(2) Kennis van die gebruik van logaritmes sal vereis word.

(3) Waar die oplossing van 'n probleem meer gevorderde Wiskunde of konstantes vereis, sal formules verstrek word.

(4) Grafiese oplossings sal aanvaar word waar nie uitdruklik om die analitiese oplossing gevra word nie.

(5) As hulle wil, kan kandidate in hul berekenings van rekenliniale gebruik maak, maar in elke geval moet 'n volledige uiteensetting gegee word van die stappe wat tot die antwoord lei.

TWEEDE INGENIEUROFFISIER (KUSVAART)—ALGEMENE INGENIEURSWETENSKAP.

(Een vraestel van 3 uur. Net 6 vrae moet beantwoord word.)

Algemeen.—Oppervlaktes, volumes en gewigte. Soortlike gewig.

Statika.—Krag, kragtedriehoek. Kragmoment. Kragtepare. Swaartepunte.

Wrywing.—Wrywingskoëffisiënt. Energie en krag wat as gevolg van wrywing in enkelvoudige laers verlore gaan.

Kinematika.—Lineêre en hoekbeweging. Vergelykings vir verplasing, snelheid en eenparige versnelling.

Dinamika.—Arbeid, krag en perdekrag. Potensiële en kinetiese energie.

Masjiene.—Eenvoudige hysmasjiene. Snelheidsverhouding, meganiese voordeel en rendement van die volgende masjiene:—

Skroefdomkrag, hidrouliese domkrag, toukatrolblokke en wurmgedrewe kettingkatrolle.

Spanning en vervorming.—Trek-, druk- en skuifspanning. Vervorming. Werkspanning en veiligheidsfaktor.

Balke.—Vrydraers en enkelvoudig gesteunde balke met gekonsentreerde belastings.

Hidrostatika.—Soortlike gewig. Beginsel van flottasie.

Elektrisiteit.—Uitwerking van elektriese stroom. Eenhede: ampére, ohm en volt. Selle en batterye: onderhoud en laai. Meetinstrumente.

HOOF-INGENIEUROFFISIER (KUSVAART)—ALGEMENE INGENIEURSWETENSKAP.

(Een vraestel van 3 uur. Net 6 vrae moet beantwoord word.)

Statika.—Swaartekrageenhede. Kragtedriehoek en -veelhoek. Resultate en ekwilibrant van 'n reeks saamlopende en saamvlakkige kragte. Kragmoment. Kragtepare. Hellende vlak.

Wrywing.—Wrywingskoëffisiënt. Arbeid verrig teen wrywing. Wrywingskoppelaars. Wrywing op hellende vlak en op drade.

Kinematika.—Lineêre en hoekbeweging met konstante versnelling. Betreklike snelhede in net 1 vlak. Vergelykings vir verplasing, snelheid en eenparige versnelling.

Dinamika.—Energiebewaring. Newton se bewegingswette. Momentum. Middelpuntvliedende krag en die toepassing daarvan op onbelaste reëlaars.

Masjiene.—Skroef- en hibrouliese domkragte. Differensiaalkatrolle. Hysmasjiene. Reduksieratwerk.

Spanning en vervorming.—Wet van Hooke. Elastisiteitsmodulus. Trektoetse.

Balke.—Vrydraers en enkelvoudig gesteunde balke met gekonsentreerde of egalig verspreide belastings. Skuifkrag- en buigmomentdiagrame. Spanning as gevolg van buiging waar die fundamentele buigvergelyking en tweede moment van die oppervlakte van die deursnee verstrek word.

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.

ANNEX 3.

SYLLABUSES FOR THE EXAMINATIONS OF SECOND ENGINEER-OFFICER (COASTING) AND CHIEF ENGINEER-OFFICER (COASTING).

Notes.

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

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

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

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

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

SECOND ENGINEER-OFFICER (COASTING)—GENERAL ENGINEERING SCIENCE.

(One paper of 3 hours. 6 questions only to be attempted.)

General.—Areas, volumes and weights. Specific gravity.

Statistics.—Force, Triangle of forces. Moment of a force. Couples. Centres of gravity.

Friction.—Coefficient of friction. Energy and power lost due to friction in simple bearings.

Kinematics.—Linear and angular motion. Equations for displacement, velocity and uniform acceleration.

Dynamics.—Work, power and horse-power. Potential and kinetic energy.

Machines.—Simple lifting machines. Velocity ratio, mechanical advantage and efficiency of the following machines:—

Screw jack, hydraulic jack, rope pulley blocks and worm-driven chain blocks.

Stress and Strain.—Tensile, compressive and shear stress. Strain. Working stress and factor of safety.

Beams.—Cantilevers and simply supported beams with concentrated loads.

Hydrostatics.—Specific gravity. Principle of flotation.

Electricity.—Effects of electrical current. Units—ampere, ohm and volt. Cells and batteries—maintenance and charging. Measuring instruments.

CHIEF ENGINEER-OFFICER (COASTING)—GENERAL ENGINEERING SCIENCE.

(One paper of 3 hours. 6 questions only to be attempted.)

Statics.—Gravitational units. Triangle and polygon of forces. Resultant and equilibrant of a series of concurrent and co-planar forces. Moment of a force. Couples. Inclined plane.

Friction.—Coefficient of friction. Work done against friction. Friction clutches. Friction on inclined plane and on threads.

Kinematics.—Linear and angular motion with constant acceleration. Relative velocities in one plane only. Equations for displacement, velocity and uniform acceleration.

Dynamics.—Conservation of energy. Newton's laws of motion. Momentum. Centrifugal force and its application to unloaded governors.

Machines.—Screw and hydraulic jacks. Differential pulley blocks. Lifting machines. Reduction gearing.

Stress and Strain.—Hooke's Law. Modulus of elasticity. Tensile tests.

Beams.—Cantilevers and simply supported beams with concentrated or uniformly distributed loads. Shearing force and bending moment diagrams. Stress due to bending, given the mental tortion equation and the polar second moment of area. of the section.

Wringing.—Wringmoment as gevolg van krukmeganisme van masjien. Sterkte en styfheid van soliede ronde asse waar die fundamentele wringvergelyking en die polêre tweede moment van oppervlakte verstrek word. Kragoorbrenging deur asse.

Dun huide.—Spannings in dun silindervormige huide wat aan inwendige druk onderworpe is.

Lasse.—Sterkte van enkel-, dubbel- en driedubbelgeklinkte oorslag- en stootlasse.

Hidrostatika.—Die ewewig van drywende liggame. Wisseling van vloeistofdruk na gelang van diepte. Totale krag as gevolg van vloeistofdruk op ingedompelde plat vlakke, vertikaal of horisontaal. Drukpunt op 'n reghoekige plat vlak met 1 rand parallel met die oppervlak van die vloeistof.

Hidroulika.—Volpypstroming van vloeistof deur pype onder konstante drukhoogte. Stroming deur opening. Snelheids-, krimpings- en uitlatingskoëffisiënt. Verhouding tussen snelheid van vaartuig en brandstofverbruik met konstante verplasing indien die variasie tussen weerstand en snelheid verstrek word.

Elektrisiteit.—Voortbrenging van EMK deur middel van chemiese stowwe en magnete. Wet van Ohm. Serie- en parallelkringe van bronne van EMK en van weerstande. Stroomverdeling van eenvoudige kringe. Geleierweerstand, uitwerking van lengte, oppervlakte, materiaal en temperatuur. Beginsels en funksie van skakelbordaanwysinstrumente. Gebruik van aardlampe. Gebruik van sekerings en stroombrekers.

TWEEDE INGENIEUROFFISIER (KUSVAART)—HITTE EN HITTEWERKTUIE.

(Een vraestel van 3 uur. Net 6 vrae moet beantwoord word.)

Grondbeginsels.—Lineêre en volumetriese uitsetting as gevolg van temperatuurverandering. Koëffisiënte en verband tussen hulle. Herleiding van Celsius tot Fahrenheit en omgekeerd.

Hitte en hitteoordrag.—Hitte-eenhede. Soortlike warmte. Meganiese ekwivalent van hitte. Hitte-ekwivalent van perdekrag. Warmte-oordrag deur geleiding, konveksie en straling.

Mengsels.—Hitte- en temperatuurprobleme waarby hoogstens 3 stowwe betrokke is.

Gasse.—Wette van Boyle en Charles betreffende ideale gasse. Absolute temperatuur.

Binnebrandenjins en lugkompressors.—Grondbeginsels en motorslag. Berekening van verrigte arbeid volgens verstrekte formules.

Eienskappe van stoom.—Toestandsverandering. Waarneembare warmte. Latente warmte. Nat, droë en oorverhitte stoom en die hoeveelhede hitte daarby betrokke. Gebruik van verkorte stoomtafels. Rendement van ketels.

Suierstoom-masjien.—Wyserdiagramme. Gemiddelde effektiewe druk en verrigte arbeid (in die veronderstelling dat PV=C). Aangegewe perdekrag en remperdekrag. Voordele van die aanwending van die uitsettingswerking van stoom en van hoë- en laedrukwerking. Eenvoudige skuif- en suierkleppe. Berekening van voorloophoek, lap, voorloop en poort.

Verbranding.—Vaste en vloeibare brandstowwe.

Verkoeling.—Dampverdigtingsiklus.

Ketels en verdamptoestelle.—Verandering van digdheid as gevolg van besoedelde voedingswater.

HOOF-INGENIEUROFFISIER (KUSVAART)—HITTE EN HITTEWERKTUIE.

(Een vraestel van 3 uur. Net 6 vrae moet beantwoord word.)

Grondbeginsels.—Formules vir werk gedoen wat met die formule $PV^n=C$ in verband staan. Eerste wet van termolinamika.

Eienskappe van stoom.—Waarneembare, latente en totale warmte. Gebruik van stoomtafels. Inwendige energie.

Mengsels.—Hitte- en temperatuurprobleme waarby 2 of meer stowwe betrokke is.

Gasse.—Wet van Boyle, Wet van Charles. Karakteristieke vergelyking. Verhoudings tussen P, V en T wanneer $PV^n=C$. Probleme met betrekking tot lugkompressors, binnebrandmasjiene, lugpompe en lugopberging.

Uitsetting van stoom.—Hipotetiese PV-diagramme. Arbeid verrig g.e.d., diagramfaktor, insluitende die uitwerking van vryruimte. Gemiddelde ontwerpdruk.

Stoomsiklus.—Uitwerking van modifikasies soos oorverhitting, uitlaatturbine en ontwikkelingstoevoerverhitting op termiese rendement. Ekwivalente verdamping. Rendemente.

Digtheid en ketelsteen.—Basiese berekenings oor die uitwerking van lekkasie in die kondensator en onsuiwere voedingswater op die digtheid en ketelsteen in ketels.

Stoomturbine.—Grondbeginsels en berekenings.

Verbranding.—Berekening van lug toereties vereis.

Verkoeling.—Werkverrigtingskoëffisiënt.

Torsion.—Twisting moment due to engine crank mechanism. Strength and stiffness of solid circular shafts given the fundamental tortion equation and the polar second moment of area. Power transmitted by shafts.

Thin Shells.—Stresses in thin cylindrical shells subject to internal pressure.

Joints.—Strength of single, double and treble riveted lap and butt joints.

Hydrostatics.—Equilibrium of floating bodies. Variation of fluid pressure with depth. Total force due to liquid pressure on immersed plane surfaces, vertical or horizontal. Centre of pressure on a rectangular plane surface with one edge parallel to the surface of the liquid.

Hydraulics.—Full bore flow of liquid through pipes under constant head. Flow through orifice. Coefficient of velocity, contraction and discharge. Relation between speed of vessel and fuel consumption with constant displacement given the variation between resistance and speed.

Electricity.—Production of e.m.f. by chemical and magnetic means. Ohm's law. Series and parallel circuits of sources of e.m.f. and of resistances. Current distribution of simple circuits. Conductor resistance, effect of length, area, material and temperature. Principles and function of switchboard indicating instruments. Use of earth lamps. Use of fuses and circuit breakers.

SECOND ENGINEER-OFFICER (COASTING)—HEAT AND HEAT ENGINES.

(One paper of 3 hours. 6 questions only to be attempted.)

Elements.—Linear and volumetric expansion due to temperature changes. Coefficients and relationship between them. Conversion from Centigrade to Fahrenheit and vice versa.

Heat and Heat Transfer.—Heat units. Specific Heat. Mechanical equivalent of heat. Heat equivalent of horse power. Heat transfer by conduction, convection and radiation.

Mixtures.—Heat and temperature problems involving not more than three substances.

Gases.—Boyle's and Charles' laws for perfect gases. Absolute temperature.

I.C. Engines and Air Compressors.—Elementary principles and cycles of operation. Calculation of work done from given formulae.

Properties of Steam.—Change of state. Sensible Heat. Latent Heat. Wet, dry and superheated steam and the quantities of heat involved. Use of abridged steam tables. Boiler efficiency.

Reciprocating Steam Engine.—Indicator diagrams. Mean effective pressure and work done (assuming PV=C). Indicated and brake horse power. Advantages of using Steam expansively and of compounding. Simple slide and piston valves. Calculation of angle of advance, lap, lead and port opening.

Combustion.—Solid and liquid fuels.

Refrigeration.—Vapour-compression cycle.

Boilers and Evaporators.—Change of density due to contaminated feed water.

CHIEF ENGINEER-OFFICER (COASTING)—HEAT AND HEAT ENGINES.

(One paper of 3 hours. 6 questions only to be attempted.)

Elements.—Formulae for work done associated with the formula $PV^n=C$. First law of thermodynamics.

Properties of Steam.—Sensible, latent and total heat. Use of steam tables. Internal energy.

Mixtures.—Heat and temperature problems involving two or more substances.

Gases.—Boyle's law. Charles' law. Characteristic equation. Relations between P, V and T when $PV^n=C$. Problems involving air compressors, internal combustion engines, air pumps and air storage.

Expansion of Steam.—Hypothetical PV diagrams. Work done, m.e.p., diagram factor, including effect of clearance. Mean referred pressure.

Steam Cycle.—Effect on thermal efficiency of such modifications as superheating, exhaust turbine and generative feed heating. Equivalent evaporation Efficiencies.

Density and Scale.—Basic calculations on the effect of condenser leakage and impure feed water on the density and scale in boilers.

Steam Turbine.—Elementary principles and calculations.

Combustion.—Calculation of theoretical air required.

Refrigeration.—Coefficient of performance.

TWEEDE INGENIEUROFFISIER (KUSVAART) EN HOOF-INGENIEUROFFISIER (KUSVAART).

INGENIEURSWESE.

Kandidate vir 'n gekombineerde stoom- en motorsertifikaat moet bereid wees om in al die items (*a*) tot (*w*) geëksamineer te word, maar kandidate sal vir 'n stoomsertifikaat of die stoomendossement op 'n motorsertifikaat nie in items (*q*) tot (*w*) en vir 'n motorsertifikaat of die motorendossement op 'n stoomsertifikaat nie in items (*j*) tot (*p*) geëksamineer word nie. Kandidate vir die Sertifikaat van Hoof-ingenieuroffisier (Kusvaart) of 'n endossement op die Sertifikaat van Hoof-ingenieuroffisier (Kusvaart), van wie verwag word om 'n ruimer kennis van die verskillede items in die leerplan aan die dag te lê as kandidate vir die Sertifikaat van Tweede Ingenieuroffisier (Kusvaart) of 'n endossement op 'n Sertifikaat van Tweede Ingenieuroffisier (Kusvaart), moet bereid wees om in items (*x*) tot (*y*) geëksamineer te word.

Opmerkings.

1. Die kennis van Ingenieurswese wat deur kandidate aan die dag gelê moet word, is dié wat vereis word vir die gebruik, bediening en onderhoud van die masjinerie, toerusting en skeepsdele waarvoor die Ingenieuroffisier gewoonlik verantwoordelik is. Ook word kennis vereis van die metodes om die verskillende onderdele te vervaardig.

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

3. Die skriftelike eksamen vir 'n stoom- of motorsertifikaat bestaan uit 2 vraestelle van 3 uur elk. In elke vraestel moet net 6 uit die 9 vrae beantwoord word.

4. Die skriftelike eksamen vir 'n gekombineerde stoom- en motorsertifikaat bestaan uit 3 vraestelle van 3 uur elk. In elke vraestel moet net 6 uit die 9 vrae beantwoord word.

5. Die skriftelike eksamen vir 'n stoom- of motorendossement bestaan uit 1 vraestel van 3 uur en hierin moet net 6 uit die 9 vrae beantwoord word.

6. Waar daar in die eksamen vir 'n Sertifikaat van Hoof-ingenieuroffisier (Kusvaart) of 'n endossement op 'n Sertifikaat van Hoof-ingenieuroffisier (Kusvaart) vrae oor hoofelektriese aandryfmasjinerie gevra word, word die 9 vrae vermeerder met die getal vrae oor hoof-elektriese aandryfmasjinerie.

7. Kandidate kan versoek word om hul antwoorde met sketse toe te lig.

(*a*) Die verskillende behandelings se algemene uitwerking op die fisiese eienskappe van materiale wat algemeen by die bou van skeepsmasjiene en -ketels 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 masjinerie op 'n skip gebruik word.

(*c*) Die gebruik, konstruksiebesonderhede en beginsels betrokke by die werking van die drukmeter, voltmeter, ammeter, termometer, pirometer, barometer, salinometer, hidrometer en ander meters wat algemeen deur ingenieurs op 'n skip gebruik word.

(*d*) Die oorsake, uitwerking en gewone middels teen ketelsteenvorming en korrosie. Voedingswater en blaasdigthede en ketelsteenvorming.

(*e*) (1) Konstruksiebesonderhede en werkbeginsels van skeepsmasjiene; metodes om hul r.p.k. te bepaal. Die beginsel waarvolgens dinamometers en wringingsmeters werk en metodes vir hul yking.

(2) Die metodes om met slytasie in masjinerie en ketels te handel. Die rig van masjiendele. Die verhelping van defekte as gevolg van gebreke in die materiaal of 'n ongeluk. Tydelike of permanente herstelwerk in die geval van ontwrigting of algehele onklaarheid.

(*f*) Konstruksiebesonderhede en werkingsbeginsels van sentrifugale, klepsuier- en perspompe. Die algemene vereistes met betrekking tot toevoer-, brandstof-, lens- en ballaspompstelsels.

(*g*) Die boukundige inrigting, besonderhede en werking van stuurmasjiene en stuurgerei, koelmasjiene, hidrouliese masjiene en sodanige stoom- en binnebrandmasjiene as wat as nood- en hulpmasjiene aan boord gebruik word.

(*h*) Aanwending van die indikateur. Berekening van gemiddelde druk en perdekrag. Wisseling van druk in silinder soos deur indikateurdiagramme aangetoon.

(*i*) (1) Voorsorgsmaatreëls teen brand of ontploffings as gevolg van olie of gas. Flitspunt. Ontplofbaarheid van gas of damp afgegee deur brandstof of smeerolies wanneer dit met 'n hoeveelheid lug gemeng is. Die gevaar van lekkasie uit olietenks, pype, gasontwikkelaars en verdampers, vernaamlik in kimme en ander ongeventileerde ruimtes. Die werking van draadgaasdiafragmas en die plekke waar sulke inrigtings aangebring behoort te word.

(2) Selfontbranding van steenkool. Ontplofbaarheid van gas afgegee deur steenkool. Ventilasie en stuwing van steenkool.

SECOND ENGINEER-OFFICER (COASTING) AND CHIEF ENGINEER-OFFICER (COASTING).

ENGINEERING KNOWLEDGE.

Candidates for a combined Steam and Motor Certificate must be prepared to be examined in all the items (*a*) to (*w*) but those for a Steam Certificate or the Steam Endorsement of a Motor Certificate will not be examined in items (*q*) to (*w*) and those for a Motor Certificate or the Motor Endorsement of a Steam Certificate will not be examined in items (*j*) to (*p*). In addition candidates for a Chief Engineer-Officer's (coasting) Certificate or an endorsement of a Chief Engineer-Officer's (coasting) 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 (coasting) Certificate or an endorsement of a Second Engineer-Officer's (coasting) Certificate, must be prepared to be examined in items (*x*) to (*y*).

Notes.

1. The Engineering Knowledge to be shown by candidates is that which is required for the use, operation and maintenance of the machinery, equipment and ship structure usually in the charge of the Engineer-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 2 papers of 3 hours each—6 questions only to be attempted out of 9 in each paper.

4. The written examination for a combined Steam and Motor Certificate consists of 3 papers of 3 hours each—6 questions only to be attempted out of 9 in each paper.

5. The written examination for a Steam or Motor Endorsement consists of 1 paper of 3 hours—6 questions only to be attempted out of 9 in the paper.

6. Where questions relating to main electric propelling plant are asked in the examination for a Chief Engineer-Officer's (coasting) Certificate or an endorsement of a Chief Engineer-Officer's (coasting) Certificate, the 9 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 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 break down.

(*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*) Application of the indicator. Calculation of mean pressure and horsepower. Fluctuation of pressure in the cylinder as shown by indicator diagrams.

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

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

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

(*j*) Die metodes om skeepstoommasjiene en stoomketels te bou, die prosesse waaraan die verskillende dele onderwerp word of wat met hul vervaardiging gepaard gaan, en die metodes wat by die montering van die masjinerie op 'n skip aangewend word.

(*k*) Die verskillende tipes aandryf- en hulpstoommasjiene tans in gebruik, die funksies van elke belangrike deel en die aandag wat deur die verskillende dele van die masjinerie op 'n skip vereis word.

(*l*) Die metodes om stoominlaat- en -uitlaatkleppe te toets en te verstel en die wyse waarop die werking van die masjien deur besliste verstelling van die kleppe beïnvloed word.

(*m*) Die konstruksiebesonderhede en werking van verdampers, voedingswaterverwarmers en voedingswaterfilters.

(*n*) Skeepsketels van verskillende moderne ontwerpe; die manier om hulle te stut, asook die voorkoming van verskuiwing van ketels wanneer vaartuie hei of rol. Bepaling, deur berekening, van geskikte werkdrukke vir ketels met verstrekte afmetings.

(*o*) Die gebruik en hantering van keteltoebehore en -monterings, veral watermeters en veiligheidskleppe. Nodige voorsorgsmaatreëls wanneer stoom opgewek en met afsluitkleppe gewerk word, veral met betrekking tot die gevaar wat deur waterslag veroorsaak word.

(*p*) Konstruksiebesonderhede, werking en onderhoud van installasies wat algemeen gebruik word om lugtrek, oorverhitting van stoom en die verbranding van steenkool of oliebrandstof aan te help.

(*q*) Die beginsels ten grondslag van binnebrandmasjiene. Die verskil tussen verskillende tipes masjiene. Konstruksiebesonderhede van binnebrandmasjiene wat algemeen in gebruik is.

(*r*) Die aard en eienskappe van die brand- en smeerolies wat gewoonlik in binnebrandmasjiene gebruik word. Die toevoer van lug en brandstof na silinders van masjiene van verskillende tipes. Die konstruksiebesonderhede van apparaat vir die vergassing of verstuiwing van brandstof. Die metodes om silinders en suiers te verkoel. Konstruksiebesonderhede en werking van lugkompressors.

(*s*) Die metodes vir die bou van skeepsbinnebrandmasjiene. Die prosesse waaraan die verskillende dele onderwerp word of wat met hul vervaardiging gepaard gaan, en die metodes wat by die montering van die masjinerie op 'n skip aangewend word.

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

(*u*) Die aandag wat vir die werking en onderhoud van die verskillende dele van masjinerie nodig is. Die gebruik en hantering van kleppe, pype, verbindings en veiligheidstoestelle wat gebruik word.

(*v*) Opnoeming en beskrywing van defekte wat uit werking van masjinerie ontstaan. Die verhelping van sulke defekte.

(*w*) Konstruksiebesonderhede en hantering van hulpstoomketels, hul toebehore en monterings, veral waterpeilglase en veiligheidskleppe. Konstruksiebesonderhede en hantering van hulpmasjinerie.

KANDIDAAT VIR SERTIFIKAAT VAN HOOF-INGENIEUROFFISIER (KUSVAART) EN ENDOSSEMENT OP SODANIGE SERTIFIKAAT.

(*x*) Die administratiewe pligte van 'n Hoof-ingenieuroffisier (Kusvaart): Organisering van sy personeel vir noodpligte en gebruik van veiligheidsuitrusting; organisering van herstelwerk en ondersoeke. Verslae aan eienaars. Die onderhoud en werkende toestand van masjinerie en toestelle wat onder die sorg van 'n Senior Ingenieuroffisier geplaas word. Die nodige aandag om onklaarheid en defekte te voorkom. Die gewone herstelwerk en vernuwings wat nodig is; toesig oor en inspeksie van masjinerie en ketels op 'n skip. Gereedmaking van ketels en masjinerie vir ondersoek.

(*y*) Die bespeuring van onreëlmatigheid in die loop van masjiene aan die hand van indikateurdiagramme. Die verhelping van hierdie onreëlmatighede. Toeligting, deur middel van sketse, van die verandering in die diagram as gevolg van verstelling of 'n verandering in die werking van die kleppe of ander faktore.

MONDELINGE EKSAMEN.

Die mondelinge eksamen sal grotendeels op die Praktiese Kennisvakke van die eksamen gebaseer word en sal vrae insluit oor die hantering van masjiene en ketels ter see, die pligte van 'n toesighoudende ingenieur, die werk wat in 'n hawe aan masjiene, ketels en hulpmasjiene gedoen moet word, en die periodieke ondersoek van die werkende dele.

Kandidate moet ook goed vertroud wees met foute wat ter see in masjiene en ketels kan voorkom, en moet in staat wees om te verduidelik hoe sulke foute voorkom en verhelp kan word.

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

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

(*k*) The various types of propelling and auxiliary 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.

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

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

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

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

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

(*q*) 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.

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

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

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

(*u*) 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.

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

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

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

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

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

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 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.

AANHANGSEL 4.

LEERPLANNE VIR DIE EKSAMENS VAN TWEEDE INGENIEUROFFISIER (VREEMDE VAART) EN HOOF-INGENIEUROFFISIER (VREEMDE VAART).

Opmerkings.

(1) Die probleme mag kennis van die cgs.- en mks. -stelsels vereis maar sal sodanig wees dat hulle met 'n kennis van elementêre Algebra, Meetkunde en Vlakdriehoeksmeting opgelos kan word.

(2) Kennis van die gebruik van logaritmes sal vereis word.

(3) Waar die oplossing van 'n probleem meer gevorderde Wiskunde of konstantes vereis, sal formules verstrek word.

(4) Grafiese oplossings sal aanvaar word waar nie uitdruklik om die analitiese oplossing gevra word nie.

(5) As hulle wil, kan kandidate in hul berekenings van rekenliniale gebruik maak, maar in elke geval moet 'n volledige uiteensetting gegee word van die stappe wat tot die antwoord lei.

TWEEDE INGENIEUROFFISIER (VREEMDE VAART)—WISKUNDE.

(Een vraestel van 3 uur. Net 6 uit die 9 vrae moet beantwoord word.)

Rekenkunde.—Herleiding van fisiese hoeveelhede waarby lengte, oppervlakte, volume of krag betrokke is, van een eenhedestelsel tot 'n ander. Verhouding en eweredigheid. Persentasies.

Algebra.—Eksponente, met inbegrip van gebroke en negatiewe tipes. Gebruik van gewone logaritmes vir vermenigvuldiging, deling, magte en wortels. Gebruik van Neperse logaritmes. Vereenvoudiging van algebraïese uitdrukkings. Optel, aftrek, vermenigvuldiging en deling van algebraïese funksies. Herrangskikking van formules. Ontbinding in faktore. Algebraïese breuke. Kwadrate en derdemagte van veelterme soos $(a \pm b)^2$ en $(a \pm b)^3$. Eenvoudige vergelykings. Kwadratiese vergelykings en oplossing deur ontbinding in faktore of deur voltooiing van die kwadraat. Bewys van algemene formule vir oplossing. Gelyktydige vergelykings, hetsy 2 lineêre vergelykings of 1 lineêre en 1 kwadratiese vergelyking. Variasie, direk en omgekeerd.

Grafiekwerk.—Eenvoudige grafieke van statistieke. Die grafiek $y=ax+b$ aan die hand van óf berekende waardes óf eksperimentele resultate. Berekening van konstates volgens grafiek. Grafiese oplossing van eenvoudige gelyktydige vergelykings waarby 2 onbekendes betrokke is. Grafiek van $y=ax^2+bx+c$ en grafiese oplossing van vergelyking $ax^2+bx+c=0$.

Driehoeksmeting.—Graad- en radiaalmaat van hoeke. Komplementêre en supplementêre hoeke. Sinus, kosinus en tangens van hoeke tot 360 grade. Oplossing van reghoekige driehoeke. Bewys van die sinus- en kosinusreëls. Oplossing van driehoeke met behulp van hierdie reëls. Oplossing van eenvoudige trigonometriese vergelykings. Ontwikkeling van *sin* $(A \pm B)$ en *cos* $(A \pm B)$.

Meetkunde.—Eienskappe van driehoeke. Som van die hoeke. Verhouding tussen buite- en binnehoeke. Gelykbenige en gelyksydige driehoeke. Gelykvormige en kongruente driehoeke. Die sirkel. Eienskappe van koorde en raaklyne. Hoeke in dieselfde segment. Middelpunthoeke en omtrekhoeke.

Oppervlakte- en volumeberekening.—Oppervlaktes van driehoek, veelhoek, parallelogram, trapesium, sirkel, sektor en segment van 'n sirkel en elips. Oppervlaktes van skewe deursneë van reëlmatige liggame met gelykmatige dwarsdeursnee. Oppervlakte en gemiddelde hoogte volgens middelordinaatreël en volgens die eerste reël van Simpson. Oppervlakteverhouding van gelykvormige figure. Volumes en oppervlaktes van prismas, piramides, afgeknotte keëls, bolle, silinders en keëls. Volumeverhouding van gelykvormige liggame. Omwentelingsliggame.

TWEEDE INGENIEUR OFFISIER (VREEMDE VAART)—TOEGEPASTE MEGANIKA.

(Een vraestel van 3 uur. Net 6 uit die 9 vrae moet beantwoord word.)

Algemeen.—Toepassings van oppervlaktes en volumes op probleme soos die gewig van masjienonderdele. Soortlike gewig. Eerste reël van Simpson soos toegepas op oppervlaktes en volumes.

Statika.—Krag. Swaartekrageenhede. Krag as 'n vektor. Kragtedriehoek en koppelveelhoek. Resulterende en ewewigskrag van 'n stelsel van saamlopende saamvlakkige kragte. Ewewig van 3 saamvlakkige kragte. Moment van 'n krag. Kragtepare. Momente van oppervlaktes en volumes. Sentroïede en swaartepunte (beperk tot meetkundige vorms). Ewewigstoetstande van vaste liggame. Hellende vlak. Nodige krag wat parallel met die vlak toegepas word om 'n liggaam teen die vlak op of af te trek of stasionêr te hou (insluitende die uitwerking van wrywing). Arbeid verrig met uniforme snelheid met die vlak op.

ANNEX 4.

SYLLABUSES FOR THE EXAMINATIONS OF SECOND ENGINEER-OFFICER (FOREIGN-GOING) AND CHIEF ENGINEER-OFFICER (FOREIGN-GOING).

Notes.

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

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

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

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

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

SECOND ENGINEER-OFFICER (FOREIGN-GOING)—MATHEMATICS.

(One paper of 3 hours—6 questions only out of 9 to be attempted.)

Arithmetic.—Conversion of physical quantities involving length, area, volume or force from one system of units to another. Ratio and proportion. Percentages.

Algebra.—Indices, including fractional and negative types. Use of common logarithms for multiplication, division, powers and roots. Use of Naperian logarithms. Simplification of algebraic expressons. Addition, subtraction, multiplication and division of algebraic functions. Re-arrangement of formulae. Factorisation. Algebraic fractions Squares and cubes of polynomials such as $(a \pm b)^2$ and $(a \pm b)^3$. Simple equations. Quadratic equations and solution by factorisation or by completing the square. Proof of general formula for solution. Simultaneous equations, either 2 linear equations or 1 linear and 1 quadric. Variation, direct and inverse.

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

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

Geometry.—Properties of triangles. Sum of the angles. Relation between exterior and interior angles. Isosceles and equilateral triangles. Similar and congruent triangles. The circle. Properties of chords and tangents. Angles in the same segment. Angles at centre and circumference.

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

SECOND ENGINEER-OFFICER (FOREIGN-GOING)—APPLIED MECHANICS.

(One paper of 3 hours—6 questions only out of 9 to be attempted.)

General.—Applications of areas and volumes to problems such as the weight of engine components. Specific gravity. Simpson's first rule as applied to areas and volumes.

Statics.—Force. Gravitational units. Force as a vector. Triangle and polygon of forces. Resultant and equilibrant of a system of concurrent co-planar forces. Equilibrium of 3 co-planar forces. Moment of a force. Couples. Moments of areas and volumes. Centroids and centres of gravity (limited to geometrical shapes). Conditions of equilibrium of solids. Inclined plane. Necessary force applied parallel to the plane to pull body up or down the plane or to hold it stationary (including effect of friction). Work done at uniform speed up the plane.

Wrywing.—Wrywingswette vir droë oppervlaktes. Wrywingskoëffisiënt. Wrywingshoek. Energie en krag wat verlore gaan as gevolg van wrywing in enkelvoudige laers.

Kinematika.—Lineêre beweging. Grafieke en vergelykings vir verplasing, spoed, snelheid en gelykmatige snelling. Eenvoudige gevalle van vektorsnelheidsverandering en die versnelling opgelewer. Betreklike snelhede in net 1 vlak. Hoekbeweging. Vergelykings vir verplasing, snelheid en eenparige versnelling.

Dinamika.—Arbeid en krag. Perdekrag. Probleme met konstante krag of krag met lineêre variasie. Energie. Energiebewaring. Potensiaalenergie. Kinetiese verplasingsenergie. Newton se wette van beweging. Momentum en tempo van momentum verandering. Sentrifugale krag en sy toepassing op koniese pendule, onbelaste reëlaar, gekromde bane en masjienonderdele. Spanning in dun velling as gevolg van sentrifugale werking.

Masjiene.—Eenvoudige hysmasjien. Grafieke van hyskrag en hysrendement. Lineêre wet. Snelheidsverhouding, hefvoordeel en rendement van die volgende masjiene: Wiel en as, differensiaalrat en -as, toukatrolblokke, differensiaalkatrolle, skroefdomkrag, Warwick-skroef, hidrouliese domkrag, wurmgedrewe kettingkatrolle en enkel- en dubeltakelwindasse. Reduksieratwerk.

Spanning en vervorming.—Direkte spanning en vervorming. Skuifspanning. Wet van Hooke. Elastisiteitsmodulus. Breektreksterkte. Vloeispanning. Verhoudingsgrens. Persentasie verlenging en vermindering van oppervlakte. Werkspannnig. Veiligheidsfaktor. Spanning as gevolg van beperkte uitsetting of sametrekking van enkelvoudige onderdele.

Balke.—Vrydraers en enkelvoudig gesteunde balke met gekonsentreerde of gelykmatige verspreide laste. Skuifkrag- en buigmomentdiagramme. Spanning as gevolg van buiging waar die fundamentele buigingsvergelyking en die tweede moment van oppervlakte van die deursnee verstrek word.

Wringing.—Wringmoment as gevolg van krukmeganisme van masjien. Sterkte en styfheid van soliede of hol dryfasse met ronde deursnee waar die fundamentele wringvergelyking en die polêre tweede moment van oppervlakte verstrek word. Krag oorgebring deur dryfasse. Koppelboute.

Dun huide.—Omtrek- en langsspanning in dun silinder- en bolvormige huide wat aan inwendige druk onderworpe is.

Lasse.—Sterkte van die volgende lasse: enkel-, dubbel- en driedubbelgeklinkte lap- en stuitlasse en gesweiste stootlasse.

Hidrostatika.—Die beginsel van Archimedes. Ewewig van drywende voorwerpe. Soortlike gewig. Gelykgewighidrometer. Wisseling van vloeistofdruk volgens diepte. Totale krag as gevolg van vloeistofdruk op ingedompelde plat vlakke, hetsy horisontaal of vertikaal. Drukpunt op reghoekige vertikale plat vlak of driehoekige plat vlak albei met 1 rand parallel met die oppervlakte van die vloeistof.

Hidroulika.—Volpypstroming van vloeistof deur pype onder konstante drukhoogte. Stroming deur opening. Snelheids-, vernouings- en uitlaatkoëffisiënt.

HOOF-INGENIEUR-OFFISIER (VREEMDE VAART)—TOEGEPASTE MEGANIKA.

(Een vraestel van 3 uur. Net 6 uit die 9 vrae moet beantwoord word.)

Statika.—Ewewigswette. Momente en kragtepare. Kragteveelhoek. Rapson-skuif.

Wrywing.—Wet van droë wrywing. Wrywingshoek. Wrywingskoppelaars. Wrywing op hellende vlak. Wrywing op drade. Arbeid verrig teen wrywing.

Kinematika.—Lineêre en hoekbeweging met gelykmatige versnelling. Swaartekragversnelling. Snelheid-tydgrafieke.

Betreklike snelheid en versnelling.—Uitwerking van 'n stroming op die snelheid en koers van 'n skip. Betreklike snelheid van voorwerpe wat in verskillende vlakke beweeg.

Dinamika.—Newton se wet van beweging. Die kragvergelyking. Die Atwood-masjien. Versnelling van verbinde liggame. Uitwerking van eenvoudige lugweerstand op beweging onder die invloed van swaartekrag. Die draaimomentvergelyking. Behoud van momentum. Kinetiese verplasings- en rotasie-energie. Vliegwiele. Potensiaalenergie. Behoud van energie. Impulsiewe kragte. Middelpuntvliedende krag. Porter-reëlaar met hulswrywing. Eenvoudige harmoniese beweging. Eenvoudige slinger. Eenvoudige trillings. Dinamiese balansering van massas wat in een vlak draai. Basiese dinamika van die masjienmeganisme. Gebruik van suiersnelheid- en -versnellingsformules. Afleiding van suierverplasingsformule.

Masjiene.—Snelheidsverhouding. Hefvoordeel. Rendement.

Spanning en vervorming.—Regstreekse spanning en vervorming en elastisiteitsmodulus. Skuifspanning en -vervorming en skuifmodulus. Spannings op skuins vlakke. Sterkte van enkelvoudige verbindings soos spy- of skroefverbindings. Veerkragtigheid as gevolg van regstreekse spanning. Skielike belasting.

Friction.—Laws of friction for dry surfaces. Coefficient of friction. Friction angle. Energy and power lost due to friction in simple bearings.

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

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

Machines—Simple lifting machine. Graphs of load-effort and load-efficiency. Linear law. Velocity ratio, mechanical advantage and efficiency of the following machines: wheel and axle, differential wheel and axle, rope pulley blocks, differential pulley blocks, screw jack, Warwick screw, hydraulic jack, wormdriven chain blocks and single and double purchase crab winches. Reduction gearing.

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

Beams.—Cantilevers and simply supported beams with concentrated or uniformly distributed loads. Shearing force and bending moment diagrams. Stress due to bending, given the fundamental bending equation and the second moment of area of the section.

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

Thin Shells.—Circumferential and longitudinal stress in thin cylindrical and spherical shells subject to internal pressure.

Joints.—Strength of the following joints: Single, double and treble riveted lap and butt joints and butt welded joints.

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

Hydraulics.—Full bore flow of liquid through pipes under constant head. Flow through orifice. Coefficients of velocity, contraction of area and discharge.

CHIEF ENGINEER-OFFICER (FOREIGN-GOING)—APPLIED MECHANICS.

(One paper of 3 hours, 6 questions only out of 9 to be attempted.)

Statics.—Laws of equilibrium. Moments and couples. Polygon of forces. Rapson's slide.

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

Kinematics.—Linear and angular motion with constant acceleration. Gravitational acceleration. Velocity-time graphs.

Relative Velocity and Acceleration.—Effect of a current on the velocity and course of a ship. Relative velocity between bodies moving in different planes.

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

Machines.—Velocity ratio. Mechanical advantage. Efficiency.

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

Saamgestelde stawe.—Uitwerking van regstreekse belasting en van temperatuurveranderings.

Balke.—SK- en BM-diagramme vir vrydraers en enkelvoudig gesteunde balke. Spannings in balke met enkelvoudige deursneë. Gebruik van eenvoudige defleksieformules.

Wringing.—Wringvergelykings vir soliede en hol ronde dryfasse. Wringing van dryfas toegerus met voering. Perdekrag oorgebring. Diggewikkelde spiraalveer.

Stutte.—Eksentriese belasting van kort kolomme. Gebruik van stutformules.

Dun huide.—Spannings in dun huide. Ontwerp van klinknate. Gebruik van formules vir ketelrompontwerp.

Hidrostatika.—Drywing in 2 vloeistowwe met verskillende soortlike gewigte. Totale krag en drukpunt op ingedompelde vlakke soos tenks en skotte.

Hidroulika.—Bernouilli se vergelyking toegepas op eenvoudige stromingsprobleme. Die Venturimeter. Vloei deur openings onder gelykmatige druk. Krag deur 'n straal uitgeoefen op 'n plat vlak haaks op die straal. Plathoekdiagramme vir 'n sentrifugale pomp.

TWEEDE INGENIEUROFFISIER (VREEMDE VAART)—HITTE EN HITTEWERKTUIE.

(Een vraestel van 3 uur. Net 6 uit die 9 vrae moet beantwoord word.)

Grondbeginsels.—Temperatuur en termometriese skale. Herleiding van Celsius tot Fahrenheit en omgekeerd. Lineêre en volumetriese uitsetting as gevolg van temperatuurverandering. Koëffisiënte en die verband tussen hulle.

Hitte en hitteoordrag.—Hitte-eenhede: Btu (BThU), Cwe, gramkalorie. Soortlike warmte. Meganiese warmte-ekwivalent. Warmte-ekwivalent van perdekrag. Hitte-oordrag deur geleiding, konveksie en straling. Wette van geleiding en straling en eenvoudige toepassing met verstrekte formules.

Mengsels.—Hitte- en temperatuurprobleme waarby hoogstens 3 stowwe betrokke is. Waterekwivalent.

Gasse.—Wette van Boyle en Charles betreffende ideale gasse. Absolute temperatuur. Karakteristieke vergelyking. Konstante R en die gebruik daarvan in eenvoudige probleme. Isotermiese en adiabatiese uitsetting en kompressie. Verband tussen P, V en T wanneer PV^n=konstante. Soortlike warmtes C_p en C_v en hul verband met mekaar.

Binnebrandmasjiene en lugkompressors.—Grondbeginsels en motorslag. Berekening van verrigte arbeid volgens verstrekte formules. Nokdiagramme vir binnebrandmasjiene, hoeke van nokspitsmiddellyne in verhouding tot kruk.

Eienskappe van stoom.—Toestandsverandering. Waarneembare warmte. Latente warmte. Nat, droog versadigde en oorverhitte stoom en die hoeveelhede hitte daarby betrokke. Gebruik van verkorte stoomtafels. Soortlike volume van stoom onder verskillende toestande. Smoring. Skei- en smoorkalorimeters. Rendement van ketels. Ekwivalente verdamping. Gebruik van stoomtafels in eenvoudige probleme met betrekking tot kondensators. Uitwerking van luglekkasie.

Suierstoommasjien.—Hipotetiese en werklike indikateurdiagramme. Diagramfaktor. Gemiddelde effektiewe druk en verrigte arbeid (as veronderstel word dat PV=C). Aangegewe perdekrag en remperdekrag. Voordele van die aanwending van die uitsettingswerking van stoom en van hoë- en laedrukwerking. Gemiddelde ontwerpdruk. Stoomverbruik per uur en per perdekraguur. Termiese, meganiese en totale rendement van enkelvoudige en saamgestelde masjiene. Warmtebalans vir masjien- en keteltoetse.

Eenvoudige skuif- en suierkleppe met buite- of binnetoelating van stoom. Gebruik van klepdiagramme ten einde voorloophoek, lap, voorloop en poortopening vir 'n verstrekte klepslag te bepaal.

Stoomturbine.—Grondbeginsels. Eenvoudige snelheidsdiagramme. Termiese, meganiese en totale rendement.

Verbranding.—Vaste en vloeibare brandstof. Hoër en laer hittewaardes. Chemiese vergelykings vir volledige verbranding. Minimum lug teoreties vereis. Oormaat lug.

Verkoeling.—Dampverdigtingsiklus. Verkoelende uitwerking. Vermoë van 'n masjien uitgedruk as "ton ys per 24 uur vanaf en by 32° F".

Ketels en verdampers.—Verandering van digtheid as gevolg van besoedelde toevoer.

HOOF-INGENIEUROFFISIER (VREEMDE VAART)—HITTE EN HITTEWERKTUIE.

(Een vraestel van 3 uur. Net 6 uit die 9 vrae moet beantwoord word.)

Grondbeginsels.—Uitsetting van liggame en vloeistowwe, met inbegrip van koëffisiënt van skynbare kubieke uitsetting. Eerste wet van termodinamika en sy toepassing op toestande van gelykmatige stroming. Formules vir verrigte werk wat verband het met die formule PV^n=C.

Compound Bars.—Effects of direct loading and of temperature changes.

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

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

Struts.—Eccentric loading of short columns. Use of strut formulae.

Thin Shells.—Stresses in thin shells. Design of riveted joints. Use of boiler shell design formulae.

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

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

SECOND ENGINEER-OFFICER (FOREIGN-GOING)—HEAT AND HEAT ENGINES.

(One paper of 3 hours, 6 questions only out of 9 to be attempted.)

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

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

Mixtures.—Heat and temperature problems involving not more than three substances. Water equivalent.

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

I.C. Engines and Air Compressors.—Elementary principles and cycles of operation. Calculation of work done from given formulae. Cam diagrams for I.C. engines, angles of cam peak centre lines relative to crank.

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

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

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

Steam Turbine.—Elementary principles. Simple velocity diagrams. Thermal, mechanical and overall efficiency.

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

Refrigeration.—Vapour-compression cycle. Refrigerating effect. Capacity of a machine expressed as "Tons of ice per 24 hours from and at 32° F."

Boilers and Evaporators.—Change of density due to contaminated feed.

CHIEF ENGINEER-OFFICER (FOREIGN-GOING)—HEAT AND HEAT ENGINES.

(One paper of 3 hours, 6 questions only out of 9 to be attempted.)

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

Hitte-oordrag.—Geleiding (uitgesonderd gemiddelde temperatuurverskil van log). Straling.

Eienskappe van stoom.—Waarneembare warmte; latente warmte; entropie; inwendige energie; volume. Gebruik van stoomtafels en entropie. Smoor- en skeikalorimeter.

Mengsels.—Hitte- en temperatuurprobleme waarby 2 of meer stowwe betrokke is.

Gasse.—Wet van Boyle. Wet van Charles. Karakteristieke vergelyking. Verband tussen P, V en T wanneer $PV^n=C$. Bepaling van *n* aan die hand van grafiek van P en V verbind.

Bewys van die formule $C_P-C_V=\frac{R}{J}$

Berekenings vir uitsettings en kompressies met lugkompressors, binnebrandmasjiene, lugpompe en lugbewaring. Eenvoudige toepassings van Dalton se wet van parsiële druk.

Gassiklusse.—Gebruik van entropiekaarte. Konstante volume-siklus. Dieselsiklus. Ope en geslote siklusse vir gasturbines. Aangeduide en remwarmterendemente. Meganiese rendement. Morse-toets.

Uitsetting van stoom.—Smoring. Hipotetiese PV-diagramme. Arbeid verrig, g.e.d., diagramfaktor, met inbegrip van die uitwerking van vry ruimte. Aanwending van hoë en lae druk. Gemiddelde ontwerpdruk. Totale krag. Gekombineerde diagramme. Reuleaux-klepdiagram.

Stoomsiklus.—Gebruik van entropiekaarte. Basiese Rankinesiklus. Hitteverlies in suiermasjiene en in turbines. Uitwerking van modfikasies soos oorverhitting, uitlaatturbine en regeneratorvoedingsverhitting op warmterendement. Ekwivalente verdamping. Rendemente.

Digtheid en ketelsteen.—Basiese berekenings oor die uitwerking van lekkasie in die kondensator en onsuiwere toevoer op die digtheid en ketelsteen in ketels. Basiese berekenings oor prestasie van verdamptoestel.

Turbine.—Basiese siklus en sy modifikasies. Vloeiing deur spuitstukke (uitgesonderd bewys van kritieke druk-verhouding). Blad-diagramme vir impuls- en reaksieturbines. Krag op blaaie. Arbeid verrig op blaaie. Gebruik van totale hitte-kaarte om die stoomtoestand in verskillende stadiums te bepaal.

Verbranding.—Verbrandingsvergelykings. Berekening van lug teoreties benodig. Bepaling van hittewaarde. Stelling van Avogadro. Basiese ontleding van uitlaatgasse. Verhouding tussen volumetriese en gravimetriese analise van 'n gasmengsel. Kooldioksiedgehalte van uitlaatgasse.

Verkoeling.—Omgekeerde Carnot-kringloop. Dampverdigtingsiklus. Gebruik van damptafels. Werkverrigtingskoëffisiënt.

TWEEDE INGENIEUROFFISIER (VREEMDE VAART)—TEKENE.

(Een vraestel van 6 uur. Daar kan uit 2 tekeninge gekies word.)

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 versoek word om 'n plan, vertikale projeksie of deursnee of 'n kombinasie van hierdie aansigte van 'n stuk skeepsmasjinerie aan die hand van verstrekte inligting te teken. Al die nodige inligting vir die voltooiing van die tekening sal in die vraestel verstrek word.

TWEEDE INGENIEUROFFISIER (VREEMDE VAART)—ELEKTROTEGNOLOGIE.

(Een vraestel van 3 uur. Net 6 uit die 9 vrae moet beantwoord word.)

Algemeen.—Werking van elektriese stroom: Chemiese, magnetiese en termiese werking en verskaffing van lig. Opwekking van EMK deur middel van chemikalieë, magnete, warmte en lig.

Die elektriese kring.—Eenhede: Ampère, ohm en volt. Ohm se wet. Serie- en parallelkringe van bronne van EMK en van weerstande. Stroomverdeling in eenvoudige kringe. Verskil tussen EMK en pv. Krag en energie. Verband tussen verwarmings-, meganiese en elektriese eenhede. Joule se ekwivalent. Geleierweerstand, uitwerking van lengte, oppervlakte, materiaal en temperatuur. Soortlike weerstand. Temperatuurkoëffisiënt. van weerstand. Tipes isolering. Wheatstonebrug, sleepdraadbrug. Toepassings op stuurinrigtings, weerstandspirometers, vervormingsmeters, ens.

Elektrolitiese werking.—Teorie van elektrolitiese dissosiasie toegepas op gewone oplossings, ens., aangesuurde water, kopersulfaat en soutwater. Gebruike van elektroliese. Wette van Faraday. Elektrochemiese ekwivalent.

Selle.—Primêre (nat of droeë Leclanché-selle) en sekondêre (suur- of alkalieselle) tipes. Konstruksie en beginsels. Onderhoud, laai. Watt-uur en ampère-uurrendemente.

Magnetisme en elektromagnetisme.—Eenvoudige teorie van magnetisme. Magnetiese veld. Kraglyne. Veldsterkte. Veldintensiteit. Magnetiese velde as gevolg van stroom in reguit geleiers, lusgeleidings, spoele en solenoïede. Betreklike rigtings van stroom en veld. Uitwerking op yster. Vloeidigtheid. Totale vloed. Permeabiliteit. Tipiese B/H- en u/B- krommes.

Heat Transfer.—Conduction (excluding log mean temperature difference). Radiation.

Properties of Steam.—Sensible heat; latent heat; entropy; internal energy; volume. Use of steam tables and entropy. Throttling and separating calorimeter.

Mixtures.—Heat and temperature problems involving 2 or more substances.

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

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

Gas Cycles.—Use of entrophy charts. Constant volume cycle. Diesel cycle. Open and closed cycles for gas turbines. Indicated and brake thermal efficiencies. Mechanical efficiency. Morse test.

Expansion of Steam.—Throttling. Hypothetical PV diagrams. Work done, m.e.p., diagram factor, including effect of clearance. Compounding. Mean referred pressure. Total power. Combined diagrams. Reuleaux valve diagram.

Steam cycle.—Use of entropy charts. Basic Rankine cycle. Heat drop in reciprocating engines and in turbines. Effect on thermal efficiency of such modifications as superheating, exhaust turbine and regenerative feed heating. Equivalent evaporation. Efficiencies.

Density and Scale.—Basic calculations on the effect of condenser leakage and impure feed on the density and scale in boilers. Basic calculations on evaporator performance.

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

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

Refrigeration.—Reversed Carnot cycle. Vapour compression cycle. Use of vapour tables. Coefficient of performance.

SECOND ENGINEER-OFFICER (FOREIGN-GOING)—DRAWING.

(One paper of 6 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.

SECOND ENGINEER-OFFICER (FOREIGN-GOING)—ELECTROTECHNOLOGY

(One paper of 3 hours, 6 questions only out of 9 to be attempted.)

General.—Effects of electric current—chemical, magnetic, thermal and production of light. Production of e.m.f. by chemical, magnetic, thermal and light means.

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

Electrolytic Action.—Theory of electrolytic dissociation applied to common solutions, etc., acidulated water, copper sulphate and salt water. Uses of electrolysis. Faraday' laws. Electro-chemical equivalent.

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

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

Elektromagnetiese induksie.—Wette van Faraday en Lenz. Omvang en rigting van geïndusseerde EMK. Krag voortgebring op 'n stroomdraende geleier.

Wisselstroomteorie.—Die sinusgolf, frekwensie, maksimum, w.g.k.- en gemiddelde waardes. Vektorvoorstelling van wisselstroomhoeveelhede. Faseverskil. Die wisselstroomkring. Die induktor. Induktansie en die uitwerking daarvan op die kring. Die kapasitor. Kapasitansie en die uitwerking daarvan op die kring. Die algemene seriekring. Die verband tussen weerstand, reaktansie en impedansie. Eenvoudige behandeling van die kragfaktor.

Instrumente.—Beginsels en funksie van skakelbordaanwysingsinstrumente. Draaispoel-, draaiyster- en dinamometertipes. Gebruik van sjunts en serieweerstande ten einde die bestek te vergroot. Die stroomtransformator en spanningstransformator vir instrumentwerk (beskrywing en eenvoudige verduideliking).

Toetsmetodes en metings.—Weerstand gemeet met ammetervoltmeter, met brug en met instrument. Eenvoudige toetsing van ohm-meter en isolering. Algemene toetsing van isolering, kontinuïteit en millivolt-daling. Opsporing van foute. Temperatuurmeting met weerstand.

Stroomkringe.—Eendraad-, tweedraad-, driedraad- en ringhoofleidingsnette vir gelykstroom. Gebruik van sekerings- en stroombrekers. Gebruik van aardlampe. Eenvoudige verwysing na die balanseerder. Eenvoudige verduideliking van die alternator as 'n opwekkingseenheid. Parallelwerking en sinkroniseringsprosedure.

Elektriese masjiene.—Konstruksiebesonderhede van die gelykstroomgenerator en -motor. Werking van kommutator. Eenvoudige benadering van lus- en golfwikkelings. Metodes om die veld van krag te voorsien—afsonderlike opwekking, sjunt, serie- en serieparallelwikkelings.

Gelykstroomgenerators.—Konstruksiebesonderhede. Beskerming, EMK en lasspanningsvergelykings. Kort behandeling van teorie van selfopwekking. Laskenmerke. Metodes om spanning te beheer. Parallelwerkingsprosedure.

Gelykstroommotore.—Konstruksiebesonderhede. Noodsaaklikheid van aansitters. Tipes aansitters. Snelheids- en draaimomentvergelykings. Laskenmerke. Snelheidsbeheer.

Elektriese ontsteking vir binnebrandmasjiene.—Spoel- en magnetostelsels. Aansitinrigtings. Onderhoudsvereistes.

HOOF-INGENIEUROFFISIER (VREEMDE VAART)—ELEKTROTEGNOLOGIE.

(Een vraestel van 3 uur. Net 6 uit die 9 vrae moet beantwoord word.)

Eenhede.—Cgs-stelsel. Mks-stelsel.

Die magnetiese kring.—B-H- en B-AT/cm-krommes. Hul uitwerking op die ontwerp van eenvoudige magnetiese kringe waarby 'n lugspleet betrokke is. Histerese. Elektromagnetisme. Wedersyde induksie.

Die elektriese kring.—Wette van Kirchoff. Parallelwerking van batterye met ongelyke EMK en verskillende inwendige weerstande. Verdelingsprobleme. Spanningsval. Verdelers met enkele en dubbele toevoer. Ringhoofleidings.

Verspreidingstelsels. Gelykstroom: 2 drade en 3 drade. Wisselstroom: eenfasig en driefasig, 3 drade en 4 drade. Vergelyking van koper wat vereis word.

Balanserder in gelykstroomstelsel met 3 drade.

Motoraansitters.—Outomatiese tipes—verwysing na tyd en stroombeheer. Die dromreëlaar vir seriemotors.

Aanwendings, ens.—Parallelwerking van sjunt- en serieparallelgenerators. Vereffeningstaaf. Lasverdeling kwalitatief behandel. Toepassings op Ward Leonard-stelsel. Stuurinrigtings. Geskiktheid van gelykstroommotore vir die verskillende soorte werk.

Defekte en onderhoud van masjiene. Oorverhitting as gevolg van meganiese en elektriese defekte. Vonke by borsels. Verlies van oorblywende magnetisme, ens. Toets van masjiene—gebruik van die megger.

Eenvoudige berekenings in verband met aansitters.

Algemeen.—Opwekking van 'n wisselspanningsgolfvorm. Die sinuswet. Frekwensie; siklus; amplitude, oombliks- en maksimumwaardes. Verband tussen frekwensie, getal pole en snelheid van 'n masjien. W.g.k.- en gemiddelde waardes. Vormfaktor. Voorstelling van 'n wisselgrootheid deur middel van vektors ten einde oombliks- en w.g.k.-waardes te verskaf.

Die seriekring.—Weerstand, induktansie en impedansie. Stroom- en stroomspanningsverhoudings. Gebruik van vektors. Vermoë, skynvermoë (VA), reaktiewe volt-ampére en kragfaktor. Die impedansiedriehoek. Reaktiewe en aktiewe komponente van 'n stroom.

Electro-magnetic Induction.—Faraday's and Lenz's laws. Magnitude and direction of induced e.m.f. Force produced on a current-carrying conductor.

Alternating Current Theory.—The sinsusoidal wave, frequency, maximum, r.m.s. and average values. Vector representation of a.c. quantities. Phase difference. The a.c. circuit. The inductor. Inductance and its effect on the circuit. The capacitor. Capacitance and its effect on the circuit. The general series circuit. Relationship between resistance, reactance and impedance. Simple treatment of power factor.

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

Testing Methods and Measurements.—Resistance measured by ammeter-voltmeter, by bridge and by instrument. Simple ohmmeter and insulation testing. General insulation, continuity and millivolt-drop testing. Fault tracing. Temperature measurement by resistance.

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

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

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

D. C. Motors.—Constructional details. Need for starters. Types of starter. Speed and torque equations. Load characteristics. Speed control.

Electric Ignition for I. C. Engines.—Coil and magneto systems. Starting arrangements. Maintenance requirements.

CHIEF ENGINEER-OFFICER (FOREIGN-GOING)—ELECTROTECHNOLOGY.

(One paper of 3 hours. 6 questions only out of 9 to be attempted.)

Units.—C.G.S. system. M.K.S. system.

The Magnetic Circuit.—B-H and B-AT/cm curves. Their effect on the design of simple magnetic circuits involving an air gap. Hysteresis. Electromagnetism. Mutual induction.

The Electric Circuit.—Kirchoff's laws. Parallel operation of batteries with unequal e.m.f.s. and differing internal resistances. Distribution problems. Volt-drop. Singly and doubly fed distributors. Ring mains.

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

Balancer in 3-wire d.c. system.

Motor Starters.—Automatic types—reference to time and current control. The drum controller for series motors.

Applications, etc.—Parallel operation of shunt and compound generators. Equalising bar. Load sharing treated qualitatively. Applications to Ward Leonrad system. Steering gear. Suitability of d.c. motors for the various types of work.

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

Simple calculations on starters.

General.—Production of an alternating waveform. The sine law. Frequency; cycle; amplitude, instantaneous and maximum values. Relation between frequency, number of poles and speed of a machine. R.M.S. and average values. Form factor. Representation of an alternating quantity by means of vectors to give instantaneous and R.M.S. values.

The Series Circuit.—Resistance, inductance and impedance. Current and voltage relationships. Use of vectors. Power, apparent power (VA) reactive volt-ampere and power factor. The impedance triangle. Reactive and active components of current.

The Parallel Circuit.—Treatment by vectors only of fairly simple circuits. Capacitance and the application of capacitors to power factor improvement. The desirability of high power factors.

Die parallelkring.—Behandeling van taamlik eenvoudige kringe net met vektors. Kapasitansie en die aanwending van kapasitors vir kragfaktorverbetering. Die wenslikheid van hoë kragfaktore.

Driefasestelsels.—Ster- en delta- (veelhoek-) verbindings vir kragbronne en belastings. Fase- en lynverhoudings. Krag. Driefasige vierdraadverdeler. Aanwending by draaiende magnetiese veld.

Alternators.—Konstruksie. EMK-vergelyking. Sinchronisering en verwysing na lasverdeling.

Induksiemotore.—Konstruksie. Glip. EMK en frekwensie van rotor. Tipiese draaimoment-spoedkrommes. Bewikkelde, sleepring- en kooitipes. Beskrywing van tipe met dubbele wikkeling. Aansitmetodes.

Sinchrone motore.—Konstruksie. Aansitmetodes. Verwysing na gebruik vir arbeidsfaktorkorreksie.

Vergelyking.—Algemene vergelyking van een- en drie- fasestesels, met aanduiding van die kostebesparing van 'n driefasestelsel.

Aandrywing.—Tipes wat van gelykstroom- en wisselstroommasjiene gebruik maak. Turboëlektriese aandrywings; aansitmetodes; snelheidswisseling. Voordele en nadele van elektriese aandrywing.

Eenfasemotore.—Beskrywing van algmene gewone tipes. Aansit.

Transformators.—Grondbeginsels en algemene beskrywing.

Instrumente.—Eenvoudige behandeling (kwalitatief) van dinamometer, wattmeter, frekwensiemeter, arbeidsfaktormeter, draaisinchroskoop.

TWEEDE INGENIEUROFFISIER (VREEMDE VAART)—ELEMENTÊRE SKEEPSBOUKUNDE.

(Een vraestel van 3 uur. Net 6 uit die 9 vrae moet beantwoord word.)

Algemeen.—Verplasing. Nat vlak. Blok-, middeldeursnee-, prismatiese- en watervlak-oppervlaktekoëffisiënt. Ton per duim indompeling. Toepassing van Simpson se eerste reël op oppervlaktes en volumes.

Diepgang en dryfvermoë.—Verandering van gemiddelde diepgang as gevolg van verandering in die digtheid van water. Dryfvermoë en reserwedryfvermoë. Gevolg van lekkasie in midskeepse kompartemente.

Transversale stabiliteit.—Verskuiwing van swaartepunt as gevolg van byvoeging of verwydering van ballas, brandstof of vrag. Stabiliteit onder klein slagsyhoeke (met die tweede oppervlaktemoment van die watervlak of formules aangegee). Die hellingstoets.

Weerstand en aandrywing.—Vergelyking van huidwrywingsweerstand van romp met model teen verskillende snelhede. $RF = f.S.V^n$. Admiraliteits- en brandstofkoëffisiënte. Verhouding tussen snelheid van vaartuig en brandstofverbruik met konstande verplasing en in die veronderstelling dat weerstand wissel soos $(\text{snelheid})^n$. Elementêre behandeling van skroef. Hei, skynbare slip, werklike slip, volgstroom, stootkrag en vermoë.

Struktuursterkte.—Eenvoudige probleme oor sterkte van struktuurdele om vloeistofdruk te weerstaan. Belasting weens drukhoogte van vloeistof.

Skeepsbou.—Algemene terme gebruik by die meting van staalskepe, bv. lengte tussen loodlyne, totale breedte, holte tot opperdek, diepgang en vryboord. Definisies van skeepsbouterme in algemene gebruik. Beskrywings en sketse van struktuurdele in gewone tipes staalskepe. Inrigting van masjienbedding. Waterdigte deure. Luike. Roere. Skroewe. Skroefaskokers. Waterdigte skotte. Dubbele bome. Ankers en kabels. Nodige voorsorgsmaatreëls alvorens leë oliebrandstof- of ballastenks binnegegaan word.

Hoe om die skip se struktuur in goeie toestand te bewaar, vernaamlik die kimme, bunkers, tenks onder ketels en waterdigte deure. Ventilasie-inrigtings (natuurlik en meganies) vir pompkamers en tenkskepe en vir ruime, kolebunkers en oliebrandstoftenks. Stuwing van steenkool. Selfontbranding. Gevaar van ontploffing van gas afgegee deur steenkool.

Inrigtings vir die verklikking en blus van brand in passasiers- en vragruimtes. Voorsorg teen brand in hawe en droogdok. Piektenks voor en agter, inrigtings vir die vulling en leegpomp van dubbele boom en dieptenk. Dreinering van kompartemente. Inrigtings vir die nivellering van beskadigde sykompartemente. Droogdokking en onderhoud van onderwatertoebehore.

HOOF-INGENIEUROFFISIER (VREEMDE VAART)—ELEMENTÊRE SKEEPSBOUKUNDE.

(Een vraestel van 3 uur. Net 6 uit die 9 vrae moet beantwoord word.)

Algemeen.—Vormkoëffisiënte. Natvlakformules. Eerste reël van Simpson toegepas op oppervlaktes, moment van oppervlaktes, tweede momente van oppervlaktes, volumes, momente van volumes, sentroïede en drukpunte.

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

Alternators.—Construction. E.m.f. equation. Synchronising and reference to load sharing.

Induction Motors.—Construction. Slip. Reference to rotor e.m.f. and frequency. Typical torque-speed curves. Wound, slip ring and cage types. Description of double wound type. Starting methods.

Synchronous Motors.—Construction. Starting methods. Reference to use for power factor correction.

Comparison.—General comparison of single- and three-phase systems bringing out the saving in cost of a three-phase system.

Propulsion.—Types using d.c. and a.c. machines. Turbo-electric drives; starting methods; speed changing. Advantages and disadvantages of electrical propulsion.

Single-phase Motors.—Description of general common types. Starting.

Transformers.—Elementary principles and general description.

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

SECOND ENGINEER-OFFICER (FOREIGN-GOING)—ELEMENTARY NAVAL ARCHITECTURE.

(One paper of 3 hours. 6 Questions only out of 9 to be attempted).

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

Draught and Buoyancy.—Alteration of mean draught due to change in density of water. Buoyancy and reserve buoyancy. Effect of bilging amidship compartments.

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

Resistance and proplusion.—Comparison of skin frictional resistance of hull with model at different speeds. $Rf = f.S\ V^n$. Admiralty and fuel coefficients. Relation between speed of vessel and fuel consumption with constant displacement and assuming that resistance varies as $(\text{speed})^n$. Elementary treatment of propeller. Pitch, apparent slip, real slip, wake, thrust and power.

Structional Strength.—Simple problems on strength of structural members to resist liquid pressure. Loading due to head of liquid.

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

The preservation in good condition of the ship's structure, in particular the bilges, bunkers, tanks under boilers and watertight doors. Ventilation arrangements (natural and mechanical) for pump rooms in tankers and for holds, coal bunkers and oil fuel tanks. Storage of coal. Spontaneous combustion. Danger of explosion from gas given off by coal.

Fire detection and extinction arrangements for passenger and cargo spaces. Fire precautions in port and dry dock. Fore and aft peak tanks, double bottom and deep tank filling and pumping arrangements. Compartmental drainage. Levelling arrangements for damaged side compartments.

Dry docking and maintenance of underwater fittings.

CHIEF ENGINEER-OFFICER (FOREIGN-GOING)—ELEMENTARY NAVAL ARCHITECTURE.

(One paper of 3 hours. 6 Questions only out of 9 to be attempted.)

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

Transversale stabiliteit.—Swaartepunt. Drukkingspunt. Metasenter. Moment van statiese stabiliteit. GZ-krommes. Dwarskrommes van stabiliteit. Hidrostatiese krommes gewoonlik aan skepe verskaf. Uitwerking van vry vloeistofoppervlak en verdeling van tenks. Gevare as gevolg van die versameling van water gedurende brandbestryding. Uitwerking van gewigte wat hang. Praktiese vereistes om stabiliteit ter see te verseker. Behartiging van water- en brandstoftenks. Vulling en lediging van tenks ter see.

Langsstabiliteit.—TM en SM oorlangs en statiese stabiliteit. Flottasiepunt en berekening daarvan. Moment van trimverandering met 1 duim.

Diepgang, trim en oorhelling.—Veranderings as gevolg van byvoeging of verwydering van brandstofballas of vrag. Veranderings as gevolg van verandering in digtheid van seewater. Veranderings as gevolg van lekkasie in kompartemente, met aanwending van die metodes betreffende verlore dryfvermoë en bygevoegde gewig. Kragte op roer en spanning in roerstok. Oorhelling wanneer gedraai word, met inbegrip van uitwerking van middelpuntvliedende krag en van roer.

Weerstand en aandrywing.—Afleiding van Admiraliteits- en brandstofkoëffisiënte. Oorweging van totale weerstand as die som van wrywings- en remanente weerstand. Die wet van ooreenstemmende snelhede. Froude se wet van vergelyking. Eenvoudige probleme oor die voorberekening van volskaalse weerstand aan die hand van modeleksperimente. Eenvoudige probleme waarby die gebruik van e.pk. (efektiewe perdekrag), g.pk. (gelewerede perdekrag) en kwasie-aandrywingskoëffisiënt. Eenvoudige probleme oor skroewe. Steekverhouding. Volgstroomfaktor. Ware slip. Skynbare slip. Stootkrag en vermoë. Kavitasie.

Skeepsbou.—Kragte op skip onder verskillende toestande, met inbegrip van hyging en stamp. Konstruksie van alle dele van staalskepe. Strukturele inrigtings vir beskerming teen brand. Inrigtings vir die verklikking en blus van brand. Voorsorgmaatreëls teen brand in hawe en in droogdok. Stuwing en ventilasie van steenkool. Gevaar van ontploffing van gas afgegee deur steenkool. Kim- en ballasinrigtings. Inrigtings vir die nivellering van beskadigde sykompartemente. Droogdokking. Ventilasie van ruime en oliebrandstoftenks.

Meting en klassifisering van skepe.—Betekenis van "geklassifiseerde" en "ongeklassifiseerde" skepe. Drie-eiland- en skuildekskepe. Gewone terme gebruik by die meting van moderne staalskepe. Gewone terme gebruik by die meting van tonnemaat, bv. bruto tonnemaat, netto tonnemaat, toelating vir dryfkrag, tonnemaatluik.

TWEEDE INGENIEUROFFISIER (VREEMDE VAART) EN HOOF-INGENIEUROFFISIER (VREEMDE VAART)—INGENIEURSWESE.

Kandidate vir 'n gekombineerde stoom- en motorsertifikaat moet bereid wees om in al die items (*a*) tot (*w*) geëksamineer te word, maar kandidate sal vir 'n stoomsertifikaat of die stoomendossement op 'n motorsertifikaat nie in items (*q*) tot (*w*) en vir 'n motorsertifikaat of die motorendossement op 'n stoomsertifikaat nie in items (*j*) tot (*p*) geëksamineer word nie. Kandidate vir die Sertifikaat van Hoof-ingenieuroffisier (Vreemde Vaart) of 'n endossement op die Sertifikaat van Hoof-ingenieuroffisier (Vreemde Vaart), van wie verwag word om 'n ruimer kennis van die verskillende items in die leerplan aan die dag te lê as kandidate vir die Sertifikaat van Tweede Ingenieuroffisier (Vreemde Vaart) of 'n endossement op 'n Sertifikaat van Tweede Ingenieuroffisier (Vreemde Vaart), moet bereid wees om in items (*x*) tot (*y*) geëksamineer te word.

Opmerkings.

1. Die kennis van Ingenieurswese wat deur kandidate aan die dag gelê moet word, is dié wat vereis word vir die gebruik, bediening en onderhoud van die masjinerie, toerusting en skeepsdele waarvoor die Ingenieuroffisier gewoonlik verantwoordelik is. Ook word kennis vereis van die metodes om die verskillende onderdele te vervaardig.

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

3. Die skriftelike eksamen vir 'n stoom- of motorsertifikaat bestaan uit 2 vraestelle van 3 uur elk. In elke vraestel moet net 6 uit die 9 vrae beantwoord word.

4. Die skriftelike eksamen vir 'n gekombineerde stoom- en motorsertifikaat bestaan uit 3 vraestelle van 3 uur elk. In elke vraestel moet net 6 uit die 9 vrae beantwoord word.

5. Die skriftelike eksamen vir 'n stoom- of motorendossement bestaan uit 1 vraestel van 3 uur en hierin moet net 6 uit die 9 vrae beantwoord word.

6. Waar daar in die eksamen vir 'n Sertifikaat van Hoofingenieuroffisier (Vreemde Vaart) of 'n endossement op 'n Sertifikaat van Hoof-ingenieuroffisier (Vreemde Vaart) vrae oor hoof elektriese aandryfmasjinerie gevra word, word die 9 vrae vermeerder met die getal vrae oor hoof- elektriese aandryfmasjinerie.

7. Kandidate kan versoek word om hul antwoorde met sketse toe te lig.

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

Longitudinal Stability.—Longitudinal BM and GM and statical stability. Centre of flotation and its calculation. Moment to change trim by one inch.

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

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

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

Ship Measurement and Classification.—Meaning of "classed" and "unclassed" ships. Three island and shelter deck vessels. Common terms used in tonnage measurement, e.g. gross tonnage, nett tonnage, propelling power allowance, tonnage hatch.

SECOND ENGINEER-OFFICER (FOREIGN-GOING) AND CHIEF ENGINEER - OFFICER (FOREIGN - GOING)—ENGINEERING KNOWLEDGE.

Candidates for a combined Steam and Motor Certificate must be prepared to be examined in all the items (*a*) to (*w*) but those for a Steam Certificate or the Steam Endorsement of a Motor Certificate will not be examined in items (*q*) to (*w*) and those for a Motor Certificate or the Motor Endorsement of a Steam Certificate will not be examined in items (*j*) to (*p*). In addition candidates for a Chief Engineer-Officer's (foreign-going) Certificate or an endorsement of a Chief Engineer-Officer's (foreign-going) 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 (foreign-going) Certificate or an endorsement of a Second Engineer-Officer's (foreign-going) Certificate, must be prepared to be examined in items (*x*) to (*y*).

Notes.

1. The Engineering Knowledge to be shown by candidates is that which is required for the use, operation and maintenance of the machinery, equipment and ship structure usually in the charge of the Engineer-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 2 papers of 3 hours each—6 questions only to be attempted out of 9 in each paper.

4. The written examination for a combined Steam and Motor Certificate consists of three papers of 3 hours each—6 questions only to be attempted out of 9 in each paper.

5. The written examination for a Steam or Motor Endorsement consists of one paper of 3 hours—6 questions only to be attempted out of 9 in the paper.

6. Where questions relating to main electric propelling plant are asked in the examination for a Chief Engineer-Officer's (foreign-going) Certificate or an endorsement of a Chief Engineer-Officer's (foreign-going) Certificate, the 9 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 sketches.

(*a*) Die verskillende behandelings se algemene uitwerking op die fisiese eienskappe van materiale wat algemeen by die bou van skeepsmasjiene en -ketels 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 masjinerie op 'n skip gebruik word.

(*c*) Die gebruik, konstruksiebesonderhede en beginsels betrokke by die werking van die drukmeter, voltmeter, ammeter, termometer, pirometer, barometer, salinometer, hidrometer en ander meters wat algemeen deur ingenieurs op 'n skip gebruik word.

(*d*) Die oorsake, uitwerking en gewone middels teen ketelsteenvorming en korrosie. Voedingswater en blaasdigthede, en ketelsteenvorming.

(*e*) (1) Konstruksiebesonderhede en werkbeginsels van skeepsmasjiene; metodes om hul rpk. te bepaal. Die beginsel waarvolgens dinamometers en wringingsmeters werk en metodes vir hul yking.

(2) Die metodes om met slytasie in masjinerie en ketels te handel. Die rig van masjiendele. Die verhelping van defekte as gevolg van gebreke in die materiaal of 'n ongeluk. Tydelike of permanente herstelwerk in die geval van ontwrigting of algehele onklaarheid.

(*f*) Konstruksiebesonderhede en werkingsbeginsels van sentrifugale, klepsuier- en perspompe. Die algemene vereistes met betrekking tot toevoer-, brandstof-, lens- en ballaspompstelsels.

(*g*) Die boukundige inrigting, besonderhede en werking van stuurmasjiene en stuurgerei, koelmasjiene, hidrouliese masjiene en sodanige stoom- en binnebrandmasjiene as wat as nood- en hulpmasjiene aan boord gebruik word.

(*h*) Aanwending van die indikateur. Berekening van gemiddelde druk en perdekrag. Wisseling van druk in silinder soos deur indikateurdiagramme aangetoon.

(*i*) (1) Voorsorgmaatreëls teen brand of ontploffings as gevolg van olie of gas. Flitspunt. Ontplofbaarheid van gas of damp afgegee deur brandstof of smeerolies wanneer dit met 'n hoeveelheid lug gemeng is. Die gevaar van lekkasie uit olietenks, pype, gasontwikkelaars en verdampers, vernaamlik in kimme en ander ongeventileerde ruimtes. Die werking van draadgaasdiafragmas en die plekke waar sulke inrigtings aangebring behoort te word.

(2) Selfontbranding van steenkool. Ontplofbaarheid van gas afgegee deur steenkool. Ventilasie en stuwing van steenkool.

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

(*j*) Die metodes om skeepstoommasjiene en stoomketels te bou, die prosesse waaraan die verskillende dele onderwerp word of wat met hul vervaardiging gepaard gaan, en die metodes wat by die montering van die masjinerie op 'n skip aangewend word.

(*k*) Die verskillende tipes aandryf- en hulpstoommasjiene tans in gebruik, die funksies van elke belangrike deel en die aandag wat deur die verskillende dele van die masjinerie op 'n skip vereis word.

(*l*) Die metodes om stoominlaat- en -uitlaatkleppe te toets en te verstel en die wyse waarop die werking van die masjien deur besliste verstelling van die kleppe beïnvloed word.

(*m*) Die konstruksiebesonderhede en werking van verdampers, voedingswaterverwarmers en voedingswaterfilters.

(*n*) Skeepsketels van verskillende moderne ontwerpe; die manier om hulle te stut, asook die voorkoming van verskuiwing van ketels wanneer vaartuie bei of rol. Bepaling, deur berekening, van geskikte werkdrukke vir ketels met verstrekte afmetings.

(*o*) Die gebruik en hantering van keteltoebehore en -monterings, veral watermeters en veiligheidskleppe. Nodige voorsorgsmaatreëls wanneer stoom opgewek en met afsluitkleppe gewerk word, veral met betrekking tot die gevaar wat deur waterslag veroorsaak word.

(*p*) Konstruksiebesonderhede, werking en onderhoud van installasies wat algemeen gebruik word om lugtrek, oorverhitting van stoom en die verbranding van steenkool of oliebrandstof aan te help.

(*q*) Die beginsels ten grondslag van binnebrandmasjiene. Die verskil tussen verskillende tipes masjiene. Konstruksiebesonderhede van binnebrandmasjiene wat algemeen in gebruik is.

(*r*) Die aard en eienskappe van die brand- en smeerolies wat gewoonlik in binnebrandmasjiene gebruik word. Die toevoer van lug en brandstof na silinders van masjiene van verskillende tipes. Die konstruksiebesonderhede van apparaat vir die vergassing of verstuiwing van brandstof. Die metodes om silinders en suiers te verkoel. Konstruksiebesonderhede en werking van lugkompressors.

(*s*) Die metodes vir die bou van skeepsbinnebrandmasjiene. Die prosesse waaraandie verskillende dele onderwerp word of wat met hul vervaardiging gepaard gaan, en die metodes wat by die montering van die masjinerie op 'n skip aangewend word.

(*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 vapour 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 break down.

(*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*) Aplication of the indicator. Calculation of mean pressure and horsepower. Fluctuation of pressure in the cylinder as shown by indicator diagrams.

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

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

(*k*) The various types of propelling and auxiliary 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.

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

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

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

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

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

(*q*) 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.

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

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

(*t*) Aansit- en omstelinrigtings en die verskillende handelings wat daarmee in verband staan.

(*u*) Die aandag wat vir die werking en onderhoud van die verskillende dele van masjinerie nodig is. Die gebruik en hantering van kleppe, pype, verbindings en veiligheidstoestelle wat gebruik word.

(*v*) Opnoeming en beskrywing van defekte wat uit werking van masjinerie ontstaan. Die verhelping van sulke defekte.

(*w*) Konstruksiebesonderhede en hantering van helpstoomketels, hul toebehore en monterings, veral waterpeilglase en veiligheidskleppe. Konstruksiebesonderhede en hantering van hulpmasjinerie.

KANDIDAAT VIR SERTIFIKAAT VAN HOOF-INGENIEUROFFISIER (VREEMDE VAART) EN ENDOSSEMENT OP SODANIGE SERTIFIKAAT.

(*x*) Die administratiewe pligte van 'n Hoof-ingenieuroffisier (Vreemde Vaart): Organisering van sy personeel vir noodpligte en gebruik van veiligheidsuitrusting; organisering van herstelwerk en ondersoeke. Verslae aan eienaars. Die onderhoud en werkende toestand van masjinerie en toestelle wat onder die sorg van 'n Senior Ingenieuroffisier geplaas word. Die nodige aandag om onklaarheid en defekte te voorkom. Die gewone herstelwerk en vernuwings wat nodig is; toesig oor en inspeksie van masjinerie en ketels op 'n skip. Gereedmaking van ketels en masjinerie vir ondersoek.

(*y*) Die bespeuring van onreëlmatigheid in die loop van masjiene aan die hand van indikateurdiagramme. Die verhelping van hierdie onreëlmatighede. Toeligting, deur middel van sketse, van die verandering in die diagram as gevolg van verstelling of 'n verandering in die werking van die kleppe of ander faktore.

MONDELINGE EKSAMEN.

Die mondelinge eksamen sal grotendeels op die praktiese kennisvakke van die eksamen gebasseer word en sal vrae insluit oor die hantering van masjiene en ketels ter see, die pligte van 'n toesighoudende ingenieur, die werk wat in 'n hawe aan masjiene, ketels en hulpmasjiene gedoen moet word, en die periodieke ondersoek van die werkende dele.

Kandidate moet ook goed vertroud wees met foute wat ter see in masjiene en ketels kan voorkom, en moet in staat wees om te verduidelik hoe sulke foute voorkom en verhelp kan word.

AANHANGSEL 5.

LEERPLAN VIR DIE EKSAMEN VAN HOOFINGENIEUROFFISIER—SPESIALE GRAAD.

Daar word van kandidate verwag om 'n meer uitgebreide kennis van al die items in die leerplanne vir Tweede Ingenieuroffisier (Vreemde Vaart) en Hoof-ingenieuroffisier (Vreemde Vaart) se eksamens aan die dag te lê.

INGENIEURSKENNIS.

Daar word vrae gestel om die kandidaat se kennis te toets van tegnologiese ondersoeke wat die ingenieurspraktyk beïnvloed het en belangrike ontwikkelings wat daaruit voortgespruit het sonder die beperkings van die eksamenleerplanne vir Tweede Ingenieuroffisier (Vreemde Vaart) en Hoof-ingenieuroffisier (Vreemde Vaart).

MASJIENLEER (HIDROMEGANIKA).

Vlakkinematika van eenvoudige meganismes. Oombliklike rotasiesenters. Relatiewe snelheid van masjiendele volgens berekening en grafiese metodes. Verplasings-, snelheids- en versnellingsdiagramme. Berekening van verplasingsnelheid en versnelling van skuifkrukmeganismes. Nokke. Vorm- en werkingsleer van rattande. Heliese, keëlwurm, reguittandrataandrywing en ratstelle. Inersiekragte op enjinmeganismes. Balansering van roterende massas, primêre balansering van suierdele, sekondêre balansering van gelidenjins. Draaimomentdiagramme. Vliegwiele. Reëlaars. Trillings van meganiese stelsels insluitende geforseerde trilling en die effek van viskeuse demping. Torsie-ossilasies van asse. Werweling van asse.

Giroskoopleer en -werking.

Wrywing, band-, tou- en kettingaandrywing, koppelaars.

Smering, leer van grenslaagsmering, koeël- en rollaers.

Hidrostatika.—Fundamentele eienskappe van vloeistowwe. Viskositeit, oppervlakspanning. Resulterende druk op vlakoppervlakte en op die vlak van enkelkromming, druksenter. Vertikale stabiliteit van die atmosfeer.

Hidrodinamika.—Stoomlyn-, laminêre en turbulente stromings, invloed van soliede grense op vloeistofbeweging. Bernoulli se wet, kontinuïteit van stroming. Verdeling van druk en snelheid in vry en geforseerde vortekse. Weerstand van viskeuse vloeistof in stroomlyn- en turbulente beweging. Gebruik

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

(*u*) 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.

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

(*w*) Constructional details and management of auxiliary steam boilers, their fittings and mountings, with special reference to water guages and safety valves. Constructional details and management of auxiliary machinery.

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

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

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

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.

ANNEX 5.

SYLLABUS FOR THE EXAMINATION OF CHIEF ENGINEER-OFFICER—SPECIAL GRADE.

Candidates are expected to show a more extensive knowledge of all the items in the syllabuses for the examination of Second Engineer-Officer (foreign-going) and Chief Engineer-Officer (foreign-going).

ENGINEERING KNOWLEDGE.

Questions will be set to test the candidate's knowledge of Technological investigations which have influenced engineering practice and important developments arising therefrom free from the limitations of the examination syllabuses for second Engineer-Officer (foreign-going) and Chief Engineer-Officer (foreign-going).

THEORY OF MACHINES (MECHANICS OF FLUIDS).

Plane kinematics of simple mechanisms. Instantaneous centres of rotation. Relative velocity of machine parts by calculation and graphic methods. Displacement, velocity and acceleration diagrams. Calculation of displacement velocity and acceleration of slider crank mechanisms. Cams. Theory of shape and action of gear teeth. Helical, bevel worm, spur gearing and gear trains. Inertia forces on engine mechanisms. Balancing of rotating masses, primary balancing of reciprocating parts, secondary balancing of "in line" engines. Turning moment diagrams. Flywheels. Governors. Vibrations of mechanical systems including forced vibration and the effect of viscous damping. Torsional oscillations of shafting. Whirling of shafts.

Gyroscopic theory and action.

Friction, belt, rope and chain drives, clutches.

Lubrication, theory of boundary film lubrication, ball and roller bearings.

Hydrostatics.—Fundamental properties of fluids. Viscosity, surface tension. Resultant pressure on plane surfaces and on surfaces of single curvature, centre of pressure. Vertical stability of the atmosphere.

Hydrodynamics.—Streamline, laminar and turbulent flow, influence of solid boundaries on fluid motion. Bernoulli's principle, continuity of flow. Distribution of pressure and velocity in free and forced vortices. Resistance of viscous fluid in streamline or turbulent motion. Use of coefficients to correct for resistance and streamline contraction. Measurement of

van koëfisiënte om weerstand- en stroomlynkrimping te korrigeer. Meet van snelheid van onsaamdrukbare stroming deur pitot- en statiese drukbuise, openinge, kepe en venturimeter. Drukverlies as gevolg van buigings, skielike vergrotings en krimpings—hidrouliese gradiënt. Dinamiese gelykvormigheid. Stroming tussen parallelle vlakke en in ronde pype. Kritieke snelhede vir stroming in pype. Reynolds-getal, Rayleigh se formules. Waterslag. Slag en reaksie van stralers. Die leer van sentrifugale pompe, suierpompe, akkumulators en ander hidrouliese masjiene vir skeepswerking.

STERTELEER EN EIENSKAPPE VAN MATERIALE.

Spanning en vervorming—Hooke se wet. Komplementêre skuifspanning. Elastisiteitsmodulus. Vastheidsmodulus; Poisson se verhouding. Verhouding tussen elastiese konstantes. Temperatuurspannings. Komplekse spanningstelsels. Hoofspannings en vervormings. Veerkrag, vervormingsenergie. Slagbelasting. Teorieë van elastiese weiering.

Skuifkrag. Buigmomente, helling en defleksie in vrysteun- en ingeboude balke en vrydraers. Verdeling van spanning in balke. Blad- en plat spiraalvere.

Style onder aksiale en parallel eksentriese belastings.

Spannings en vervormings in dun- en dikwandsilinders onder vloeistofdruk. Samegestelde silinders.

Wringing van asse, kragtransmissie deur asse. Heliese toespoel- en oopspoelvere.

Spanning en defleksie in raamwerk wat analities en grafies behandel word. Meganiese eienskappe van materiale, samestelling en eienskappe van die belangrike ysterhoudende en nie-ysterhoudende metale. Termiese ewewigdiagramme, yster, koolstofdiagramme, mikrostrukture en maktrostrukture. Hittebehandeling en gebruik van gewone en legeringstaal. Gietysters insluitende hoëdiens- en smeebare tipes. Giettegniek van ysterhoudende en nie-ysterhoudende metale. Vervaardiging van vloeiyster en hulle defekte. Effekte van koudbewerking. Kruip en vermoeidheid van metale. Korrosie en korrosiebeskerming. Sweisprosedure en ondersoek van sweislasse. Nie-destruktiewe metodes van metaaltoetsing. Gewone tipes toetsmasjiene en instrumente. Materiaaltoetsprosedure.

TOEGEPASTE TERMODINAMIKA.

Die eienskappe van gasse en dampe insluitende wisselende soortlike hitte. Termodinamikawette. Interne energie, totale hitte en entropie. Mengsels van gasse en dampe. Gedeeltelike druk.

Die Carnot-siklus, omstelbare en nie-omstelbare prosesse.

Die voorstelling van versnelling-, isotermiese, adiabatiese, isentropiese en politropiese prosesse op energiekaarte.

Ideale lug- en dampsiklusse vir primêre kragbronne, kompressors en verkoelers; die voorstelling daarvan op energiekaarte. Rendementsberekenings. Stroming van gasse en dampe deur nossels en blaaie.

Elementêre hitteoordrag insluitende geleiding deur saamgestelde wande. Verbranding. Eienskappe van vaste, vloeistof-, en gasbrandstowwe. Kalorimetrie. Die effekte van wisselende lugtoevoer. Ontleding van verbrandingsprodukte.

SKEEPSHITTEWERKTUIE.

Toets en doeltreffendheid van ketelinstallasies. Lugtoevoer en -reëling. Kondensators, toevoerverhitters, ontlugters, bespaarders, lugverhitters, superverhitters, nabranders, toevoerstelsels, verdampers.

Praktiese stoommasjiensiklusse. Effekte van superverhitting, nabranding en toevoerverhitting. Rendemente. Turbinenossel- en bladberekenings. Die suierstoomenjin. Saamgestelde instelling.

Praktiese binnebrandenjinsiklusse. Verbranding. Effekte van dissosiasie en wisselende soortlike hitte.

Verkoeling insluitende meereffekverdamping. Hittepompsiklusse. Koolsuurgas-, ammoniak-, metielchloried-, Arcton- en swaeldioksiedstelsels.

Lugkompressors, lugmotors. Suier- en draaimasjiene. Gasturbines, siklusse en rendemente.

Die toets en prestasie van skeepshitte-enjins.

OPSTEL.

Die doel met die opstel is om die kandidaat se bekwaamheid te toets om goeie grammatiese Engels of Afrikaans saam te stel en te skryf en om hulle menings, bevindings en wenke uit te druk in behoorlik geskrewe verslae, besigheidsbriewe of opstelle oor onderwerpe wat in verband staan met die professie of van 'n meer algemene belang.

Daar word 2 onderwerpe aangegee; slegs 1 moet beantwoord word.

velocity of incompressible flow by Pitot and static pressure tubes, orifices, notches and Venturi meter. Loss of head due to bends, sudden enlargements and contractions- hydraulic gradient. Dynamical similarity. Flow between parallel surfaces and in circular pipes. Critical velocities for flow in pipes. Reynolds' number, Rayleigh's formulae. Water-hammer. Impact and reaction of jets. The theory of centrifugal pumps, reciprocating pumps, accumulators and other hydraulic machines with a marine application.

STRENGTH AND PROPERTIES OF MATERIALS.

Stress and strain. Hooke's law. Complementary shear stress. Modulus of elasticity. Modulus of rigidity; Poisson' ratio. Relationships between the elastic constants. Temperature stresses. Complex stress systems. Principal stresses and strains. Resilience, strain energy. Impact loading. Theories of elastic failure.

Shearing force. Bending moments, slope and deflection in freely supported and built-in beams and cantilevers. Distribution of stress in beams. Leaf and flat spiral springs.

Struts subjected to axial and parallel accentric loadings. Stresses and strains in thin walled and thick walled cylinders under fluid pressure. Compound cylinders.

Torsion of shafts, transmission of power by shafting. Close coiled and open coiled helical springs.

Stress and deflection in frameworks treated analytically and graphically. Mechanical properties of materials, composition and properties of the important ferrous and non-ferrous metals. Thermal equilibrium diagrams, iron carbon diagram, microstructure and macrostructure. Heat treatment and uses of plain and alloy steels. Cast irons including high duty and malleable types. Casting technique for ferrous and non-ferrous metals. Production of ingots and their defects. Effects of cold working. Creep and fatigue of metals. Corrosion and corrosion protection. Welding procedure and examination of welds. Non-destructive methods of metal testing. Common types of testing machines and instruments. Material testing procedure.

APPLIED THERMODYNAMICS.

The properties of gases and vapours including variable specific heats. Laws of thermodynamics. Internal energy, total heat and entropy. Mixtures of gases and vapours. Partial pressures.

The Carnot cycle, reversible and irreversible processes.

The representation of throttling, isothermal, adiabatic, isentropic and polytropic processes on energy charts.

Ideal air and vapour cycles for prime movers, compressors and refrigerators; their representation on energy charts. Efficiency calculations. Flow of gases and vapours through nozzles and blading.

Elementary heat transfer including conduction through composite walls. Combustion. Properties of solid, liquid and gaseous fuels. Calorimetry. The effects of varying air supply. Analysis of combustion products.

MARINE HEAT ENGINES.

Boiler plant testing and efficiency. Air supply and regulation. Condensers, feed heaters, de-aerators, economisers, air heaters, superheaters, reheaters, closed feed system, evaporators.

Practical steam engine cycles. Effects of superheating, reheating and feed heating. Efficiencies. Turbine nozzle and blade calculations. The reciprocating steam engine. Compounding.

Practical internal combustion engine cycles. Combustion. Effects of dissociation and variable specific heats.

Refrigeration, including multiple effect evaporation. Heat pump cycles. Carbon dioxide, Ammonia, Methyl Chloride, Arcton and Sulphur dioxide systems.

Air compressors, air motors. Reciprocating and rotary machines. Gas turbines, cycles and efficiencies.

The testing and performance of marine heat engines.

ESSAY.

The purpose of the essay is to test the candidates' ability to compose and write good grammatical English or Afrikaans and to express their opinions, conclusions and suggestions in suitably written reports, business letters or essays on subjects connected with the profession or of a more general interest.

2 subjects will be given; 1 only is to be attempted.

INGENIEURSTEKENE EN -ONTWERP.

Die opstel van 'n werktekening van enige deel van skeepsmasjinerie, ketels, meganiese uitrusting of dele van skeepstruktuur wat meebring die rangskikking van samestellende dele uit gegewe besonderhede, en ontwerpberekenings wat gevra word.

Daar word 2 onderwerpe gegee; slegs 1 moet beantwoord word.

ELEKTROTEGNOLOGIE.

Elektromagnetisme.—Magnetiese eienskappe van ferro magnetiese materiaal, berekening van ampérewindings vir saamgestelde magnetiese kringe, energie opgegaar in magnetiese veld, self- en onderlinge induktansie, effek van induktansie of kapasitansie op direkstroomkringe.

Elektrostatika.—Algemene beginsels van elektrostatika. Intensiteit en sterkte van elektriese velde. Stellings van Gauss en Coulomb. Potensiaal en kapasitansie, potensiaalgradiënt. Kapasitors—lading en ontlading van kapasitors insluitende ossilatorlading en ontlading. Beginsels van diëlektrika.

Glykstroommasjiene.—Bou van gelykstroommasjiene. Wikkelings asook meerdraaiwikkelings. Effenaarringe. Kommutasie. Ankerreaksie, hulppole. Eienskappe van alle tipes gelykstroommotors en generators. Motorspoed en -draaimoment, -motoraansit en kontrole. Eenvoudige kwalitatiewe behandeling van die amplidien en metadien, toepassing van amplidien en metadien op spoedbeheer, stroom en spanning. Werking van gelykstroomgenerators in serie en parallel. Toets van gelykstroommasjiene, direkte en indirekte metodes—skeiafstand van verliese, vertraging- en regeneratiewe toetsmetodes. Verdeling van gelykstroom-, driedraad-, balanseerder, aanjaer, en ringhoofleidingstelsels.

Wisselstroom.—Opwekking van sinusvormige elektromotoriese kraggolfvorm, amplitude en frekwensie. Waardes sinusvormige stroom en spanning. Berekenings op eenvoudige kringe insluitende weerstand, kapasitansie, induktansie en resonansie. Vektorvoorstelling. Abeidsfaktor. Enkel- en driefasekringe met ster- en deltaverbindings. Krag- en energiemeting in gebalanseerde driefasekringe. Transformators, transformasieverhoudings, vektordiagramme, spanningsreëling en -rendement.

Wisselstroommasjiene.—Vloedverdeling in uitspringende pool- en nie-uitspringende poolvelde. Elektromotoriese krag opgewek in spoele en verdeelte wikkelings. Alternators en hulle gebruik as sinchrone motors. Polifase-inlaatmotors, teorie, eienskappe en aansitreëlings. Parallelle werking van wisselstroomalternators en instrumente. Gelykrigters vir wisselstroomkragkringe.

Elektronika.—Die vakuumdiode- en -triodebuis. Elementêre beskrywing van katodestraalbuis, transistors, gelykrigters, elementêre behandeling van versterkerstrome.

Verligting.—Elektriese gloeidraad- en gasontladingslampe.

SKEEPSBOUKUNDE.

Afleiding van Simpson en Tchebycheff se wette.

Stabiliteit.—Hidrostatiese krommes, statistiese krommes en dwarskrommes van stabiliteit.

Dinamiese stabiliteit.—Vryvlakprobleme. Gronding.

Onderverdeling van passasierskepe.—Onderwaterlengtekrommes en die gebruik daarvan.

Sterkte van skepe.—Die trochoïdale golfteorie. Plaaslike en langssterkteberekenings. Statiese sterkte grafies en deur berekening behandel. Dinamiese effekte. Ossilasie, rol en hei van skepe. Eenvoudige kwalitietsbehandeling van trillings.

Weerstand en aandrywing van skepe.—Modeleksperimente en wette van vergelyking. Dinamiese gelykvormigheid. Viskositeit en die effekte daarvan op vloeistofwrywing. Dimensionele ontleding en die nie-dimensionele faktorbenadering van Reynolds- en Froude-getalle. Ander metodes vir bepaling van krag, bv. Admiraliteitskoëffisiëntformule, Tylorkrommes. Kringkonstantes en die gebruik daarvan.

Skroewe, meetkunde van die heliks, tipiese snelheidsdriehoek wat skeepshelling en invalshoek insluit. Stukrag, draaimoment en rendement. Bladelementteorie—hefkrag en sleur op stroombladvak. Aksiale momentum. Skroefkoëffisiënte en die gebruik daarvan. Kavitasie. Wisselwerking tussen skroef en skip. Romprendement en sy faktore. Totale aandrywingskoëffisiënt.

Materiaal gebruik by skeepsbou.—Staal, aluminium, keepverbrossing.

Klassifikasieverenigingsreëls.—Moderne ontwikkeling in strukturele ontwerp. Diskontinuïteite. Die gebruik van sweis. Korrosie en aangroeisels.

Algemene beginsels van laslyntoewysing en tonnemaatmetings.

ENGINEERING DRAWING AND DESIGN.

To produce a working drawing of any part of marine machinery, boilers, mechanical equipment or parts of ship structure involving the arrangement of constituent members from given particulars, and the design calculations asked for.

Two subjects will be given; one only is to be attempted.

ELECTROTECHNOLOGY.

Electromagnetism.—Magnetic properties of ferromagnetic material, calculation of ampere turns for composite magnetic circuits, energy stored in magnetic field, self and mutual inductance, effect of inductance or capacitance on d.c. circuits.

Electrostatics.—General principles of electrostatics. Intensity and strength of electric field. Theorems of Gauss and Coulomb. Potential and capacitance. Potential gradient. Condensers- charge and discharge of condensers including oscillatory charge and discharge. Principles of dielectrics.

D.C. Machines.—Construction of d.c. machines. Windings, including multi-turn windings. Equaliser rings. Commutation. Armature reaction, interpoles. Characteristics of all types of d.c. motors and generators. Motor speed and torque- motor starting and control. Simple qualitative treatment of the amplidyne and metadyne, application of amplidyne and metadyne to control of speed, current and voltage. Operation of d.c. generators in series and parallel. Testing of d.c. machines, direct and indirect methods-separation of losses, retardation and regenerative methods of testing. Distribution of d.c. current, 3-wire system, balancers, boosters, ring mains ystems.

Alternating Current.—Generation of sinusoidal e.m.f. waveform, amplitude and frequency. Values sinusoidal current and voltage. Calculations on simple circuits involving resistance, capacitance, inductance and resonance. Vector representation. Power factor. Single- and three-phase circuits with star and delta connections. Power and energy measurement in three-phase balanced circuits. Transformers, transformation ratios, vector diagrams, voltage regulation and efficiency.

A.C. Machines.—Flux distribution in salient pole and non-salient pole fields. E.m.f. generated in coils and distributed windings. Alternators and their use as synchronous motors. Polyphase induction motors, theory, characteristics and starting arrangements. Parallel operation of a.c. alternators and instruments. Rectifiers for a.c. power circuit.

Electronics.—The vacuum diode and triode valves. Elementary description of Cathode-Ray tube, transistors, rectifiers, elementary treatment of amplifier currents.

Illumination.—Filament and gas discharge type of electric lamps.

NAVAL ARCHITECTURE.

Derivation of Simpson's and Tchebycheff's rules.

Stability.—Hydrostatic curves, statical curves and cross curves of stability.

Dynamical stability. Free surface problems. Grounding.

Subdivision of passenger ships. Floodable length curves and their use.

The Strength of Ships.—The trochoidal wave theory. Local and longitudinal strength calculations. Statical strength treated graphically and by calculation. Dynamical effects. Oscillation, rolling and pitching of ships. Simple qualitative treatment of vibrations.

Resistance and propulsion of ships.—Model experiments and laws of comparison. Dynamical similarity. Viscosity and its effects on fluid friction. Dimensional analysis and the non-dimensional factor approach to Reynolds' and Froude's numbers.

Other methods of estimating power, e.g. Admirality coefficient formula, Taylor's curves. Circular constants and their use.

Propellers, geometry of the helix, typical triangle of velocities introducing slip and angle of incidence. Thrust, torque and efficiency. Blade element theory- lift and drag on aerofoil section. Axial momentum. Propeller coefficients and their use. Cavitation. Interaction between screw and ship. Hull efficiency and its factors. Overall propulsion coefficient.

Materials used in ship building.—Steel, aluminium, notch embrittlement.

Classification societies' rules.—Modern developments in structural design. Discontinuities. The employment of welding. Corrosion and fouling.

General Principles of Load Line assignment and Tonnage Measurements.

T.V. 5/116.

AANHANGSEL 6.

REPUBLIEK VAN SUID-AFRIKA.

BEKWAAMHEIDSERTIFIKAAT AS.....

INGENIEUROFFISIER VAN 'N

.....

TOEGERUS MET.....

AANDRYFMASJINERIE.

No.....

Aan.....

Nademaal u aan al die vereistes wat by wet voorgeskryf is vir die verlening aan u van 'n bekwaamheidsertifikaat as..... .....Ingenieuroffisier van 'n..... .....toegerus met..... aandryfmasjinerie, voldoen het, word hierdie sertifikaat kragtens artikel..... van die Handelskeepvaartwet, 1951 (Wet No. 57 van 1951), soos gewysig, aan u verleen.

Gedateer te .....hierdie.....dag van.....19.....

Minister van Vervoer.

PERSOONSBESKRYWING VAN KANDIDAAT.

Lengte.		Kleur van oë.	Kleur van hare.	Geboortedatum.	Geboorteplek.
Voet.	Duim.				

Ras.	Persoonlike merke of eienaardighede (indien enige).

Hierdie sertifikaat word uitgereik op grond van 'n eksamen geslaag te.....op die.....dag van..... ..... 19.....

.....
Handtekening van bevoegde beampte of eksaminator.

Kantoordatumstempel.

.....
Handtekening van houer.

STRAWWE VIR BEDRIEGLIKE HANDELINGE IN VERBAND MET HIERDIE SERTIFIKAAT.

Enigeen wat—

(*a*) 'n bekwaamheidsertifikaat wat kragtens Wet No. 57 van 1951 uitgereik is, vervals; of

(*b*) 'n vervalste dokument wat heet 'n bekwaamheidsertifikaat te wees wat kragtens Wet No. 57 van 1951 uitgereik is, vertoon of andersins uitgee terwyl hy weet dat dit vervals is; of

(*c*) 'n bekwaamheidsertifikaat wat ingetrek of opgeskort is of wat verstryk het of waarop hy nie geregtig is nie, wetens vertoon of andersins gebruik; of

(*d*) 'n bekwaamheidsertifikaat aan 'n persoon leen van wie hy weet dat hy nie daarop geregtig is nie, of toelaat dat so 'n persoon dit gebruik,

begaan 'n misdryf en is by skuldigbevinding strafbaar met 'n boete van R1,000 of met gevangenisstraf van 2 jaar of met beide sodanige boete en gevangenisstraf [sien artikels 313 (2) en 315 van Wet No. 57 van 1951].

L.W.—Enigeen, behalwe die eienaar, wat in besit kom van hierdie sertifikaat, moet dit dadelik aan die Sekretaris van Vervoer, Pretoria, stuur.

ADDISIONELE KWALIFIKASIES.

T. V. 5/116

ANNEX 6.

REPUBLIC OF SOUTH AFRICA.

CERTIFICATE OF COMPETENCY AS.....

ENGINEER-OFFICER OF A

... ...

FITTED WITH ... ...

PROPELLING MACHINERY.

No.....

To.....

Whereas you have satisfied all the requirements prescribed by law for the grant to you of a Certificate of Competency as ..... Engineer-Officer of a..... fitted with ..... propelling machinery, this certificate is granted to you in terms of section ..... of the Merchant Shipping Act, 1951 (Act No. 57 of 1951), as amended.

Dated at.....this..... day of..... 19.....

Minister of Transport.

PERSONAL DESCRIPTION OF CANDIDATE.

Height.		Colour of Eyes.	Colour of Hair.	Date of Birth.	Place of Birth.
Feet.	Inches.				

Race.	Personal marks or peculiarities (if any).

This certificate is given upon an examination passed at .....on the.....day of ..... 19.....

.....
Signature of proper officer or examiner.

Office Date Stamp.

.....
Signature of holder.

PENALTIES FOR FRAUDULENT ACTS CONNECTED WITH THIS CERTIFICATE.

Any person who—

(*a*) forges any certificate of competency issued under Act No. 57 of 1951; or

(*b*) produces or otherwise puts off any forged document purporting to be a certificate of competency issued under Act No. 57 of 1951, which he knows to be forged; or

(*c*) knowingly produces or otherwise uses any certificate of competency which has been cancelled or suspended or which has expired or to which he is not entitled; or

(*d*) lends to any person who he knows is not entitled thereto a certificate of competency or allows it to be used by any person,

is guilty of an offence and on conviction is liable to a fine of R1,000 or 2 years' imprisonment or both [see sections 313 (2) and 315 of Act No. 57 of 1951].

N.B.—Any person other than the owner hereof becoming possessed of this certificate should transmit it forthwith to the Secretary for Transport, Pretoria.

ADDITIONAL QUALIFICATIONS.

T.V. 5/116A.

REPUBLIEK VAN SUID-AFRIKA.

BEKWAAMHEIDSERTIFIKAAT AS HOOF-INGENIEUROFFISIER—SPESIALE GRAAD.

No.....

Aan.....

Nademaal u aan al die vereistes wat by wet voorgeskryf is vir die verlening aan u van 'n bekwaamheidsertifikaat as Hoof-ingenieuroffisier—Spesiale Graad—voldoen het, word hierdie sertifikaat kragtens artikel.....van die Handelsskeepvaartwet, 1951 (Wet No. 57 van 1951), soos gewysig, aan u verleen.

Gedateer te.....hierdie..... dag van.....19.....

Minister van Vervoer.

PERSOONSBESKRYWING VAN KANDIDAAT.

Lengte.		Kleur van oë.	Kleur van hare.	Geboorte-datum.	Geboorte-plek.
Voet.	Duim.				

Ras.	Persoonlike merke of eienaardighede (indien enige).

Hierdie sertifikaat word uitgereik op grond van 'n eksamen geslaag te.....op die.....dag van..... 19.....

.....
Handtekening van bevoegde beampte of eksaminator.

Kantoordatumstempel.

.....
Hantekening van houer.

STRAWWE VIR BEDRIEGLIKE HANDELINGE IN VERBAND MET HIERDIE SERTIFIKAAT.

Enigeen wat—

(*a*) 'n bekwaamheidsertifikaat wat kragtens Wet No. 57 van 1951 uitgereik is, vervals; of

(*b*) 'n vervalste dokument wat heet 'n bekwaamheidsertifikaat te wees wat kragtens Wet No. 57 van 1951 uitgereik is, vertoon of andersins uitgee terwyl hy weet dat dit vervals is; of

(*c*) 'n bekwaamheidsertifikaat wat ingetrek of opgeskort is of wat verstryk het of waarop hy nie geregtig is nie, wetens vertoon of andersins gebruik; of

(*d*) 'n bekwaamheidsertifikaat aan 'n persoon leen van wie hy weet dat hy nie darop geregtig is nie, of toelaat dat so 'n persoon dit gebruik,

begaan 'n misdryf en is by skuldigbevinding strafbaar met 'n boete van R1,000 of met gevangenisstraf van 2 jaar of met beide sodanige boete en gevangenisstraf [sien artikels 313 (2) en 315 van Wet No. 57 van 1951].

L.W.—Enigeen, behalwe die eienaar, wat in besit kom van hierdie sertifikaat, moet dit dadelik aan die Sekretaris van Vervoer, Pretoria, stuur.

ADDISIONELE KWALIFIKASIES.

T.V. 5/118.

AANHANGSEL 7.

REPUBLIEK VAN SUID-AFRIKA.

DIENSSERTIFIKAAT AS

.....

van..... No.....

Naam.....

wat aan die bepalings van artikel 80 van die Handelskeepvaartwet, 1951 (Wet No. 57 van 1951), soos gewysig, voldoen het, word hierdie dienssertifikaat toegeken.

Gedateer te.....hierdie.....dag van.....19.....

.....
Sekretaris van Vervoer.

TV 5/116A.

REPUBLIC OF SOUTH AFRICA.

CERTIFICATE OF COMPETENCY AS CHIEF ENGINEER-OFFICER—SPECIAL GRADE.

No.....

To.....

Whereas you have satisfied all the requirements prescribed by law for the grant to you of a Certificate of Competency as Chief Engineer-Officer—Special Grade, this certificate is granted to you in terms of section..... of the Merchant Shipping Act, 1951 (Act No. 57 of 1951), as amended.

Dated at ..... this.....day of..... 19.....

Minister of Transport.

PERSONAL DESCRIPTION OF CANDIDATE.

Height.		Colour of Eyes.	Colour of Hair.	Date of Birth.	Place of birth.
Feet.	Inches.				

Race.	Personal marks or peculiarities (if any).

This certificate is given upon an examination passed at .....on the..... day of..... 19.....

.....
Signature of Proper Officer or Examiner.

Office Date Stamp.

.....
Signature of Holder.

PENALTIES FOR FRAUDULENT ACTS CONNECTED WITH THIS CERTIFICATE.

Any person who—

(*a*) forges any certificate of competency issued under Act 57/1951; or

(*b*) produces or otherwise puts off any forged document purporting to be a certificate of competency issued under Act 57/1951, which he knows to be forged; or

(*c*) knowlingly produces or otherwise uses any certificate of competency which has been cancelled or suspended or which has expired or to which he is not entitled; or

(*d*) lends to any person who he knows is not entitled thereto a certificate of competency or allows it to be used by any person,

is guilty of an offence and on conviction is liable to a fine of R1,000 or 2 years' imprisonment or both [see sections 313 (2) and 315 of Act No. 57 of 1951.]

N.B.—Any person other than the owner hereof becoming possessed of this certificate should transmit it forthwith to the Secretary for Transport, Pretoria.

ADDITIONAL QUALIFICATIONS.

T.V. 5/118.

ANNEX 7.

REPUBLIC OF SOUTH AFRICA.

CERTIFICATE OF SERVICE AS

.....

of..... No. .....

Name.....

having complied with the provisions of section 80 of the Merchant Shipping Act, 1951 (Act No. 57 of 1951), as amended, is hereby granted this CERTIFICATE OF SERVICE.

Dated at..... this.....day of..... 19.....

.....
Secretary for Transport.

PERSOONSBESKRYWING VAN KANDIDAAT.

Lengte.		Kleur van oë.	Kleur van hare.	Geboortedatum.	Geboorteplek.
Voet.	Duim.				

Ras.	Persoonlike merke of eienaardighede (indien enige).

.....
Handtekening van houer.

Uitgereik by die hawe.....

hierdie.....dag van.....19.....

Datumstempel.

.....
Handtekening van bevoegde beampte of eksaminator.

STRAWWE VIR BEDRIEGLIKE HANDELINGE IN VERBAND MET HIERDIE SERTIFIKAAT.

Enigeen wat—

(*a*) 'n dienssertifikaat wat kragtens Wet No. 57 van 1951 uitgereik is, vervals; of

(*b*) 'n vervalste dokument wat heet 'n dienssertifikaat te wees wat kragtens Wet No. 57 van 1951 uitgereik is, vertoon of andersins uitgee terwyl hy weet dat dit vervals is; of

(*c*) 'n dienssertifikaat wat ingetrek of opgeskort is of wat verstryk het of waarop hy nie geregtig is nie, wetens vertoon of andersins gebruik; of

(*d*) 'n dienssertifikaat aan 'n persoon leen van wie hy weet dat hy nie daarop geregtig is nie, of toelaat dat so 'n persoon dit gebruik,

begaan 'n misdryf en is by skuldigbevinding strafbaar met 'n boete van R1,000 of met gevangenisstraf van 2 jaar of met beide sodanige boete en gevangenisstraf [sien artikels 313 (2) en 315 van Wet No. 57 van 1951].

L.W.—Enigeen, behalwe die eienaar, wat in besit kom van hierdie sertifikaat, moet dit dadelik aan die Sekretaris van Vervoer, Pretoria, stuur.

ADDISIONELE KWALIFIKASIES.

PERSONAL DESCRIPTION OF CANDIDATE.

Height.		Colour of Eyes.	Colour of Hair.	Date of birth.	Place of birth.
Feet.	Inches.				

Race.	Personal marks or peculiarities (if any).

.....
Signature of Holder.

Issued at the port of.....

this..... day of..... 19.....

Date Stamp.

.....
Signature of Proper Officer or Examiner.

PENALTIES FOR FRAUDULENT ACTS CONNECTED WITH THIS CERTIFICATE.

Any person who—

(*a*) forges any certificate of service issued under Act No. 57 of 1951; or

(*b*) produces or otherwise puts off any forged document purporting to be a certificate of service issued under Act No. 57 of 1951, which he knows to be forged; or

(*c*) knowingly produces or otherwise uses any certificate of service which has been cancelled or suspended or which has expired or to which he is not entitled; or

(*d*) lends to any person who he knows is not entitled thereto a certificate of service or allows it to be used by any person,

is guilty of an offence and on conviction is liable to a fine of R1,000 or 2 years imprisonment or both [see sections 313 (2) and 315 of Act No. 57 of 1951.].

N.B.—Any person other than the owner hereof becoming possessed of this certificate should transmit it forthwith to the Secretary for Transport, Pretoria.

ADDITIONAL QUALIFICATIONS.

INHOUD.

No. BLADSY

Departement van Vervoer.

GOEWERMENTSKENNISGEWING.

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