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DEPARTEMENT VAN VERVOER

No. R. 738

20 April 1994

HANDELSKEEPVAARTWET, 1951
(WET No. 57 VAN 1951)

EKSAMENREGULASIES VIR BEKWAAMHEID-
SERTIFIKATE VIR DEKOFFISIERS, 1994

Die Minister van Vervoer het kragtens artikel 356 (1) van die Handelskeepvaartwet, 1951 (Wet No. 57 van 1951), die regulasies in die Bylae hiervan vervat, uitgevaardig.

BYLAE

Ordering van regulasies

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Regulasie No.

1. Woordomsrywings.
2. Inleiding en klasse van sertifikate.
3. Vrywillige Eksamens vir Gesagvoerder (Spesiale Graad).
4. Sertifikate "Nie-handelsdiens" en "Hawebedryfsdiens geëndosseer".
5. Sertifikate deur ander administrasies uitgereik.
6. Sertifikate "Gevaarlike vrag" geëndosseer.
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8. Minimum vereistes vir die voortgesette geldigheid van bekwaamheidsertifikate.

GOVERNMENT NOTICE

DEPARTMENT OF TRANSPORT

No. R. 738

20 April 1994

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

EXAMINATION REGULATIONS FOR CERTIFICATES OF COMPETENCY FOR DECK OFFICERS, 1994

The Minister of Transport has, under section 356 (1) of the Merchant Shipping Act, 1951 (Act No. 57 of 1951), made the regulations contained in the Schedule hereto.

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HOOFSTUK 1

ALGEMEEN

Woordomskrywings

1. In hierdie regulasies het enige woord of uitdrukking waaraan daar in die Wet 'n betekenis geheg is, dié betekenis, en tensy uit die samehang anders blyk beteken—

“Direkteur-generaal” die Direkteur-generaal van Vervoer;

“eksaminator” die persoon wat kragtens artikel 77 (4) van die Wet aangestel is;

“beperkte handel” 'n seereis beperk tot omskrewe operasies tot 'n maksimum afstand van 50 seemyl van 'n gemelde hawe of plek af.

“begrenste handel” handel beperk tot binne die seegebied aangrensend aan die Suider-Afrikaanse kus tussen die grense van Kaap Delgado in die ooste en die Kongorivier in die weste en strekkende 250 seemyl van die kus af;

“Minister” die Minister van Vervoer;

“seemyl” 1 852 meter;

“kortseehandel” handel beperk tot 'n gebied tussen Punta do Ouro en die monding van die Kunenerivier en strekkende hoogstens 250 seemyl van die kus af;

“goedgekeur” deur die Direkteur-generaal goedgekeur;

“IMO” die Internasionale Maritieme Organisasie;

“lang seereis” 'n seereis waartydens die skip 'n afstand tussen die verste hawens wat hy besoek (of punte wat hy bereik) van minstens 500 seemyl aflê;

“seereis naby die kus” 'n reis wat geheel en al tot die kortseehandelsgebied beperk is;

“hawebedryfvaartuie” hawesleepbote, baggerbote, modderskuite, loodsbote, werksbote, geleiskepe en selfaangedrewe drywende hyskrane wat by die hawegebied werk en wat soms seereise mag onderneem;

“hawebedryfsgebied” daardie gebiede by die verskillende hawens wat binne die jurisdiksie van Transnet val;

“kort seereis” 'n seereis waartydens die skip 'n afstand tussen die verste hawens wat hy besoek (of punte wat hy bereik) van minder as 500 seemyl maar meer as 50 seemyl aflê;

Annexure L: Master (Limited Trade) Endorsement: Syllabus.

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CHAPTER 1

GENERAL

Definitions

1. In these regulations any word or expression to which a meaning has been assigned in the Act shall have that meaning and, unless the context otherwise indicates—

“approved” means approved by the Director-General;

“Director-General” means the Director-General of Transport;

“examiner” means the person appointed in terms of section 77 (4) of the Act;

“IMO” means the International Maritime Organization;

“limited trade” means trade restricted to within the sea area adjacent to the southern African coast between the limits of Cape Delgado in the east and the Congo River in the west and extending 250 nautical miles from the shore;

“long voyage” means a voyage in which the distance between the extreme ports visited (or positions reached) by the ship in the course of the voyage is not less than 500 nautical miles;

“Minister” means the Minister of Transport;

“nautical miles” means 1 852 metres;

“near coastal voyage” means a voyage confined wholly within the short sea trade area;

“port operation vessels” means harbour tugs, dredgers, hoppers, pilot boats, workboats, tenders and self-propelled floating cranes which operate at a port and which may undertake occasional voyages to sea;

“port operation area” means those areas at the various ports that fall within the jurisdiction of Transnet;

“restricted trade” means a voyage restricted to defined operations up to a maximum distance of 50 nautical miles from a stated port or place;

“short sea trade” means trade restricted to an area between Punta do Ouro and the mouth of the Kunene River extending not more than 250 nautical miles from the shore;

“short voyage” means a voyage in which the distance between the extreme ports visited (or positions reached) by the ship in the course of the voyage is less than 500 nautical miles but in excess of 50 nautical miles;

"SODW-konvensie" die Internasionale Konvensie insake die Standaard van Opleiding, Diplomerings en Waghoud vir Seevaarders, 1978; en

"die Wet" die Handelskeepvaartwet, 1951 (Wet No. 57 van 1951).

Inleiding en klasse van sertifikate

2. (1) Hierdie regulasies dui die standaarde van bekwaamheid en die voorwaardes aan waaraan voldoen moet word vir die uitreiking van 'n bekwaamheidsertifikaat—

- (a) Klas 1 (Bevare Seekaptein);
- (b) Klas 2;
- (c) Klas 3;
- (d) Klas 4;
- (e) Klas 5; en
- (f) Klas 6—Onbegrenste Handel of Kortseehandel of Beperkte Handel.

(2) (a) Die Bekwaamheidsertifikaat (Dekoffisier) Klas 6—Beperkte Handel word uitgereik aan 'n kandidaat wat 'n sertifikaat wil bekom wat hom toelaat om as waghouer of gesagvoerder op te tree op vaartuie wat slegs in die beperkte handel optree. Met dien verstande dat sodanige vaartuie minder as 25 bruto ton mag wees en klein kusvoorraadbote, veerbote op beperkte reise, dagreis-passasiersbote en klein hawe-vaartuie kan insluit.

(b) Die beperktehandelendossement op die sertifikaat beperk die houer tot 'n bepaalde soort vaartuig wat in 'n bepaalde deel van die beperkte handelsgebied vaar.

(3) Die kortseehandelendossement op 'n Bekwaamheidsertifikaat (Dekoffisier) Klas 6 meld of die houer as gesagvoerder of waghouer mag optree en ook die tonnemaatbeperking van die skip waarop hy in daardie hoedanigheid mag optree. Met dien verstande dat die tonnemaatbeperkings meer as 25 ton maar minder as 100 ton, of 100 ton of meer is.

(4) Hierbenewens bestaan daar twee bevelvoeringsendossemente wat verwerf kan word deur afsonderlike eksamens, een van toepassing op gesagvoerders in die beperkte handelgebied, bekend as die Endossement as Gesagvoerder (Beperkte Handel), een van toepassing op gesagvoerders in die Kortseehandelgebied, bekend as die Endossement as Gesagvoerder (Kortseehandel) en een van toepassing op gesagvoerders in die hawebedryf, bekend as die Endossement as Gesagvoerder (Hawebedryf).

Vrywillige eksamens vir die Bekwaamheidsertifikaat as Gesagvoerder (Spesiale Graad)

3. Die Departement van Vervoer neem vrywillige eksamens af vir die Bekwaamheidsertifikaat as Gesagvoerder (spesiale Graad) ooreenkomstig die bepalings van Aanhangsel O by hierdie regulasies.

Sertifikate "Nie-handelsdiens" en "Hawebedryfsdiens" geëndosseer

4. (1) Offisiere wat minder diens gelewer het as die vereiste minimum diens op handelsvaartuie vir 'n sekere klas sertifikaat ooreenkomstig die regulasies kan bekwaamheidsertifikate verwerf wat beperk is tot indiensneming in nie-handelskepe, welke sertifikate "Nie-handelsdiens" geëndosseer word.

"STCW Convention" means the International Convention on the Standards of Training, Certification and Watchkeeping for Seafarers, 1978;

"the Act" means the Merchant Shipping Act, 1951 (Act No. 57 of 1951).

Introduction and classes of certificates

2. (1) These regulations specify the standards of competency and the conditions to be satisfied for the issue of a certificate of competency—

- (a) Class 1 (Master Mariner);
- (b) Class 2;
- (c) Class 3;
- (d) Class 4;
- (e) Class 5; and
- (f) Class 6—Unlimited Trade or Short Sea Trade or Restricted Trade.

(2) (a) The Certificate of Competency (Deck Officer) Class 6—Restricted Trade shall be issued to a candidate who wishes to obtain a certificate allowing him to act as a watch-keeper or master on vessels operating in the restricted trade only: Provided that such vessels may be less than 25 gross tons and may include small off-shore supply boats, ferries on restricted voyages, day-trip passenger boats and small harbour craft.

(b) The restricted trade endorsement on the certificate shall limit the holder to a specific type of vessel operating in a specified part of the restricted trade area.

(3) The short sea trade endorsement on a Certificate of Competency (Deck Officer) Class 6 shall state whether the holder is permitted to act in the capacity of master or watch-keeper and the tonnage limitation of the ship on which he may act in that capacity: Provided that the tonnage limits shall either be 25 or more gross tons but less than 100 gross tons, or 100 or more gross tons.

(4) In addition, there shall be three command endorsements, obtainable by separate examinations, one appropriate for masters in the limited trade area known as the Master (Limited Trade) endorsement, one appropriate for masters in the short sea trade area known as the Master (Short Sea Trade) endorsement and one appropriate for Masters in the port operation area known as the Master (Port Operation) endorsement.

Voluntary Examinations for the Certificate of Competency as Master Special Grade

3. The Department of Transport shall conduct examinations for the Certificate of Competency as Master Special Grade in accordance with the provisions of Annexure O to these regulations.

Certificates endorsed "Non-trading Service" and "Port Operation Service"

4. (1) Officers who have performed less than the required minimum service on trading vessels for a certain class of certificate in accordance with the regulations shall be able to obtain certificates of competency limited to employment in non-trading ships, which certificates shall be endorsed "Non-trading Service".

(2) Offisiere wat die vereiste minimum diens op hawebedryfvaartuie vir 'n sekere klas sertifikaat ooreenkomstig die regulasies gelewer het, kan bekwaamheidsertifikate verwerf wat beperk is tot werk op hawebedryfvaartuie, welke sertifikate "Hawebedryfdiens" geëndosser word.

(3) Die endossemente in subregulasies (1) en (2) bedoel, word na voltooiing van sodanige gespesifiseerde tydperke op handelskepe, soos deur die Direkteur-generaal verlang verwyder.

Sertifikate deur ander administrasies uitgereik

5. Bekwaamheidsertifikate uitgereik deur die Regering van 'n land wat tot die SODW-konvensie toetree het, word aanvaar as ekwivalent aan die toepaslike sertifikaat wat kragtens die Wet en hierdie regulasies uitgereik word, tensy daar rede bestaan om te glo dat die sertifikaat op bedrieglike wyse verkry is of dat die houer van die sertifikaat nie die persoon is aan wie die sertifikaat uitgereik is nie.

Sertifikate "Gevaarlike vrag" geëndossee

6. Enige skip met 'n massavrag wat in sy geheel of gedeeltelik as gevaarlike vrag gespesifiseer word, moet as gesagvoerende offisier en as tweede-in-bevel onderskeidelik, dekkoffisiere aan boord hê wat, benevens die kwalifikasies wat gewoonlik by hierdie regulasies van hulle vereis word, aan sodanige bykomende vereistes voldoen as wat die Direkteur-generaal mag verlang, en hierdie bykomende vereistes moet op hulle bekwaamheidsertifikate geëndossee word.

Sertifikate voor die inwerkingtreding van hierdie regulasies uitgereik

7. Sertifikate ingevolge die Wet uitgereik voor die inwerkingtreding van hierdie regulasies word beskou as ekwivalent aan die onderskeie klasse van sertifikate beoog in hierdie regulasies, ooreenkomstig Aanhangsel A hiervan.

Minimum vereistes vir die voortgesette geldigheid van bekwaamheidsertifikate

8. (1) Van elke gesagvoerder en elke dekkoffisier wat die houer van 'n sertifikaat is en op see diens doen of wat van voorneme is om na 'n tydperk op land weer seediens te doen, word vereis om met gereelde tussenpose van hoogstens vyf jaar die Direkteur-generaal te oortuig van—

- (a) mediese geskiktheid, veral ten opsigte van gesig en gehoor; en
- (b) professionele bekwaamheid—
 - (i) deur goedgekeurde seediens van minstens een jaar as gesagvoerder of dekkoffisier gedurende die voorafgaande vyf jaar; of
 - (ii) op grond van take verrig in verband met die pligte toepaslik op die sertifikaat gehou, wat beskou word as ekwivalent aan die seediens in subparagraaf (i) vereis; of

(2) Officers who have performed the required minimum service on port operation vessels for a certain class of certificate in accordance with these regulations shall be able to obtain certificates of competency limited to employment in port operation vessels, which certificate shall be endorsed "Port Operation Service".

(3) The endorsements referred to in subregulations (1) and (2) shall be removed upon completion of such specified periods in trading ships as may be required by the Director-General.

Certificates issued by other administrations

5. Certificates of competency issued by the government of a country which has acceded to the STCW Convention may be accepted by the Director-General as equivalent to the appropriate certificate issued in terms of the Act and these regulations unless there are grounds for believing that the certificates have been fraudulently obtained or that the holder of the certificate is not the person to whom the certificate was issued.

Dangerous cargo endorsement

6. Any ship which has a bulk cargo specified in whole or part as being a dangerous cargo shall carry as officer in command and as second in command deck officers who, in addition to holding the qualifications required generally of them under these regulations, shall satisfy such additional requirements as may be required by the Director-General, and these additional requirements shall be endorsed on their certificates of competency.

Certificates issued prior to the coming into effect of these regulations

7. Certificates issued under the Act prior to the coming into effect of these regulations shall be deemed to be equivalent to the various classes of certificates contemplated in these regulations, in accordance with Annexure A hereto.

Minimum requirements for the continued validity of certificates of competency

8. (1) Every master and every deck officer holding a certificate who is serving at sea or intends to return to sea after a period ashore shall, in order to continue to qualify for seagoing service, be required at regular intervals not exceeding five years to satisfy the Director-General as to—

- (a) medical fitness, particularly regarding eyesight and hearing; and
- (b) professional competence—
 - (i) by approved seagoing service of at least one year as master or deck officer during the preceding five years; or
 - (ii) by virtue of having performed functions relating to the duties appropriate to the certificate held which are considered to be at least equivalent to the seagoing service required in subparagraph (i); or

(iii) op een van die volgende maniere:

Deur 'n goedgekeurde toets te slaag; of
 deur 'n goedgekeurde kursus of kursus te deurloop; of

deur goedgekeurde seediens as 'n dekkoffisier te voltooi vir 'n tydperk van minstens drie maande in 'n botallige hoedanigheid onmiddellik voordat hy die rang waarop hy kragtens sy sertifikaat geregtig is, opneem.

(2) Elke gesagvoerder en dekkoffisier moet vir voortgesette seediens aan boord van vaartuie ten opsigte waarvan daar internasionaal op spesiale opleidingsvereistes ooreengekom is, die goedgekeurde toepaslike opleiding suksesvol voltooi.

HOOFSTUK 2

VEREISTES

Bewys van nasionaliteit

9. (1) Van elke kandidaat vir 'n sertifikaat van enige klas word vereis om bewys te lewer van Suid-Afrikaanse nasionaliteit of van permanente verblyf in Suid-Afrika of van nasionaliteit van 'n verdragsland.

(2) Die bewys wat by subregulasie (1) verlang word, behels die voorlê van die kandidaat se identiteitsdokument of paspoort en, indien van toepassing, 'n permanente verblyfpermit.

Eksamendatum en plekke waar eksamens afgeneem word

10. Die eksamendatum en plekke waar eksamens afgeneem word, word elke jaar deur die Direkteur-generaal in Marinekennisgewings gepubliseer.

Hoe om aansoek te doen

11. (1) Kandidaat wat die hele eksamen of slegs 'n gedeelte daarvan wil aflê, moet 'n aansoekvorm, goedgekeur deur die Direkteur-generaal, invul.

(2) Die vorm in subregulasie (1) bedoel, moet behoorlik ingevul word en tesame met die toepaslike eksamengeld en getuigskrifte, ontslagsertifikate, bewys van nasionaliteit, bekwaamheidsertifikaat of dienssertifikaat, as daar is, en waghoudienssertifikaat of enige ander sertifikaat, soos vereis, minstens twee weke voor die datum van die eksamen ingelewer word by die senior eksaminator by die hawe waar die eksamen afgeneem gaan word.

(3) 'n Kandidaat word nie in die mondelinge of seingedeelte van 'n eksamen ondervra alvorens hy in die geskrewe gedeelte geslaag het of vrystelling daarvan verleen is nie.

(4) Kandidaat moet enige onderbrekings in hulle seediens tot tevredenheid van die eksaminator verduidelik.

(5) (a) 'n Kandidaat wat enige deel van die eksamen voltooi het en verlang om in die ander deel of gedeeltes geëksamineer te word vir daardie klas sertifikaat, moet twee weke kennis van sy voorneme gee.

(b) Kandidaat moet aparte aansoekvorms vir elke deel van die eksamen invul.

(iii) in one of the following ways:

Passing an approved test; or

successfully completing an approved course or courses; or

having completed approved seagoing service as a deck officer for a period of not less than three months in a supernumerary capacity immediately prior to taking up the rank to which he is entitled by virtue of his certificate.

(2) Every master and deck officer shall, for continuing seagoing service on board ships for which special training requirements have been internationally agreed upon, successfully complete the approved relevant training.

CHAPTER 2

REQUIREMENTS

Proof of nationality

9. (1) Every candidate for a certificate of any class shall be required to produce proof of South African nationality or of permanent residence in South Africa or of nationality of a treaty country.

(2) The proof required in subregulation (1) shall involve the production of the candidate's identity document or passport and, if applicable, permanent residence permit.

Dates and places of examinations

10. The dates on which and places where examinations are to be held shall be published annually by the Director-General in Marine Notices.

How to apply

11. (1) Candidates for the whole or part of an examination shall complete an application form as approved by the Director-General.

(2) The form referred to in subregulation (1), duly completed, together with the appropriate examination fees and testimonials, discharge certificates, proof of nationality, certificate of competency or service, if any, and watch-keeping or any other certificates, as required, shall be lodged with the senior examiner at the port where the examination is to be conducted at least two weeks before the date of the examination.

(3) A candidate shall not be examined in the oral or signals part of an examination before having completed the written part or having been granted exemption therefrom.

(4) Candidates shall be required to explain to the satisfaction of the examiner any periods of discontinuity in their sea service.

(5) (a) A candidate who has completed any part of the examination and wishes to be examined in the other part or parts for that class of certificate shall give two weeks notice of his intention.

(b) Candidates shall be required to complete separate application forms for each part of the examination.

(6) (a) Kandidate wat by hul tweede of daaropvolgende poging in die skriftelike deel van die eksamen drui, kom nie in aanmerking vir 'n verdere poging nie tot die datum bepaal vir die eksamen wat volg op die volgende vir daardie klas sertifikaat of bevelvoerings-endorsement: Met dien verstande dat hierdie beperking nie van toepassing is op kandidate aan wie in een vak in die skriftelike deel uitstel verleen is of wat in die mondelinge of seingedeelte van die eksamen drui nie.

(b) Slegs twee agtereenvolgende pogings om 'n skriftelike eksamen af te lê, word deur die eksaminator toegelaat.

Hoe om in spesiale gevalle aansoek te doen

12. (1) In gevalle waar kandidate twyfel of hul diens aan die vereistes van die regulasies voldoen en verlang om hul saak vir spesiale oorweging voor te lê, moet hulle al hul sertifikate, ontslagsertifikate, getuigskrifte en waghoudienssertifikate, soos verlang, tesame met die volledig ingevulde aansoekvorm aan die eksaminator voorlê.

(2) Voorleggings van kandidate oorsee kan aan 'n eksaminator geos word: Met dien verstande dat oorspronklike dokumente nie gestuur moet word nie, maar dat volle besonderhede oor die geval wat, indien nodig, gesteun word deur gewaarmerkte fotokopieë van dokumente, ingesluit moet word.

Omkopery

13. 'n Kandidaat wat aan omkopery skuldig bevind is soos beoog in artikel 314 van die Wet of wat ingevolge artikel 324 'n boete vir sodanige omkopery opgelê is, word nie tot 'n eksamen vir 'n bekwaamheidsertifikaat toegelaat nie alvorens 'n tydperk van minstens 12 maande vanaf die datum van sodanige skuldigbevinding of boeteoplegging verloop het.

Getuigskrifte verlang

14. Getuigskrifte aangaande karakter, met inbegrip van soberheid, en ondervinding en bekwaamheid aan boord van 'n skip vir minstens die laaste 12 maande sediens wat die datum van aansoek om eksaminering voorafgaan, en aangaande goeie gedrag ter see vir dieselfde tydperk, word van alle kandidate vereis, welke getuigskrifte in 'n vorm moet wees soos in Aanhangel B voorgeskryf en, behalwe in spesiale omstandighede, deur die gesagvoerder onderteken moet word.

Onbevredigende gedrag

15. Kandidate of potensiële kandidate wat, na ondertekening van ooreenkomste met die bemanning, soos beoog in artikel 102 van die Wet, versuim het om by hul vaartuie aan te sluit, of wat nadat hulle aangesluit het hul vaartuie om 'n ander rede as ontslag verlaat het, of wat hulle aan boord aan wangedrag skuldig gemaak het, moet bevredigende bewys lewer van twee jaar daaropvolgende diens met goeie gedrag ter see, tensy die Direkteur-generaal dit na ondersoek goedgevind om hierdie tydperk te verminder.

(6) (a) Candidates who fail in the written part of an examination at their second or subsequent attempt shall not be considered eligible for a further attempt until the date set for the examination following upon the next for that class of certificate or command endorsement: Provided that this restriction shall not apply to candidates who are referred in one subject in the written part or who fail in the oral or signals part of the examination.

(b) Only two successive attempts at a written examination shall be allowed by the examiner.

How to apply in special cases

12. (1) In cases where candidates are in doubt as to whether their service complies with the requirements of the regulations and wish to submit their cases for special consideration, all certificates, discharges, testimonials and watch-keeping certificates as required, together with the application form duly completed, shall be submitted to an examiner.

(2) Submissions from candidates abroad may be made by post to an examiner: Provided that original documents shall not be forwarded but full details of the case, which shall be supported if necessary by certified photocopies of documents, shall be included.

Bribery

13. Any candidate who has been convicted of bribery as contemplated in section 314 of the Act or who has been penalised in terms of section 324 for such bribery shall not be admitted to any examination for a certificate of competency until a period of at least 12 months has elapsed since the date of such conviction or penalty.

Testimonials required

14. Testimonials as to character, including sobriety, and as to experience and ability on board ship for at least the last 12 months of sea service preceding the date of application to be examined, and as to good conduct at sea for the same period, shall be required of all candidates, which testimonials shall be in a form similar to Annexure B and shall, except in special circumstances, be signed by the Master.

Unsatisfactory conduct

15. Candidates or potential candidates who, after having signed crew agreements as contemplated in section 102 of the Act, have neglected to join their vessels, or who after having joined have left their vessels other than upon discharge, or who have committed misconduct on board, shall be required to produce satisfactory proof of two years' subsequent service with good conduct at sea, unless the Director-General, after investigation, reduces this period.

Doofheid en ander liggaams- en geestesgebreke

16. (1) Indien die eksaminator in die loop van die eksamen vind dat 'n kandidaat doof is of 'n spraakgebrek het of aan die een of ander liggaamlike of geestesgebrek ly, en by verdere ondersoek daarvan oortuig is dat die mate van gebrek sodanig is dat dit die kandidaat onbekwaam maak vir die vervulling van die gewone pligte ter see as die houer van 'n bekwaamheidsertifikaat, moet hy die kandidaat nie toelaat om die eksamen te voltooi nie.

(2) Die eksaminator moet elke geval in subregulasie (1) beoog aan die Direkteur-generaal rapporteer en as die kandidaat die houer is van 'n bestaande gesondheidsertifikaat moet daardie sertifikaat saam met die verslag deurgestuur word.

(3) As 'n kandidaat daarna 'n mediese sertifikaat bedoel in subregulasie (1) toon te dien effekte dat sy gehoor, spraak, of liggaams- of geestestoestand verbeter het of normaal is, moet die Direkteur-generaal die kandidaat se aansoek om eksamen heroorweeg.

Kandidaat se kennis van Engels of Afrikaans

17. (1) Kandidaat kan kies of hulle die eksamen in Engels of in Afrikaans wil aflê en van 'n kandidaat vir 'n eksamen vir 'n ander bekwaamheidsertifikaat as 'n Klas 6, wat verkies om die eksamen in Afrikaans af te lê, word verwag om aan die eksaminator te bewys dat hy ten volle vertrou is met die IMO "Standard Maritime Vocabulary."

(2) Kandidaat moet ter bevrediging van die eksaminator bewys lewer dat hulle Engels of Afrikaans goed genoeg kan praat en skryf om hul pligte aan boord van 'n Suid-Afrikaanse vaartuig te verrig, en 'n kandidaat wat druipe weens 'n gebrek aan kennis van Engels of Afrikaans mag hy nie hereksamineer word voordat 'n verdere ses maande verloop het nie.

Eksamenuitslae

18. (1) Kandidaat wat in hul eksamens slaag, ontvang vorm TV5/106, wat ingedien moet word wanneer die kandidaat hul sertifikate gaan afhaal by die hawe deur hulle op hul aansoekvorms aangedui.

(2) 'n Kandidaat wat net gedeeltelik in die eksamen geslaag het of daarin gedruip het, ontvang vorm TV5/107 van die eksaminator, waarop die eksamenuitslae verstrek word, welke vorm deur sodanige kandidaat by die eksaminator ingedien moet word wanneer hy weer om eksaminering aansoek doen.

Onvoldoende seediens

19. Indien daar bevind word dat 'n kandidaat wat in die eksamen geslaag het, nie oor voldoende diens beskik om hom geregtig te maak op 'n sertifikaat van daardie klas waarvoor hy geslaag het nie, word 'n sertifikaat van sodanige klas nie aan hom uitgereik nie: Met dien verstande dat indien die Direkteur-generaal daarvan oortuig is dat die fout in die berekening van die kandidaat se diens nie voorgekom het weens 'n fout van of opsetlike wanvoorstelling deur die kandidaat nie, die sertifikaat aan die kandidaat toegeken word sodra die seediensrekort aangevul is.

Deafness and other physical and mental disabilities

16. (1) If in the course of the examination the examiner finds that a candidate is afflicted with deafness, with an impediment in speech or with some other physical or mental infirmity, and upon further investigation is satisfied that the degree of infirmity is such as to render the candidate incapable of discharging adequately the ordinary seagoing duties of the holder of a certificate of competency, he shall not allow the candidate to complete the examination.

(2) The examiner shall report every case contemplated in subregulation (1) to the Director-General and if the candidate is the holder of an existing health certificate that certificate shall be forwarded with the report.

(3) If a candidate referred to in subregulation (1) subsequently produces a medical certificate to the effect that his hearing, speech, or physical or mental condition has improved or is normal, the Director-General shall reconsider the candidate's application for examination.

Candidate's knowledge of English or Afrikaans

17. (1) Candidates shall have the option of undertaking the examination in either English or Afrikaans and a candidate in an examination for a certificate of competency other than Class 6 who elects to be examined in Afrikaans shall be required to demonstrate to the examiner that he has a full knowledge of the IMO Standard Maritime Vocabulary.

(2) Candidates shall be required to prove to the satisfaction of the examiner that they can speak and write English or Afrikaans sufficiently well to perform the duties required of them on board a South African vessel, and if a candidate fails through ignorance of English or Afrikaans he shall not be re-examined until a further six months have elapsed.

Examination results

18. (1) Candidates who pass their examinations shall receive a form TV5/106, which shall be produced by the candidates when collecting certificates at the port designated by them on their application forms.

(2) A candidate who fails or is partially successful in his examination shall receive from the examiner form TV5/107, stating his results, which form shall be produced to the examiner by such candidate when next applying for examination.

Insufficient sea service

19. If, after a candidate has passed an examination, it is found that his sea service is insufficient to entitle him to receive a certificate of that class for which he passed, a certificate of such class shall not be granted to him: Provided that if the Director-General is satisfied that the error in calculation of the candidate's service did not occur through fault or wilful misrepresentation by the candidate, such certificate shall be granted to him when he has made up the deficiency in sea service.

HOOFSTUK 3**KLASSE VAN SERTIFIKATE: BESONDERE VEREISTES****Klas 6 (Sien Aanhangsel F)**

20. (1) 'n Kandidaat vir die beperkte sertifikaat moet minstens 20 jaar oud wees en moet minstens 24 maande seediens in enige aanvaarbare dekhoedanigheid verrig het op een van die volgende vaartuie:

- (a) Gewone handelsvaartuie;
- (b) vissersvaartuie;
- (c) vaartuie van Klas V, VI of VII;
- (d) vaartuie betrokke by plaaslike operasies wat nie ten volle binne die grense van voorgeskrewe hawens val nie; of
- (e) vaartuie wat slegs binne die hawegrense opereer;

Met dien verstande dat die seediens waarop aanspraak gemaak word, verenigbaar is met die beperkings op die bekwaamheidsertifikaat aangedui.

(2) 'n Kandidaat vir die Kortseehandel- of Onbegrenstehandelcertifikaat moet minstens 20 jaar oud wees en moet minstens 36 maande seediens in enige aanvaarbare dekhoedanigheid verrig het op een van die volgende vaartuie:

- (a) Gewone handelsvaartuie;
- (b) vissersvaartuie
- (c) vaartuie van Klas XI of XII:

Met dien verstande dat die seediens waarop aanspraak gemaak word, verenigbaar is met die sertifikaat aangevra.

Klasse 4 en 5 (Sien Aanhangsels G en H onderskeidelik)

21. (1) 'n Kandidaat moet minstens 19 jaar oud wees en moet die volgende seediens op gewone handelsvaartuie verrig het:

- (a) Óf 2½ jaar as kadet of leerlingdekoffisier wat 'n erkende opleidingsprogram deur die Direkteur-generaal erken, deurloop het;
- (b) óf 3½ jaar in enige aanvaarbare dekhoedanigheid:

Met dien verstande dat minstens ses maande van die laaste 12 maande seediens bestee is aan pligte in verband met brugwaghouding onder toesig van 'n gediplomeerde offisier.

(2) Die tydperke van seediens in paragrawe (a) en (b) van subregulasie (1) bedoel, kan deur kwytstelling tot 'n maksimum van 10 maande verminder word vir die bywoning van goedgekeurde opleidingskursusse.

(3) 'n Kandidaat wie se diens hoofsaaklik op sleepbote verrig is, kan kwalifiseer vir 'n sertifikaat wat "Slegs sleepbootdiens" geëndosseer is: Met dien verstande dat indien nie minder nie as 12 maande van die tydperk gespesifiseer in paragrawe (a) en (b) van subregulasie (1) op sleepbote ter see verrig is, die res verrig kan word—

- (a) ter see op ander skepe as sleepbote; of
- (b) op sleepbote op die kortseehandel, bereken teen driekwart van die tydperk.

CHAPTER 3**CLASSES OF CERTIFICATES: SPECIFIC REQUIREMENTS****Class 6 (see Annexure F)**

20. (1) A candidate for the restricted certificate shall be not less than 20 years of age and shall have served at sea for not less than 24 months in any acceptable deck capacity in vessels being either—

- (a) ordinary trading vessels;
- (b) fishing vessels;
- (c) vessels of Class V, VI or XII;
- (d) vessels engaged in local operations other than wholly within the harbour limits of prescribed harbours; or
- (e) vessels whose operations are wholly within harbour limits:

Provided that the sea time claimed shall be consistent with the limitations required on the certificate of competency.

(2) A candidate for the Short Sea Trade or Unlimited Trade Certificate shall be not less than 20 years of age and shall have served at sea for not less than 36 months in any acceptable deck capacity in vessels being either—

- (a) ordinary trading vessels;
- (b) fishing vessels; or
- (c) vessels of Class XI or XII:

Provided that the sea time claimed shall be consistent with the certificate required.

Classes 4 and 5 (see Annexures H and G, respectively)

21. (1) A candidate shall be not less than 19 years of age and shall have served at sea in ordinary trading vessels either—

- (a) for 2½ years as a cadet or trainee deck officer undergoing a training programme recognised by the Director-General; or
- (b) for 3½ years in any acceptable deck capacity:

Provided that at least 6 months of the final 12 months' sea service shall have been spent on duties associated with bridge watch-keeping under the supervision of a certificated officer.

(2) The periods of sea service referred to in paragraphs (a) and (b) of subregulation (1) may be reduced by remission up to a maximum of 10 months for attendance at approved courses of training.

(3) A candidate whose service has been performed mainly in tugs may qualify for a certificate endorsed "Tug service only": Provided that if not less than 12 months of the period specified in paragraphs (a) and (b) of subregulation (1) has been served in tugs at sea the balance may be served—

- (a) at sea in ships other than tugs; or
- (b) in tugs on the short sea trade, counted at three-quarters rate.

Kwytskelding van seediens vir die bywoning van goedgekeurde opleidingskursusse kan die res van die kwalifiserende diens met hoogstens 10 maande verkort, maar nie die minimum van 12 maande seediens nie.

Klas 3 (Sien Aanhangsel I)

22. (1) 'n Kandidaat—

- (a) moet minstens 19 jaar oud wees;
- (b) moet die seediens by regulasie 21 vereis, voltooi het; en
- (c) moet die houer wees van 'n Nasionale Senior Sertifikaat waarop aangedui word dat hy geslaag het in Wiskunde en Fisika, of hulle ekwivalente soos deur die Direkteur-generaal bepaal.

(2) 'n Bekwaamheidsertifikaat as Dekoffisier Klas 4 word vir doeleindes van hierdie paragraaf as ekwivalent aan 'n Nasionale Senior Sertifikaat beskou.

Klas 2 (Sien Aanhangsel J)

23. (1) 'n Kandidaat—

- (a) moet minstens 21 jaar oud wees;
- (b) moet aan die vereistes vir 'n Klas 3-sertifikaat voldoen; en
- (c) moet minstens 18 maande ter see as 'n brugwaghou-offisier diens verrig het op gewone handelsvaartuie terwyl hy die houer van minstens 'n Klas 4-bekwaamheidsertifikaat was.

(2) Minstens ses maande van die tydperk in paragraaf (c) van subregulasie (1) bedoel, moet op vaartuie wat lang seereise aflê, verrig wees.

(3) Offisiere wie se diens hoofsaaklik op sleepbote verrig is, kan in aanmerking kom vir die eksamen vir 'n Klas 2-sertifikaat beperk tot indiensneming op sleepbote. Met dien verstande dat minstens ses maande van sodanige diens voltooi is op sleepbote op lang seereise.

Klas 1 (Sien Aanhangsel K)

24. (1) 'n Kandidaat—

- (a) moet 'n Suid-Afrikaanse burger, 'n permanente inwoner van die Republiek of 'n burger van 'n verdragsland wees;
- (b) moet minstens 23 jaar oud wees; en
- (c) moet op gewone handelsvaartuie diens gedoen het—
 - (i) minstens twee jaar ter see as waghou-offisier terwyl hy die houer van minstens 'n Klas 4-sertifikaat was; en
 - (ii) minstens 18 maande ter see as waghou-offisier terwyl hy die houer van minstens 'n Klas 2-sertifikaat was.

(2) Minstens 18 maande van die volle tydperk in paragraaf (c) van subregulasie (1) bedoel, moet op vaartuie wat lang seereise aflê, verrig word, en minstens ses maande van daardie tydperk moet verrig word op vaartuie wat seereise na hawens buite die Republiek aflê.

Remissions of sea service for attendance at approved courses of training may reduce the balance of qualifying service by up to a maximum of 10 months, but not the minimum of 12 months' sea service.

Class 3 (see Annexure I)

22. (1) A candidate—

- (a) shall be at least 19 years of age;
- (b) shall have completed the sea service required by regulation 21; and
- (c) shall hold a National Senior Certificate in which it is indicated that he has passed in Mathematics and Physics, or their equivalent as determined by the Director-General.

(2) For the purposes of this paragraph a certificate of competency as Deck Officer Class 4 shall be accepted as equivalent to a National Senior Certificate.

Class 2 (see Annexure J)

23. (1) A candidate—

- (a) shall be at least 21 years of age;
- (b) shall have qualified for the issue of a Class 3 certificate; and
- (c) shall have served at least 18 months at sea as a bridge watch-keeping officer in ordinary trading vessels while holding a certificate of competency not lower than Class 4.

(2) At least 6 months of the period referred to in paragraph (c) of subregulation (1) shall be served on vessels engaged in long voyages.

(3) Officers whose service has been performed mainly in tugs may qualify for examination for a Class 2 certificate limited to employment in tugs: Provided that at least 6 months of such service has been served in tugs engaged on long voyages.

Class 1 (see Annexure K)

24. (1) A candidate—

- (a) shall be a South African citizen, a permanent resident of the Republic or the citizen of a treaty country;
- (b) shall be at least 23 years of age; and
- (c) shall have served in ordinary trading vessels—
 - (i) for at least two years at sea as a watch-keeping officer while holding a certificate not lower than Class 4; and
 - (ii) for at least 18 months at sea as a watch-keeping officer while holding a certificate not lower than Class 2.

(2) At least 18 months of the total period referred to in paragraph (c) of subregulation (1) shall have been served on vessels engaged in long voyages, and at least six months of that period shall have been served on vessels engaged in voyages to ports outside the Republic.

(3) Offisiere wat houters is van 'n Dienssertifikaat as Gesagvoerder uitgereik ingevolge artikel 80 van die Wet, en wat in die Suid-Afrikaanse Vloot diens gedoen het, kan die eksamen vir 'n Bekwaamheidsertifikaat (Dekoffisier) Klas 1 aflê sonder bewys van seediens en sonder om die eksamen vir 'n laer klas sertifikaat af te lê.

Sertifikaat as Gesagvoerder (Spesiale Graad)

25. Die eksamen vir die Sertifikaat as Gesagvoerder (Spesiale Graad) is vrywillig en is bedoel vir offisiere wat hulle kwalifikasies wil verbeter en wat 'n sertifikaat van die hoogste graad wat deur die Minister toegeken word, wil verwerf.

Bevelvoeringsendossemente

26. (1) Daar is twee vlakke van bevelvoeringsendossemente van bekwaamheidsertifikate vir dekkoffisiere—een vir Gesagvoerders in diens in die begrensde-handelsgebied en die ander vir Gesagvoerders in diens in die kortseehandelsgebied.

(2) Waar diens beperk is tot vaartuie soos sleepbote en bystand- of seismiese en oseanografiese opmetingsvaartuie kan dieselfde vlakke van bevelvoeringsendossement as dié in subregulasie (1) beoog, uitgereik word.

(3) 'n Kandidaat vir enige bevelvoeringsendossement moet minstens 23 jaar oud wees en moet behoudens die bepalings van subregulasie (4) minstens 3 jaar seediens verrig het as waghoud-offisier terwyl hy die houer was van minstens 'n Klas 5-bekwaamheidsertifikaat.

(4) Die kwalifiserende vereiste van 3 jaar ter see as waghoud-offisier bedoel in subregulasie (3) kan, in die geval van 'n kandidaat vir die Endossement as Gesagvoerder (Kortseehandel) soos volg saamgestel wees:

- (a) Minstens 12 maande werklike seediens as waghoud-offisier moet verrig word na kwalifisering vir die Klas 5-bekwaamheidsertifikaat.
- (b) Waghoudiens wat verrig is alvorens 'n Klas 5-bekwaamheidsertifikaat verwerf is, mag aanvaar word om die res van die vereiste 3 jaar te behaal: Met dien verstande dat geen sodanige diens twee keer in aanmerking geneem mag word nie, dit is vir sowel die eerste Klas 5-bekwaamheidsertifikaat as die bevelvoerdersendossement.
- (c) Kwalifiserende diens as eerste-in-bevel of tweede-in-bevel na die uitreiking van die Klas 5-bekwaamheidsertifikaat kan in berekening gebring word vir die vereiste 3 jaar, bereken teen 1½ keer die werklike waghoudiens.

(5) 'n Kandidaat vir 'n Endossement as Gesagvoerder (Hawebedryf) moet minstens 18 maande diens as 'n waghoud-offisier verrig het terwyl hy die houer van 'n ander bekwaamheidsertifikaat as 'n Klas 6-bekwaamheidsertifikaat was: Met dien verstande dat minstens ses maande diens op vaartuie bedrywig in kortseehandel verrig is.

(6) 'n Kandidaat vir 'n Endossement as Gesagvoerder (Begrenste Handel) moet die houer van 'n Bekwaamheidsertifikaat Klas 2, Klas 3 of Klas 4 wees en moet minstens 18 maande van die kwalifiserende tydperk van 3 jaar soos bedoel in subregulasie (3) deurgebring het op gewone handelsvaartuie wat vaar tussen hawens waarvan minstens een buite die kortseehandelsgebied geleë is.

(3) Officers holding a Certificate of Service as Master issued under section 80 of the Act; and who have served in the South African Navy, may be examined for a Certificate of Competency (Deck Officer) Class 1 without producing evidence of sea service and without taking the examination for a lower class certificate.

Master Special Grade Certificate

25. The examination for the Master Special Grade certificate is voluntary and is intended for officers who wish to improve their qualifications and who wish to have a certificate of the highest grade granted by the Minister.

Command endorsements

26. (1) Two levels of command endorsements of certificates of competency for deck officers may be issued—one appropriate for Masters employed in the limited trade area and the other for Masters employed in the short sea trade area.

(2) In the case of service limited to vessels such as tugs, standby or seismic and oceanographic survey vessels the same levels of command endorsement as those contemplated in subregulation (1) may be issued.

(3) A candidate for any command endorsement shall be at least 23 years of age and shall, subject to the provisions of subregulation (4), have served three years at sea as a watch-keeping officer while holding a certificate of competency not lower than Class 5.

(4) The qualifying requirement of three years at sea as a watch-keeping officer referred to in subregulation (3) may, in the case of a candidate for a Master (Short Sea Trade) endorsement, be made up as follows:

- (a) At least 12 months' actual sea service as a watch-keeping officer shall be completed after having qualified for the issue of a Class 5 Certificate of Competency.
- (b) Watch-keeping service performed before obtaining a Class 5 Certificate of Competency may be accepted to make up the balance of the three years requirement: Provided that no such service may be counted twice, i.e. towards both a first Class 5 Certificate of Competency and the command endorsement.
- (c) Qualifying service as chief or only mate following the issue of a Class 5 Certificate of Competency may be counted towards the total three years' requirement at 1½ times the actual watch-keeping service.

(5) A candidate for a Master (Port Operation) endorsement shall have served for 18 months as a Watch-keeping Officer while holding a certificate of competency other than a Class 6 Certificate of Competency: Provided that at least six months shall have been served on vessels engaged in the short sea trade.

(6) A candidate for a Master (Limited Trade) endorsement shall hold a Class 2, Class 3 or Class 4 Certificate of Competency and shall have spent at least 18 months of the three-year qualifying period referred to in subregulation (3) in ordinary trading vessels trading between ports at least one of which is situated beyond the limits of the short sea trade area.

(7) 'n Kandidaat vir 'n Endossement as Sleepboot-gesagvoerder (Beperkte Handel) moet die houer wees van 'n Bekwaamheidsertifikaat Klas 2, Klas 3 of Klas 4 en moet minstens 18 maande van die kwalifiserende tydperk van 3 jaar soos bedoel in subregulasie (3) deurgebring het as Eerste Waghout-offisier op sleepbote wat buite die kortsee handelsgebied vaar.

(8) 'n Kandidaat vir 'n Endossement as Sleepboot-gesagvoerder (Kortseehandel) moet altesaam 3 jaar as waghout-offisier diens gedoen het terwyl hy die houer van minstens 'n Klas 5-bekwaamheidsertifikaat was, welke tydperk kan bestaan uit minstens 12 maande ter see op 'n sleepboot op die kortseehandel en die res uit seediens óf op ander skepe as sleepbote, óf op sleepbote wat hawediens doen, bereken teen 50% van die werklike diens verrig.

Verwydering van beperkings

27. Offisiere wat die houer is van bekwaamheidsertifikate wat beperk is ten opsigte van die gebruik en tipe vaartuig kan sodanige beperking laat verwyder ooreenkomstig die bepalinge van regulasie 4 (3).

Addisionele kwalifikasies moet verstrek word

28. (1) Alle kandidate moet dokumentêre bewys lewer van bykomende geldige kwalifikasies in hul besit voordat hulle kwalifiseer vir die uitreiking van bekwaamheidsertifikate of vir bevelvoeringsendossemente op bestaande sertifikate.

(2) Die bykomende kwalifikasies in subregulasie (1) bedoel, gespesifiseer vir elke klas van sertifikaat en bevelvoeringsendossement daarvan, is soos volg:

(7) A candidate for a Tugmaster (Limited Trade) endorsement shall hold a Class 2, Class 3 or Class 4 Certificate of Competency and shall have served at least 18 months of the three-year qualifying period referred to in subregulation (3) as First Watch-keeping Officer in tugs operating beyond the short sea trade area.

(8) A candidate for a Tugmaster (Short Sea Trade) endorsement shall have served as a watch-keeping officer while holding a certificate of competency not lower than Class 5 for a total of three years, which may be made up of a minimum of 12 months at sea in a tug on the short sea trade and the balance by either or both service at sea in ships other than tugs or service in tugs engaged in harbour duties, reckoned at 50% of the actual time served.

Removal of limitations

27. Officers holding certificates of competency which are limited as to use and type of vessel may have the limitation removed in accordance with regulation 4 (3).

Additional qualifications to be produced

28. (1) All candidates shall be required to produce documentary evidence of additional valid qualifications held before qualifying for the issue of certificates of competency or for command endorsements upon existing certificates.

(2) The additional qualifications contemplated in subregulation (1), specified for each class of certificate and command endorsement thereto, are as follows:

Addisionele kwalifikasie	Klas van sertifikaat of bevelvoeringsendossement									
	1	2	* 2e	3	* 3e	4	* 4e	5	* 5e	6
Gesigtoetssertifikaat.....	X	X	X	X	X	X	X	X	X	X
Navigasiebeheerkursus.....	X	X	X		X		X		X	
Praktiese Noodhulpsertifikaat.....										X
Sertifikaat in Noodhulp ter See				X		X		X		X
Skeepskaptein se Sertifikaat in Mediese Opleiding.....	X	X	X		X		X		X	
Brandbestrydingskursussertifikaat (twee dae)...										X
Brandbestrydingskursussertifikaat (vier dae)				X		X		X		
Kursus in Elektroniese Navigasiestelsels				X		X		X		
Sertifikaat as Bekwame Dekseeman.....				X		X		X		
Sertifikaat van Bekwaamheid in oorlewings-vaartuie				X		X		X		
Sertifikaat van Bekwaamheid in oorlewings-vaartuie (plaaslik)										X
Beperkte Radiotelefoonbedienersertifikaat (See) of Beperkte Operateursertifikaat (GMDSS).....				X		X		X		X
Mediese Sertifikaat.....	X	X	X	X	X	X	X	X	X	X

* Dui die Bevelvoeringsendossement vir Kortseehandel of Beperkte Handel aan na gelang van die geval.

Additional qualification	Class of certificate or command endorsement									
	1	2	* 2e	3	* 3e	4	* 4e	5	* 5e	6
Sight test certificate	X	X	X	X	X	X	X	X	X	X
Navigation Control Course	X	X	X		X		X		X	
Practical First Aid Certificate.....										X
First Aid at Sea Certificate				X		X		X		
Ship Captain's Medical Training Certificate	X	X	X		X		X		X	
Fire-fighting Course Certificate (Two-day).....										X
Fire-fighting Course Certificate (Four-day)				X		X		X		
Electronic Navigation Systems Course.....				X		X		X		
Efficient Deck Rating Certificate				X		X		X		
Certificate of Proficiency in Survival Craft.....				X		X		X		
Certificate of Proficiency in Survival Craft (Local)										X
Restricted Radio Operator's Certificate (Marine) or GMDSS Restricted Operator's Certificate				X		X		X		X
Medical certificate.....	X	X	X	X	X	X	X	X	X	X

* Indicates the Short Sea Trade or Limited Trade Command endorsements, as the case may be.

Gesigtoetssertifikaat

29. (1) Geen kandidaat word vir enige deel van 'n eksamen aanvaar nie, tensy hy in besit is van 'n geldige gesigtoetssertifikaat.

(2) Die gesigtoetssertifikaat in subregulasie (1) bedoel, word uitgereik nadat die gesigtoets van die Departement van Vervoer, Marine-Afdeling, geslaag is, wesenslik in die vorm van Aanhangsel C, vir kandidaat wat vir bekwaamheidsertifikate geëksamineer wil word.

(3) Die gesigtoetssertifikaat in subregulasie (1) bedoel, is slegs vir ses maande geldig.

Sertifikaat in Elektroniese Navigasiestelsels

30. 'n Sertifikaat in Elektroniese Navigasiestelsels is slegs geldig as dit verkry is na voltooiing van 10 maande seediens in die dekadefdeling.

Navigasiebeheerkursusertifikaat

31. 'n Navigasiebeheerkursusertifikaat is slegs geldig as dit verkry is na voltooiing van 18 maande seediens as 'n gediplomeerde waghoud-offisier.

Sertifikaat in Praktiese Noodhulp

32. 'n Sertifikaat in Praktiese Noodhulp is geldig vir 3 jaar vanaf die datum waarop geslaag is in die eksamen aan 'n inrigting wat deur die Direkteur-generaal goedgekeur is.

Sertifikaat Noodhulp ter See

33. 'n Sertifikaat in Noodhulp ter See is geldig vir 3 jaar vanaf die datum waarop geslaag is in die eksamen aan 'n inrigting wat deur die Direkteur-generaal goedgekeur is.

Sight test certificate

29. (1) No candidate shall be accepted for any part of an examination unless he is in possession of a valid sight test certificate.

(2) The sight test certificate referred to in subregulation (1) shall be issued upon the passing of the sight test of the Department of Transport, Marine Division, substantially in the form of Annexure C, for candidates wishing to be examined for certificates of competency.

(3) The sight test certificate referred to in subregulation (1) shall be valid for 6 months.

Electronic Navigation Systems Certificate

30. An Electronic Navigation Systems Certificate shall only be valid if obtained after the completion of 10 months' sea service in the deck department.

Navigation Control Course Certificate

31. A Navigation Control Course Certificate shall only be valid if obtained after the completion of 18 months' sea service as a certificated watch-keeping officer.

Practical First Aid Certificate

32. A Practical First Aid Certificate shall be valid for 3 years from the date of passing the examination at an institution approved by the Director-General.

First Aid At Sea Certificate

33. A First Aid at Sea Certificate shall be valid for 3 years from the date of passing the examination at an institution approved by the Director-General.

Skeepskaptein se Sertifikaat in Mediese Opleiding

34. (1) 'n Skeepskaptein se Sertifikaat in Mediese Opleiding is 5 jaar lank geldig vanaf die datum van slaging in die eksamen.

(2) Vir toelating tot die Skeepskaptein se Kursus in Mediese Opleiding moet 'n kandidaat in besit wees van 'n geldige Sertifikaat in Noodhulp ter See, of 'n Skeepskaptein se Sertifikaat in Mediese Opleiding wat verstryk het.

Sertifikaat van Bywoning van 'n Brandbestrydskursus

35. Kursusse in brandbestryding duur 2 of 4 dae en bywoningssertifikaat is slegs vir 5 jaar geldig.

Beperkte Radiotelefoonbedienersertifikaat (See)

36. 'n Beperkte Bekwaamheidssertifikaat in Radiotelefonie word deur die Direkteur-generaal van Pos- en Telekommunikasiewese uitgereik aan kandidaat wat slaag in die kwalifiserende eksamen, waarvan die besonderhede van die Marineradio-opnemer by die Hoofposkantoor te Durban of Kaapstad verkry kan word.

Beperkte Operateursertifikaat: Globale Marietieme Nood- en -Veiligheidsetelsel (GMDSS)

37. 'n Beperkte Operateursertifikaat (GMDSS) word deur die Direkteur-generaal van Pos- en Telekommunikasiewese uitgereik aan kandidaat wat die kwalifiserende eksamen slaag.

Mediese sertifikaat

38. 'n Mediese sertifikaat is 'n sertifikaat wat deur 'n mediese praktisyn uitgereik word waarin vermeld word dat 'n kandidaat se mediese geskiktheid voldoen aan die vereistes soos in 'n Marinekennisgewing uiteengesit.

Skryftelike eksamens

39. (1) (a) 'n Kandidaat wat kwalifiseer vir 'n Bekwaamheidssertifikaat Klas 2, 4 of 5 kan eksamen aflê in die skryftelike gedeelte van die eksamen vir die volgende hoër klas sertifikaat sonder dat hy bewys hoef te lewer van verdere seediens of enige bykomende kwalifikasie.

(b) 'n Kandidaat wat kwalifiseer vir 'n Klas 2-sertifikaat kan eksamen aflê in die skryftelike gedeelte van die eksamen vir 'n bevelvoeringsendossement en vir die mondelinge toetse vir Skeepsake en Reg van die Kortseehandelsbevelvoeringendossement en vir die Hawebedryfbevelvoeringendossement eksamen sonder dat hy bewys hoef te lewer van verdere seediens of enige bykomende kwalifikasie.

(2) 'n Kandidaat mag nie in die mondelinge of praktiese en, indien van toepassing, die seingedeelte van 'n eksamen geëksamineer word nie totdat die tydperk van waghouidiens of kwalifiserende seediens of beide sodanige tydperk en diens, gespesifiseer vir die uitreiking van 'n sertifikaat of endossement van daardie klas voltooi is nie.

Ship Captain's Medical Training Certificate

34. (1) The Ship Captain's Medical Training Certificate shall be valid for 5 years from the date of passing the examination.

(2) For admission to the Ship Captain's Medical Training Course a candidate shall be in possession of a valid First Aid at Sea Certificate or an expired Ship Captain's Medical Training Certificate.

Fire-fighting Course Attendance Certificate

35. Fire-fighting courses shall be of 2 or 4 days' duration and attendance certificates issued shall be valid for a period of 5 years.

Restricted Radio Telephone Operator's Certificate (Marine)

36. A Restricted Certificate of Competence in Radiotelephony shall be issued by the Director-General of Posts and Telecommunications to candidates who pass the qualifying examination, details of which examination may be obtained by application to the Marine Radio Surveyor at the Main Post Offices of Durban or Cape Town.

Global Maritime Distress and Safety System (GMDSS) Restricted Operator's Certificate

37. A GMDSS Restricted Operator's Certificate shall be issued by the Director-General of Posts and Telecommunications to candidates who pass the qualifying examination.

Medical certificate

38. A medical certificate is a certificate issued by a medical practitioner which states that a candidate's medical fitness complies with the requirements as set out in a Marine Notice.

Written examinations

39. (1) (a) A candidate qualifying for the issue of a Class 2, 4 or 5 Certificate of Competency may sit for the written part of the examination for the next higher class of certificate without producing evidence of further sea service or any additional qualification.

(b) A candidate qualifying for the issue of a Class 2 Certificate may sit for the written part of the examination for a command endorsement and for the Business and Law orals of the Short Sea Trade Command endorsement and for the Port Operation Command endorsement examination without producing evidence of further sea service or any additional qualification.

(2) A candidate shall not be examined in the oral or practical and, if appropriate, signals parts of an examination until the period of watch-keeping or qualifying sea service, or both such period and service, specified for the issue of a certificate or endorsement of that class has been completed.

(3) 'n Slaagsyfer in die skriftelike gedeelte van die eksamen vir 'n Bekwaamheidsertifikaat Klas 1, of vir 'n bevelvoeringsendossement is vir 'n tydperk van 5 jaar geldig; maar 'n slaagsyfer in die skriftelike gedeelte van die eksamen vir ander klasse sertifikate, en in die mondelinge en, indien van toepassing, die seingedeelte van sodanige eksamens, is slegs vir 'n tydperk van 1 jaar geldig.

(4) (a) 'n Kandidaat kan 'n skriftelike eksamen aflê bestaande uit daardie vraestelle in die Klas 3-leerplanne wat bykomende is by Klas 4, te wete Beginsels van Navigasie, Toegepaste Wetenskap en Wiskunde.

(b) Kandidaat wat in die eksamen bedoel in paragraaf (a) slaag en wat daarna vir die Klas 4-sertifikaat kwalifiseer, ontvang krediet vir die Klas 3-sertifikaat, welke sertifikaat aan die kandidaat uitgereik word na voltooiing van die vereiste seidiens.

(c) Kandidaat vir genoemde eksamen hoef geen van die bykomende kwalifikasies voor te lê nie.

(d) Die krediet bedoel in paragraaf (a) is vir 'n tydperk van 5 jaar geldig.

Vrystelling van skriftelike eksamens

40. (1) (a) 'n Kandidaat wat die houer is van 'n Klas 2-sertifikaat word vir 'n tydperk van 5 jaar vrygestel van die toepaslike vraestelle oor Skeepsbou en Skeepsstabiliteit en Skeepsboordwerkzaamhede wanneer eksamen afgelê word vir 'n Endossement as Gesagvoerder (Begrenste Handel), Gesagvoerder (Kortseehandel) of Gesagvoerder (Hawebedryf).

(b) 'n Kandidaat in paragraaf (a) bedoel wat deur in 'n eksamen te slaag kwalifiseer vir die Klas 4-sertifikaat kan te eniger tyd kwalifiseer vir 'n Klas 3-sertifikaat deur in die oorbruggingseksamen in Beginsels van Navigasie, Wiskunde en Toegepaste Wetenskap op Klas 3-vlak te slaag.

(2) 'n Kandidaat vir enige klas dekkoffisersertifikaat kan na goeëdunke van die Direkteur-generaal van die hele skriftelike eksamen of van enige gedeelte daarvan vrygestel word indien hy bewys kan lewer dat hy sodanige nasionaal erkende akademiese kwalifikasie besit soos deur die Direkteur-generaal goedgekeur en in 'n Marinekennisgewing afgekondig is.

Geldigheid van bevelvoeringsendossemente

41. (1) As 'n offisier wat die houer is van 'n Begrenstehandelbevelvoeringsendossement op 'n Klas 4-sertifikaat vir 'n Klas 3- of Klas 2-sertifikaat kwalifiseer, word sodanige endossement outomaties op sy nuwe sertifikaat oorgeplaas.

(2) As 'n offisier wat die houer is van 'n Kortseehandelbevelvoeringsendossement of 'n Hawebedryfbevelvoeringsendossement vir 'n hoër bekwaamheidsertifikaat kwalifiseer, behou hy sodanige endossement totdat hy deur in 'n eksamen te slaag, kwalifiseer vir 'n Begrenstehandelbevelvoeringsendossement of 'n Klas 1-sertifikaat: Met dien verstande dat hy nie kan waarneem as gesagvoerder van enige ander skip as 'n skip waarop 'n Kortseehandelbevelvoeringsendossement van toepassing is nie.

(3) A pass mark in the written part of the examination for a Class 1 Certificate of Competency, or for a command endorsement, shall be valid for a period of 5 years; but a pass in the written part of the examination for other classes of certificates and in the oral and, if appropriate, signals parts of such examinations shall be valid for a period of one year only.

(4) (a) A candidate may sit for a written examination consisting of those papers in the Class 3 syllabus which are additional to Class 4, viz Principles of Navigation, Applied Science and Mathematics.

(b) Candidates who pass in the examination referred to in paragraph (a) and who subsequently qualify for the Class 4 certificate shall be granted credit for a Class 3 certificate, which certificate shall be issued to the candidates on their satisfactory completion of the requisite sea service.

(c) Candidates for the said examination shall not be required to produce any of the additional qualifications.

(d) The credit referred to in paragraph (a) shall be valid for a period of 5 years.

Exemption from written examinations

40. (1) (a) A candidate holding a Class 2 Certificate shall be exempt for a period of 5 years from the appropriate Ship Construction and Stability and Shipboard Operations papers when sitting for the examination for Master (Limited Trade), Master (Short Sea Trade) or Master (Port Operation) endorsement.

(b) A candidate referred to in paragraph (a) who qualifies by examination for the issue of a Class 4 Certificate may at any time qualify for the issue of a Class 3 Certificate by passing the bridging examinations in Principles of Navigation, Mathematics and Applied Science at Class 3 level.

(2) A candidate for any class of deck officer certificate may, at the discretion of the Director-General, be exempted from the whole or any part of the written examination if he produces proof of holding such nationally recognised academic qualification as may be approved by the Director-General and promulgated in a Marine Notice.

Validity of command endorsements

41. (1) An officer holding a Limited Trade Command endorsement to a Class 4 certificate who subsequently qualifies for the issue of a Class 3 or Class 2 Certificate shall automatically have such endorsement transferred to his new certificate.

(2) An officer holding a Short Sea Trade or Port Operations Command endorsement who subsequently qualifies for the issue of a higher certificate of competency shall retain such endorsement until he qualifies by examination for a Limited Trade Command endorsement or a Class 1 certificate: Provided that he may not act as master of any ship other than a ship for which a Short Sea Trade Command endorsement is appropriate.

Afskrifte van verlore sertifikate

42. (1) Die houer van 'n bekwaamheidsertifikaat of dienssertifikaat moet wanneer sodanige sertifikaat verlore raak by die bevoegde beampte by die naaste hawe aansoek doen om 'n gewaarmerkte afskrif daarvan deur 'n aansoekvorm in te vul en terselfdertyd die voorgeskrewe bedrag te betaal.

(2) Die aansoeker moet by die bevoegde beampte 'n verklaring aflê aangaande die omstandighede waaronder die sertifikaat verlore geraak het. Die bevoegde beampte moet dan die aansoek en die verklaring aan die Direkteur-generaal stuur.

(3) Indien die aansoeker kan bewys dat die sertifikaat as gevolg van skipbreuk of brand aan boord verlore geraak het, word geen betaling gevorder nie.

HOOFSUK 4**BEREKENING VAN SEEDIENS****Algemeen**

43. (1) Kwalifiserende seediens vir bekwaamheidsertifikate en bevelvoeringsendossemente daarvan moet in die dekadefdeling verrig word.

(2) Vir 'n eerste bekwaamheidsertifikaat tel diens wat as 'n utiliteitseeman gelewer is twee derdes totdat die eerste jaar van kwalifiserende diens voltooi is (d.w.s. vir 'n maksimum van 18 maande), daarna tel dit ten volle.

(3) Die kwalifiserende diens gespesifiseer vir enige besondere bekwaamheidsertifikaat of endossement daarvan word verrig binne 'n tydperk van 10 jaar wat die datum voorafgaan waarop die eksamen die eerste keer afgelê is, na goeddunke van die senior eksaminator in individuele gevalle.

(4) Slegs diens op skepe groter as 100 bruto ton word aanvaar as kwalifiserende diens vir enige ander bekwaamheidsertifikaat as Klas 5 of 6.

(5) Diens op skepe van meer as 100 bruto ton wat lang seereise aflê, tel ten volle vir alle klasse van sertifikate.

(6) Diens op skepe wat kort seereise aflê, word alles as kwalifiserende diens vir 'n Klas 5- of 6-sertifikaat aanvaar, en vir alle ander klasse van sertifikate geld twee derdes daarvan as kwalifiserende diens: Met dien verstande dat sodanige diens ten volle in aanmerking geneem word vir die Endossement as Gesagvoerder (Kortseehandel).

(7) (a) Tensy anders aangedui, moet die kwalifiserende diens wat vir alle bekwaamheidsertifikate vereis word, uitgesonderd Klas 6 en bevelvoerdersendossemente, verrig word op skepe wat ter see gaan en aktief betrokke is by kommersiële handel.

(b) Sekere nie-handelsdiens kan gedeeltelik aanvaar word in plaas van 'n beperkte dienstyd op handelsvaartuie, maar nie-handelsdiens waarvoor daar nie spesifiek voorsiening gemaak is in regulasie 46 (2) tot (4) nie, word nie algemeen aanvaar as kwalifiserende diens nie.

Copies of lost certificates

42. (1) The holder of a certificate of competency or service shall, where that certificate is lost, apply for a certified copy thereof to a proper officer at the nearest port by completing an application form and paying at the same time the required fee.

(2) A declaration as to the circumstances in which the certificate was lost shall be made by the applicant to the proper officer, who shall then forward the application and declaration to the Director-General.

(3) No fee shall be chargeable if the applicant can show that the certificate was lost through shipwreck or fire on board ship.

CHAPTER 4**ESTIMATING SEA SERVICE****General**

43. (1) Qualifying sea service for certificates of competency and command endorsements thereto shall be performed in the deck department.

(2) For a first certificate of competency, service as a general purpose rating shall count at two-thirds rate until the first year of qualifying service is completed (i.e. for a maximum of 18 months), after which it shall count in full.

(3) The qualifying service specified for any particular certificate of competency or endorsement thereto shall be performed within a period of 10 years preceding the date upon which the examination is first taken, subject to the discretion of the senior examiner in individual cases.

(4) Only service in ships of more than 100 gross tons shall be accepted as qualifying service for any certificate of competency other than Class 5 or 6.

(5) Service in ships of 100 or more gross tons engaged in long voyages shall be counted in full for all classes of certificates.

(6) Service in ships engaged in short voyages shall be accepted in full for Class 5 and 6 certificates and at two-thirds rate for all other classes of certificate: Provided that such service shall count in full for the Master (Short Sea Trade) endorsement.

(7) (a) Except when otherwise specified, qualifying service required for all certificates of competency other than Class 6 and command endorsements shall be service performed in ships which proceed to sea and are actively engaged in commercial trading.

(b) Certain non-trading service may be accepted in part in lieu of a limited amount of service in trading vessels, but non-trading service not specifically provided for in regulation 46 (2) to (4) shall not generally be accepted as qualifying service.

(8) (a) Diens op skepe van meer as 25 bruto ton maar minder as 100 bruto ton word ten volle aanvaar vir 'n Klas 6-sertifikaat: Met dien verstande dat opgelede seediens van toepassing moet wees op die bedryf van 'n Klas 6-dekoffisiersertifikaat waarom aansoek gedoen word, naamlik Onbegrenste, Kortsee- of Beperkte Handel.

(b) Die diens bedoel in paragraaf (a) tel ten volle vir 'n Klas 5-sertifikaat tot 'n maksimum van 12 maande en diens op skepe van minder as 25 ton word slegs, indien van toepassing, aanvaar vir 'n Klas 6-sertifikaat.

(9) (a) Kwalifiserende diens word bereken vanaf die datum van indiensneming tot die datum van ontslag vanaf 'n skip.

(b) Kwalifiserende diens word bereken deur die werklike getal dae tussen die datum van indiensneming en die datum van ontslag, beide ingereken, te tel en te bereken teen 30 dae per maand en 12 maande per jaar.

(10) Behoudens verwysing na die bepalings van ooreenkomste word ontslagsertifikaat as bewys van seediens aanvaar. Waar diens in bevel van 'n wag vereis word, moet 'n kandidaat 'n waghoudienssertifikaat, onderteken deur die onderskeie gesagvoerders van die vaartuie waarop hy diens verrig het, voorlê. Sodanige sertifikaat moet meld dat hy minstens agt uur uit elke 24 uur diens waarop aanspraak gemaak word, as waghoud-offisier opgetree het.

(11) Waar 'n kandidaat aanspraak maak op kwalifiserende seediens op 'n nie-handelskip moet hy 'n verklaring van die bevelvoerder of eienaar voorlê waarin besonderhede verstrek word van die datums waarop die skip op reis ter see was en voor anker gelê het, en van die werk wat die skip verrig het en die vaargebied.

(12) 'n Kandidaat, met inbegrip van 'n kadet of leerlingdekoffisier vir sertifikate van Klasse 3, 4 en 5 moet verklarings van die gesagvoerder onder wie hy gedien het of van sy werkgewer voorlê waarin vermeld word dat hy gedurende die laaste 12 maande van sy seediens minstens 6 maande bestee het aan pligte wat verband hou met waghoudiens op die brug onder toesig van 'n gediplomeerde offisier, welke pligte dié van 'n uitkykwag op die brug, maar nie dié van stuurman nie, kan insluit, behalwe in die mate van 2 maande uit elke 6.

(13) 'n Maksimum van 6 maande waghoudiens terwyl die kandidaat die houer was van 'n ander bekwaamheidsertifikaat as 'n Klas 6, op 'n tweewaghouskip kan getel word teen een en een vyfde keer die werklike diens verrig, behalwe waar voordeel getrek word uit die verslapping in regulasie 26 (4) (c) toegelaat.

(14) 'n Kadet of leerlingdekoffisier wat aanspraak maak op 'n vermindering van die vereiste seediens ingevolge regulasie 21 (2), moet bevredigende bewys voorlê dat 'n opleidingsprogram dwarsdeur die vereiste tydperk van seediens gevolg is, dat al sy diens tydens sy tydperk aan boord op 'n bevredigende wyse verrig is en dat hoogstens 2 maande van daardie diens deurgebring is op skepe wat op hawebystand was, wat in 'n droogdok gelê het, wat masjienherstelwerk ondergaan het of wat andersins stilgelê het.

(8) (a) Service in ships of more than 25 gross tons but less than 100 gross tons shall be accepted in full for a Class 6 certificate: Provided that the sea service accumulated shall be appropriate to the trade of Deck Officer Class 6 certificate being applied for, i.e. Unlimited, Short Sea or Restricted Trade.

(b) The service referred to in paragraph (a) shall count in full for a Class 5 certificate up to a maximum of 12 months and service in ships of less than 25 gross tons shall only be accepted, if appropriate, for a Class 6 certificate.

(9) (a) Qualifying service shall be reckoned from the date of engagement to the date of discharge from a ship.

(b) Qualifying service shall be calculated by taking the actual days between the dates of engagement and discharge, both inclusive, and reckoning 30 days to the month, 12 months to the year.

(10) Subject to reference with the articles of agreements when necessary, certificates of discharge shall be accepted as proof of sea service. Where service in charge of a watch is required, a candidate shall produce certificates of watch-keeping service signed by the respective masters of the vessels in which he has served stating that he has acted as watch-keeping officer for at least 8 hours out of every 24 hours' service claimed.

(11) Where qualifying sea service is claimed for time spent on a non-trading vessel, the candidate shall produce a statement from the master or owner giving details of the dates when the ship was at sea on passage, and at anchor, and the work that the ship was engaged in and the area of operation.

(12) A candidate, including a cadet or trainee deck officer for Classes 3, 4 and 5 certificates, shall produce statements from the master under whom he has served or from his employer in which it is stated that during the final 12 months of his sea service at least 6 months has been spent on duties associated with bridge watch-keeping under the supervision of a certificated officer, which duties may include those of a lookout on the bridge but not those of helmsman except to the extent of 2 months out of every 6.

(13) A maximum of 6 months' watch-keeping service while holding a certificate of competency other than a Class 6 in a two-watch ship may be reckoned at one and one fifth times the actual service performed, except where advantage is taken of the relaxation allowed in regulation 26 (4) (c).

(14) A cadet or a trainee deck officer claiming a reduction in the required sea service under regulation 21 (2) shall show satisfactory proof that a training programme was followed throughout the required period of sea service, that all service while on board was performed in a satisfactory manner, and that not more than 2 months of that service was spent on ships in port standing-by, in drydock, undergoing engine repairs or otherwise laid up.

(15) 'n Kandidaat wat in gebreke bly om bevredigende bewys te lewer dat hy 'n opleidingsprogram goedgekeur, deur die Direkteur-generaal, gevolg het, moet 'n bykomende tydperk seediens verrig alvorens hy tot die eksamen toegelaat word.

(16) 'n Offisier wat diens verrig op 'n skip in 'n hawe kan op hoogstens 3 maande kwalifiserende diens aanspraak maak vir tyd bestee as nie aangeteken ingevolge ooreenkoms nie, maar in diens met pligte wat van dekoffisiere op Suid-Afrikaanse skepe verwag word, tussen die datums van kwalifisering vir—

- (a) Klas 3- en Klas 1-sertifikate; of
- (b) enige eerste sertifikaat en 'n bevelvoerings-endorsement:

Met dien verstande dat enige aanspraak op kwalifiserende diens ingevolge hierdie paragraaf vergesel gaan van 'n sertifikaat van die gesagvoerder gestaaf deur 'n waghousertifikaat waarin die presiese aard van die betrokke pligte en tydperke gespesifiseer word.

Bewys van diens in ander skepe as Suid-Afrikaanse skepe

44. (1) Waar 'n kandidaat op kwalifiserende diens op 'n skip wat nie in die Republiek geregistreer is nie, aanspraak maak en sodanige diens nie deur die Direkteur-generaal geverifieer kan word nie, moet die diens bevestig word deur 'n amptelike owerheid van die land waaraan die skip behoort.

(2) As daar enigsins twyfel oor die afdoenheid van die gelewerde bewys bestaan, moet al die dokumente na die Direkteur-generaal verwys word vir sy beslissing.

Nie-handelsdiens

45. (1) Diens op nie-handelsvaartuie het tot gevolg dat 'n nie-handelsendorsement ten opsigte van gebruik op 'n bekwaamheidsertifikaat of endorsement aangebring word wanneer dit uitgereik word.

(2) Diens uitsluitlik verrig op treilers en ander diepseevissersvaartuie met 'n tonnemaat van meer as 100 bruto registerton tel ten volle as kwalifiserende diens vir sertifikate van Klasse 3, 4 en 5, maar kandidaat moet daarbenewens minstens 12 maande lank gedien het op ander vaartuie as vissersvaartuie.

(3) Diens in vlootvaartuie en ander soortgelyke vaartuie wat gereeld ter see gaan, tel ten volle as kwalifiserende diens vir sertifikate van Klas 3, 4 en 5, maar kandidaat moet daarbenewens minstens 12 maande lank gedien het op vaartuie wat kort of lang seereise onderneem.

(4) Diens op kabelskepe, seilopleidingskepe, visserybeskermingsvaartuie, navorsingsvaartuie, bergingsbote en ander nie-handelsvaartuie word behoudens die bepalings van regulasie 44 (4), (5), (6) en (7) ten volle in aanmerking geneem.

(5) (a) Diens verrig op skepe wat nie gereeld ter see gaan nie, ongeag of dit handelskepe of nie-handelskepe is, tel ten volle as die tyd werklik ter see deurgebring 2/3 van die totale dienstydperk aan boord van sodanige skip behoort of te bowe gaan.

(b) As die werklike seediens minder is as die verhouding een-en-n-half word die tyd werklik ter see deurgebring as kwalifiserende diens bereken.

(15) A candidate who fails to produce satisfactory proof that he has followed a training programme approved by the Director-General shall be required to complete an additional period of sea service before being admitted to an examination.

(16) An officer serving on a ship in port may claim up to a maximum of 3 months' qualifying service for time spent not signed on articles of agreement but employed in duties appropriate to the role of deck officers on South African merchant ships between the dates of qualifying for—

- (a) Class 3 and Class 1 certificates; or
- (b) any first certificate and a command endorsement:

Provided that claims for qualifying service under this paragraph shall require a certificate from the master supported by a watch-keeping certificate which specifies the precise nature of the duties and periods concerned.

Proof of service in ships other than South African ships

44. (1) Where a candidate claims qualifying service in a ship that is not registered in the Republic and such service cannot be verified by the Director-General, the service shall be confirmed by an official authority of the country to which the ship belongs.

(2) If the sufficiency of the proof given appears to be at all doubtful, all papers shall be referred to the Director-General for a decision.

Non-trading service

45. (1) Service in non-trading vessels shall result in a non-trading endorsement as to use being placed on a certificate of competency or endorsement issued.

(2) Service performed exclusively in trawlers and other deep sea fishing vessels of over 100 gross register tons shall count in full towards the qualifying service for Classes 3, 4 and 5 certificates but candidates shall, in addition, have to serve for at least 12 months in vessels other than fishing vessels.

(3) Service in naval craft and other similar vessels which regularly proceed to sea shall count in full towards the qualifying service for Classes 3, 4 and 5 certificates but candidates shall, in addition, have to serve for at least 12 months in vessels engaged in short or long voyages.

(4) Service in cable ships, sail training vessels, fishery protection vessels, research vessels, salvage vessels and other non-trading vessels shall, subject to the provisions of regulation 44 (4), (5), (6) and (7), be reckoned in full.

(5) (a) Service performed in ships which do not regularly proceed to sea, whether trading vessels or non-trading vessels, shall be counted in full if the time actually spent at sea constitutes or exceeds two thirds of the total period of service on board such ship.

(b) If the time actually spent at sea falls below this proportion one and one half times, the time actually spent at sea shall be counted as qualifying service.

(c) Kandidate moet benewens die bewys van seediens wat van alle kandidate vereis word, 'n verklaring of sertifikaat van die gesagvoerder of eienaars van die skip voorlê wat die hoeveelheid tyd aandui wat werklik op see deurgebring is en elke aansoek moet na verdienste deur die eksaminator behandel word.

(6) Bystandsdiens gedurende die finale konstruksiestadiums van 'n nuwe vaartuig tel tot 'n maksimum van 3 maande ten volle as kwalifiserende diens vir 'n Klas 1-bekwaamheidsertifikaat of vir 'n bevelvoeringsendossement vir 'n bekwaamheidsertifikaat, mits 'n offisier daarna gedurende die eerste seereis op sodanige vaartuig diens verrig.

Hawebedryfsdiens

46. (1) 'n Kandidaat wat hoofsaaklik op hawebedryfvaartuie diens verrig het, kwalifiseer vir die eksamen vir Dekoffisier Klas 3, 4 of 5, "(Hawebedryf)" geëndosseer: Met dien verstande dat sy seediens soos volg verrig is:

- (a) Minstens 12 maande van die diens moet in die kortseehandel verrig wees; en
- (b) die res van die tydperk wat by regulasie 22 vereis word, moet in enige dekhoedanigheid ter see verrig wees of op hawebedryfvaartuie besig met hawepligte.

(2) Kandidate wat kwalifiseer vir die uitreiking van 'n Dekoffisiersertifikaat Klas 3, 4 of 5, geëndosseer, "(Hawebedryf)" is nie geregtig op die uitreiking van 'n SODW-endossement op hulle bekwaamheidsertifikate nie.

Ongewone vaartuie

47. Dokumentêre bewys van diens op skeertuie, skeerbote of ander ongewone vaartuie moet aan die Senior Eksaminator vir oorweging voorgelê word.

Korting van seediens

48. (1) Kandidate kan kwalifiseer vir afslag op seediens soos beoog in hierdie regulasie, maar die totale vrystelling mag in geen geval 10 maande te bowe gaan nie.

(2) Geen korting van seediens word toegelaat ten opsigte van die kwalifiserende diens wat vereis word vir sertifikate van Klasse 1 en 2 of vir 'n bevelvoeringsendossement nie, en ook nie ten opsigte van die vereiste tydperk van minstens 6 maande wat bestee moet word aan pligte in verband met brugwaghouidiens gedurende die laaste 12 maande seediens vir 'n sertifikaat van Klas 3, 4 of 5 nie.

(3) (a) Elke kadet of leerlingoffisier wat beskou wil word as iemand wat 'n verminderde tydperk kadetskaps ingevolge regulasie 21 (1) (a) gevolg het, moet 'n verklaring toon van die eienaar, of van die gesagvoerder onder wie hy diens verrig het, wat meld dat al sy diens tydens sy tydperk aan boord op 'n bevredigende wyse verrig is en dat hoogstens 2 maande van daardie diens deurgebring is aan boord van skepe wat in 'n droogdok gelê het, wat enjinherstelwerk ondergaan het of andersins stilgelê het.

(b) Hoogstens die helfte van die toegewing in paragraaf (a) beoog, mag deurgebring gewees het as bystanddiens gedurende die finale konstruksiestadiums van 'n nuwe vaartuig.

(c) Candidates shall be required to produce, in addition to the evidence of sea service required of all candidates, a statement or certificate from the master or owners of the ship showing the amount of time actually spent at sea and each application shall be treated on its merits by the examiner.

(6) Service standing by a new vessel during the final stages of construction, provided that an officer subsequently serves in such vessel on the maiden voyage, shall count in full towards the qualifying service for a Class 1 Certificate of Competency or for a command endorsement for a certificate of competency up to a maximum of 3 months.

Port operation service

46. (1) A candidate who has served mainly on port operation craft shall qualify for the examination for a Deck Officer Class 3, 4 or 5 certificate endorsed "(Port Operation)": Provided that he has sea service made up as follows:

- (a) At least 12 months of the service shall have been obtained in the short sea trade; and
- (b) the balance of the period required by regulation 22 shall have been served at sea in any deck capacity or shall be service on port operation vessels engaged in harbour duties.

(2) Candidates who qualify for the issue of a Deck Officer Class 3, 4 or 5 certificate endorsed "(Port Operation)" shall not be entitled to the issue of an STCW endorsement in their certificates of competency.

Novel craft

47. Documentary evidence of service on hovercraft, hydrofoils or other novel craft shall be submitted to the Senior Examiner for consideration.

Remission of sea service

48. (1) Candidates may qualify for remission of sea service as contemplated in this regulation, but in no instance shall the total remission granted exceed 10 months.

(2) No remission of sea service shall be allowed in respect of the qualifying service required for Classes 1 and 2 certificates or for command endorsement, nor in respect of the period of at least 6 months required to be spent on duties associated with bridge watch-keeping during the final 12 months of sea service for a Class 3, 4 or 5 certificate.

(3) (a) A cadet or trainee deck officer who wishes to be deemed to have followed a reduced period cadetship under regulation 21 (1) (a) shall produce a statement from the owner, or from the master under whom he has served, stating that all his service while on board ship was performed in a satisfactory manner, and that not more than 2 months of that service was spent on board ships in drydock, undergoing engine repairs or otherwise laid up.

(b) Not more than half of the allowance contemplated in paragraph (a) shall be spent standing by a new vessel during the final stages of construction.

(4) Aan 'n kandidaat wat 'n intensiewe voorsese kursus wat deur die Direkteur-generaal goedgekeur is, bygewoon het, kan korting van seediens op 'n dag-vir-dag basis tot 'n maksimum van een maand toegestaan word.

(5) 'n Kandidaat vir 'n bekwaamheidsertifikaat Klas 3, 4 of 5 wat die houer van 'n Nasionale Senior Sertifikaat is en in Wiskunde en Wetenskap geslaag het, kan ten opsigte van sodanige kwalifikasie korting van hoogstens 6 maande toegelaat word ten opsigte van die 2½ of 3½ jaar kwalifiserende diens, na gelang van die geval, in regulasie 21 (1) voorgeskryf. Met dien verstande dat, behoudens die bepalings van subregulasie (1), sodanige korting bykomend is by enige korting wat ingevolge regulasie 51 (1) toegestaan word.

Kolleges vir seevaartopleiding

49. (1) 'n Gedeelte van die diens wat na die ouderdom van 16 verrig is by 'n kollege vir seevaartopleiding op land, kan as korting van seediens toegelaat word. Met dien verstande dat—

- (a) die kollege deur die Direkteur-generaal erken word;
- (b) na 'n inspeksie deur een van sy vakkundige beamptes die Direkteur-generaal oortuig is dat die kollege opleiding verskaf wat die tyd daar deurgebring regverdig en wat beskou word as deel van die vereiste tydperk kwalifiserende diens vir 'n bekwaamheidsertifikaat; en
- (c) die kandidaat 'n sertifikaat betreffende bevredigende bywoning voorlê van die kollege-owerhede wanneer hy die kollege verlaat.

(2) Die Direkteur-generaal stel van tyd tot tyd 'n lys van die name van goedgekeurde kolleges vir seevaartopleiding vry.

Diens in vlootopleidingskolleges

50. Die helfte van die tyd aan 'n Suid-Afrikaanse vlootkollege bestee aan bedryfsleierskursusse kan as korting van seediens tel, en 'n soortgelyke toegewing word gemaak ten opsigte van tyd bestee aan kursusse by inrigtings op land na bevordering tot die rang van Waarnemende Onderluitenant. Met dien verstande dat die totale korting van seediens ten opsigte van alle tyd bestee aan opleiding op land nie 6 maande te bowe gaan nie.

Kadetopleidingskepe

51. (1) Korting van seediens word verleen aan kadette en leerlingdekoffisiere wat vir 'n minimum tydperk diens doen op kadetopleidingskepe wat deur die Direkteur-generaal goedgekeur is. Met dien verstande dat die maksimum korting van seediens wat toegelaat word ten opsigte van kadetopleidingskeepsdiens tydens goedkeuring vasgestel word.

(2) Elke kadet of leerlingdekoffisier wat korting verlang vir kadetopleidingskeepsdiens moet 'n sertifikaat, geteken deur die gesagvoerder, voorlê waarin gemeld word dat sy gedrag en bekwaamheid bevredigend was.

(4) A candidate who has attended an approved intensive pre-sea course approved by the Director-General may be allowed a remission of sea service on a day-for-day basis up to a maximum of one month.

(5) A candidate for a Class 3, 4 or 5 Certificate of Competency who is the holder of a National Senior Certificate with passes in Mathematics and Science shall, in respect of such qualification, be allowed a remission of sea service not exceeding 6 months of the 2½ or 3½ years' qualifying service, as the case may be, prescribed in regulation 21 (1). Provided that, subject to the provisions of subregulation (1), such remission shall be in addition to any remission granted under regulation 51 (1).

Colleges for nautical training

49. (1) A proportion of the time spent after the age of 16 at a college for nautical training conducted on premises ashore may be allowed as a remission of sea service: Provided that—

- (a) the college is recognised by the Director-General;
- (b) after an inspection by one of his professional officers the Director-General is satisfied that the college provides training that justifies time spent there, being reckoned as part of the necessary qualifying time for a certificate of competency; and
- (c) on leaving, the candidate produces a certificate regarding satisfactory attendance from the college authorities.

(2) A list of approved colleges of nautical training shall be promulgated from time to time by the Director-General.

Service in naval training colleges

50. Half the time spent at a South African naval training college on executive officer's courses shall count as a remission of sea service, and a similar allowance shall be made in respect of time spent on courses at shore establishments after promotion to the rank of Acting Sub-Lieutenant. Provided that the total remission of sea service in respect of all time spent in training ashore shall not exceed 6 months.

Cadet training ships

51. (1) Remissions of sea service shall be granted to cadets and trainee deck officers who serve a minimum period in cadet training ships approved by the Director-General. Provided that the maximum remission of sea service that shall be allowed in respect of cadet training ship service shall be fixed at the time of approval.

(2) Every cadet or trainee deck officer seeking remission for cadet training ship service shall be required to produce a certificate signed by the master stating that his conduct and proficiency were satisfactory.

HOOFSTUK 5

OPLEIDINGSKEMAS

Inleiding

52. Kadette of leerlingdekoffisiere kan na bevredigende voltooiing van die gespesifiseerde minimum opleidingstydperk kwalifiseer vir 'n eerste bekwaamheidsertifikaat hetsy op die Klas 3-, 4- of 5-vlak: Met dien verstande dat hulle gedurende die hele opleidingstydperk 'n opleidingsprogram deurloop wat deur die Direkteur-generaal erken word.

Beplande opleiding gedurende seetydperke

53. (1) (a) Studente moet 'n tydperk van beplande opleiding ter see van minstens 20 maande voltooi.

(b) Bewys van beplande opleiding ter see kan die vorm aanneem van 'n dekkadet se rekordboek, behoorlik ingevul deur die gesagvoerders en offisiere van die skepe waarop seediens verrig word.

(2) Versuim om bevredigende bewys te lewer van beplande opleiding ter see wanneer by voltooiing van die kursus aansoek gedoen word om toelating tot die eksamen vir 'n bekwaamheidsertifikaat sal meebring dat 'n bykomende tydperk bevredigende seediens soos gespesifiseer deur die Direkteur-generaal verrig moet word voordat toelating tot die eksamen verleen word.

(3) (a) Die kadet en die leerlingoffisier moet verseker dat 'n dekkadetrekkordboek behoorlik bygehou en geëndosseer word.

(b) Die gesagvoerder en die betrokke senior offisiere moet die toepaslike gedeeltes van sodanige boek invul wanneer hulle tevrede is dat die take behoorlik uitgevoer is.

HOOFSTUK 6

AFNEEM VAN EKSAMENS

Tyd van eksamens

54. (1) Die eksamen begin elke dag, en 'n etenspouse word toegestaan, op 'n tyd deur die eksaminator bepaal.

(2) Kandidate moet sover moontlik vroegtydig kennis kry van die datum en tyd van hul mondelinge eksamen en, indien toepaslik, van hul eksamen in seinwerk.

Geen vreemdelinge toegelaat nie

55. Geen ander persone as die kandidate en diegene wat ampshalwe teenwoordig moet wees, word in die eksamenlokaal toegelaat nie.

Stilte

56. Absolute stilte moet vir die volle duur van 'n skriftelike eksamen in die eksamenlokaal gehandhaaf word.

Gebruik van boeke en seevaarttafels tydens die eksamen

57. (1) Die volgende tafels en boeke word deur die eksaminator in die eksamenlokaal verskaf: Nautical Almanac; Burton's Nautical Tables; Norie's Tables; Getytafels van die Admiraliteit, Vol. 1 en Vol. 2.

CHAPTER 5

TRAINING SCHEMES

Introduction

52. Cadets or trainee deck officers may qualify for a first certificate of competency at either Class 3, 4 or 5 level upon satisfactory completion of the minimum training period specified: Provided that during the whole of such training period they shall undergo a programme of training recognised by the Director-General.

Planned training during sea periods

53. (1) (a) Students shall complete a period of planned training at sea of not less than 20 months.

(b) Proof of planned training at sea may take the form of a deck cadet's record book duly completed by the masters and officers of the ships in which sea service is performed.

(2) Failure to produce satisfactory evidence of planned training at sea when applying for admission to the examination for a certificate of competency upon completion of the course shall entail the performance of such additional period of satisfactory sea service as the Director-General may specify, before admission to the examination is granted.

(3) (a) The cadet and the trainee officer shall ensure that a deck cadet's record book is properly maintained and endorsed.

(b) The master and appropriate senior officers shall complete the relevant sections of such book when they are satisfied that the tasks have been properly carried out.

CHAPTER 6

CONDUCT OF EXAMINATIONS

Time of examinations

54. (1) The examination shall begin, and a luncheon interval shall be given, each day at a time appointed by the examiner.

(2) As far as possible, candidates shall be given ample notice of the date and time of their oral and, if appropriate, signals examinations.

No strangers allowed

55. No person other than the candidates and those whose duties require them to be present shall be allowed in the examination room.

Silence

56. Complete silence shall be maintained in the examination room for the full duration of a written examination.

Use of books and nautical tables at the examination

57. (1) The following tables and books shall be supplied by the examiner in the examination room: Nautical Almanac, Burton's Nautical Tables, Norie's Tables, Admiralty Tide Tables Vol. I and Vol. 2.

(2) 'n Kandidaat wat 'n rekenaar, rekenliniaal of ander tafels as dié wat hierbo genoem is, wil gebruik, kan sodanige tafels in die eksamenlokaal inbring: Met dien verstande dat hy hulle minstens 'n week voor die aanvang van die eksamen met die oog op besigtiging en goedkeuring aan die eksaminator toon.

(3) Behoudens die bepalings van subregulasie (2) word geen beperking op die gebruik van enige tafels geplaas nie, maar 'n kandidaat moet die teorie begryp waarop die tafels gebaseer is en sodanige tafels moet in staat wees om 'n antwoord binne die vereiste noukeurigheidssperke te verskaf.

(4) Wanneer daar by die beantwoording van 'n vraag gebruik gemaak word van ander tafels as dié wat deur die eksaminator verskaf word, moet die naam van die tafels en 'n aanduiding van wat werklik uit hulle verkry is, op die kandidaat se eksamenskrif verstrek word.

Gebruik van instrumente

58. (1) (a) Alle instrumente wat vir gebruik in die eksamen nodig is, word deur die eksaminator verskaf, maar 'n kandidaat kan toegelaat word om sy eie tekeninstrumente en rekenliniale te gebruik: Met dien verstande dat die eksaminator se goedkeuring voor die aanvang van die eksamen verkry word.

(b) As 'n rekenliniaal of rekeninstrument gebruik word, moet 'n aantekening te dien effekte op die kandidaat se eksamenskrifte aangebring word.

(2) 'n Kandidaat wat gebruik maak van 'n rekenliniaal of 'n rekeninstrument vir sy berekenings moet die volledige stappe wat nodig is om die resultate te verkry in ink in die eksamenskrif uiteensit, so nie word geen punte ten opsigte van die betrokke resultate toegeken nie.

(3) (a) Die eksaminator moet hom daarvan vergewis dat die inligting op rekenliniale nie oormatig is nie en dat rekeninstrumente nie geprogrammeer kan word of voor die aanvang van die eksamen geprogrammeer is nie.

(b) Die eksaminator moet die gebruik van rekeninstrumente verbied in eksamens in suiwer en toegepaste wiskunde waar die basiese wiskundige beginsels bewys moet word.

Ongeoorloofde boeke en papiere streng verbode

59. (1) Behoudens die bepalings van regulasie 57 (2) mag 'n kandidaat nie ander boeke, aantekeninge, memorandums of papiere by hom hê as wat vir gebruik in die eksamen verskaf is nie en indien 'n kandidaat wel boeke, aantekeninge, memorandums of papiere met hom saamgebring het, moet hy hulle aan die eksaminator oorhandig voordat hy met die eksamen begin.

(2) Kandidaat wat 'n boek, instrument of ander eiendom van die Departement van Vervoer skend of andersins beskadig se diensdokumente (d.w.s. sertifikate, getuigskrifte, ens.) sal teruggehou word totdat hulle die beskadigde boek of instrument vervang het.

(3) Geen kandidaat mag die eksamenlokaal of die gebou sonder die eksaminator se toestemming verlaat nie, en as hy die kamer verlaat, moet hy die eksamenskrif waarmee hy besig is by die eksaminator inlewer.

(2) A candidate who wishes to use tables other than the above may bring such tables into the examination room: Provided that he shall submit them to the examiner for scrutiny and approval at least one week before the examination begins.

(3) Subject to the provisions of subregulation (2) no restriction shall be placed on the use of any tables, but a candidate must understand the theory on which the tables are based, and such tables must be capable of giving an answer within the required limits of accuracy.

(4) When tables other than those supplied by the examiner are used in answering a question, the name of the tables and a note of what is actually obtained from them shall be stated on the candidate's paper.

Use of instruments

58. (1) (a) All instruments necessary for use in the examination shall be supplied by the examiner, but a candidate may be allowed to use his own drawing instruments, slide rule and calculating instrument: Provided that the examiner's approval shall be obtained at least one week before the examination begins.

(b) If a slide rule or calculating instrument is used, a note to this effect shall be entered on the candidate's answer papers.

(2) A candidate who uses a slide rule or a calculating instrument for his calculations shall show in ink on the answer paper the full working statement necessary for arriving at the results, or no marks shall be awarded in respect of the results concerned.

(3) (a) The examiner shall satisfy himself that information on slide rules is not excessive and that calculating instruments either cannot be programmed or have not been programmed before the commencement of the examination.

(b) The examiner shall prohibit the use of calculating instruments in examinations in pure and applied mathematics in which basic mathematical principles have to be demonstrated.

Unauthorised books and papers strictly forbidden

59. (1) Subject to the provisions of regulation 57 (2), a candidate shall not have with him any books, notes, memoranda or papers other than those supplied for use at the examination, and if a candidate has brought any books, notes, memoranda or papers with him he shall hand them to the examiner before commencing the examination.

(2) Candidates who deface or otherwise damage any book, instrument or other property of the Department of Transport shall have their service papers (i.e. certificates, testimonials, etc.) retained until they have replaced the damaged book or instrument.

(3) No candidate shall leave the examination room or building without the permission of and without handing to the examiner the paper upon which he is engaged.

(4) (a) Alle werk moet getoon word en geen kandidaat mag toegelaat word om probleme op skeurpapier uit te werk nie.

(b) Kladderwerk moet aan die einde van elke eksamen ingelewer word.

(5) '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 wat hulp of inligting van iemand anders ontvang, of op enige wyse met 'n ander persoon as die eksaminator in verbinding tree, of wat enige deel van die antwoorde afskryf met die doel om hulle uit die eksamenkamer te neem, word geag die eksamen te gedruip het en mag nie vir 'n tydperk van tot 12 maande vir hereksamen aangeneem word nie.

(6) 'n Kandidaat wat enige van die bepalings van subregulasie (1), (3), (4) of (5) oortree of wat parmantig is teenoor die eksaminator of wat hom skuldig maak aan onordelike of onbehoorlike gedrag in of by die eksamenkamer, word geag die eksamen te gedruip het en mag nie vir sodanige tydperk as wat die Direkteur-generaal bepaal vir hereksamen aangeneem word nie.

Verlangde graad van akkuraatheid en oplossings

60. (1) Werk moet so akkuraat wees as wat die beskikbare gegewens en die betrokke tipe probleem toelaat.

(2) Inligting uit tafels moet so noukeurig wees as wat die inherente akkuraatheid van die tafels toelaat en finale antwoorde hoef nie noukeuriger te wees as wat geregverdig is nie.

(3) Wanneer hulle berekenings doen om 'n skip se posisie te bepaal, word daar van kandidate verwag om dit tot 0,1 van 'n boogminuut en tot die naaste sekonde in tyd te doen.

(4) Enige berekeningsmetode waarvolgens 'n standlyn bepaal word, moet 'n antwoord korrek tot hoogstens 'n halwe seemyl gee.

(5) By die berekening van kompasfoute, liggings en koerse moet die antwoord korrek tot 0,5 van 'n graad bereken word.

(6) By die berekening van getye moet die antwoord binne 15 cm van die presiese antwoord wees.

(7) Kandidate kan probleme oplos volgens enige metode waaraan hulle gewoon is, mits die beginsel reg is en mits sodanige metode die vereiste juistheidsgraad verleen en op die vraestel aangetoon word.

Geldigheid van gedeeltelike slagings

61. (1) Slaging in die hele skriftelike deel van die eksamen vir 'n Bekwaamheidsertifikaat Klas 1 of vir 'n bevelvoeringsendossement is geldig vir 'n tydperk van 5 jaar, maar slaging in die skriftelike deel van die eksamen vir ander klasse sertifikate en in die mondelinge en seingedeelte is geldig vir 'n tydperk van slegs 12 maande.

(2) Die mondelinge Klas 5-eksamen in Weerkunde en Gesagvoerder (Kort Seehandel) Skeepsake en Reg word beskou as deel van 'n kandidaat se skriftelike eksamens.

(3) Slaging in Gedeelte A of B van die Gesagvoerder (Spesiale Graad)-eksamen bly vir altyd geldig.

(4) (a) All work shall be shown and no candidate shall be allowed to work out problems on scrap paper.

(b) Rough work shall be handed in at the end of each examination.

(5) Any candidate who, during the time of the examination, is discovered referring to any unauthorised book or paper, or copying from another person, or affording any assistance or giving any information to another person, or accepting assistance or information from another person, or communicating in any way with another person other than the examiner, or copying any part of the answers 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 up to 12 months.

(6) A candidate who contravenes the provisions of subregulation (1), (3), (4) or (5), or who is guilty of insolence to the examiner, or of disorderly or improper conduct in or about the examination room, shall be regarded as having failed the examination and shall not be accepted for re-examination for such period as the Director-General may determine.

Degree of precision required and solutions

60. (1) Work to a degree of precision consistent with the data available and the type of problem in question is required.

(2) Information from tables shall be extracted as accurately as possible consistent with the inherent accuracy of the tables, and final answers shall be given to the best degree of precision which is justified.

(3) When making calculations to obtain a ship's position, candidates are expected to work to 0,1 of a minute of arc and to the nearest second of time.

(4) Any method of calculation used to obtain a position line shall be capable of giving an answer to within a maximum of one half of a nautical mile.

(5) In the calculation of compass errors, bearings and courses, the answers shall be worked to within 0,5 of a degree.

(6) Tidal calculations shall be worked to provide an answer within 15 cm of a precise result.

(7) Candidates may solve problems by any method they are accustomed to using, provided that such method is correct in principle, affords the required degree of precision, and is shown on the paper.

Validity of partial passes

61. (1) A pass in the whole of the written part of the examination for a Class 1 Certificate of Competency or for a Command endorsement shall be valid for a period of 5 years, but a pass in the written part of the examination for other classes of certificates and in the oral and signals parts shall be valid for a period of 12 months only.

(2) The Class 5 Meteorology and Master (Short Sea Trade) Business and Law oral examinations shall be considered part of a candidate's written examinations.

(3) A pass in Part A or B of the Master Special Grade examination shall hold good for all time.

Uitstelverlening

62. (1) 'n Kandidaat vir 'n bekwaamheidsertifikaat wat in hoogstens een vak in die skriftelike eksamen drui, kan, mits hy die vereiste slaagpunt behaal, indien sodanige skriftelike eksamen uit minstens 3 vraestelle bestaan, net in daardie vak hereksamineer word binne 12 maande vanaf die aanvangsdatum van die skriftelike gedeelte van die eksamen as geheel.

(2) 'n Kandidaat wat dan in daardie vak slaag, word geag in die skriftelike gedeelte van die eksamen as geheel te geslaag het. Met dien verstande dat as hy versuim om binne die voorgeskrewe tydperk van 12 maande aansoek te doen om hereksaminering of as hy by sodanige hereksaminering in die uitgestelde vak drui, hy geag word in die skriftelike gedeelte van die eksamen as geheel te gedruip het.

(3) As 'n kandidaat daarna in 'n uitgestelde vak slaag, is die datum waarop hy in die skriftelike eksamen geslaag het ook die datum waarop hy in die uitgestelde vak geslaag het.

Mondelinge eksamens

63. (1) Mondelinge eksamens is bedoel om die kandidaat se bekwaamheid in die praktiese aspekte van 'n offisier se plig te bepaal.

(2) Gedurende die mondelinge eksamen moet die eksaminator die kandidaat se kennis toets betreffende die strekking en betekenis van die Internasionale Regulasies vir die Voorkoming van Botsings ter See. Die vermoë om die Regulasies bloot woord vir woord te herhaal is nie voldoende om te verseker dat 'n kandidaat die eksamen slaag nie, maar dit sal ook nie noodwendig meebring dat die kandidaat drui nie mits die eksaminator oortuig is dat die kandidaat die volle betekenis, inhoud en praktiese toepassing van genoemde regulasies begryp.

(3) Eksaminators moet die kandidaat nie in die posisie stel om 'n varende skip te hanteer nie, maar moet die kandidaat se vermoë toets om 'n varende skip se ligte uit te ken en die kandidaat se kennis van 'n varende skip se moontlike manoeuvres na gelang van die windrigting toets.

(4) Die eksaminator kan aan die kandidaat vrae stel wat voortspruit uit die skriftelike werk wat deur die kandidaat gelewer is.

(5) 'n Kandidaat wat weens 'n ernstige gebrek aan praktiese kennis in die mondelinge deel van die eksamen vir enige bekwaamheidsertifikaat drui, kan na goeddunke van die eksaminator aangesê word om verdere toepaslike seediens te verrig voordat hy hereksamineer word: Sodanige seediens mag nie 6 maande te bowe gaan nie en kan in enige hoedanigheid op die dek van enige seevarende skip verrig word.

(6) 'n Kandidaat wat nie op die bepaalde tyd vir enige skriftelike of mondelinge eksamen opdaag nie, kan by gebrek aan redelike bewys dat die afwesigheid onvermydelik was, drui en sy eksamengeld word dan verbeur.

(7) Die mondelinge eksamen word afgeneem op 'n tyd deur die eksaminator bepaal, sodra die uitslae van die skriftelike deel van die eksamen beskikbaar is.

Referrals

62. (1) A candidate for a certificate of competency who fails in not more than one subject in the written examination may, provided that he has attained the required aggregate for a pass, if such written examination consists of at least 3 papers, be re-examined in that subject only within 12 months from the date of commencement of the written part of the examination taken as a whole.

(2) A candidate who then passes in that subject shall be deemed to have passed in the written part of the examination as a whole: Provided that failure to apply for re-examination within the prescribed period of 12 months, or failure in the referred subject at such re-examination, shall result in failure in the written part of the examination as a whole.

(3) Where a candidate subsequently passes a referred subject the date of passing the written examination shall be the date on which he passed the referred subject.

Oral examinations

63. (1) Oral examinations shall be conducted to ascertain a candidate's competency in the practical aspects of an officer's duty.

(2) During the oral examination the examiner shall test candidates' knowledge of the ambit and intention of the International Regulations for Preventing Collisions at Sea, and the mere ability to repeat the regulations verbatim shall not suffice to ensure a candidate passing the examination, nor shall the lack of a verbatim repetition necessarily entail failure, provided that the examiner is satisfied that the candidate grasps the full significance, content and practical application of the said regulations.

(3) Examiners shall not place a candidate in the position of handling a sailing ship, but shall test the candidate's ability to recognise a sailing ship's lights and the candidate's knowledge of a sailing ship's possible manoeuvres according to the direction of the wind.

(4) The examiner may ask the candidate questions arising from the written work produced by the candidate.

(5) A candidate who fails in the oral part of the examination for any certificate of competency through serious weakness in practical knowledge may, at the examiner's discretion, be required to perform further appropriate sea service before being re-examined: Provided that such sea service shall not exceed 6 months and may be performed in any capacity on deck in any seagoing ship.

(6) A candidate who fails to appear for any written or oral examination at the appointed time may be failed by default in the absence of reasonable proof that failure to attend was unavoidable and his examination fee shall be forfeited.

(7) The oral examination shall be conducted at a time determined by the examiner as soon as the results of the written part of the examination are available.

HOOFSUK 7**GEVAARLIKEVRAGENDOSSEMENTE****Bykomende kwalifikasies vir die uitreiking van gevaarlikevragedossemente**

64. (1) Persone aangestel as gesagvoerder en tweede-in-bevel van 'n skip wat gevaarlike vrag vervoer, aan wie die Direkteur-generaal 'n Gevaarlikevragedossement (Vloeibare Gas), Gevaarlikevragedossement (Vloeibare Chemikalieë) of Gevaarlikevragedossement (Petroleum) uitreik, moet, benevens enige ander kwalifikasies, óf—

- (a) voorheen 6 maande bevredigende diens voltooi het as gesagvoerder of tweede-in-bevel aan boord van 'n skip wat die betrokke gevaarlike vrag vervoer het hoogstens 36 maande voor die datum waarop hierdie regulasies in werking getree het, en getuigskrifte van hulle werkgewers te dien effekte kan voorlê; óf
- (b) 'n opleidingskursus deurloop het in die vervoer van die betrokke gevaarlike vrag, goedgekeur deur die Direkteur-generaal, en óf—
 - (i) in 'n botallige hoedanigheid 14 dae lank aan boord van 'n skip opleiding ontvang het gerig op die skep van 'n algehele besef van die betrokke operasies in verband met gevaarlike vrag en die gepaardgaande gevare en moet 3 maande gekrediteerde diens in 'n ondergeskikte hoedanigheid aan boord van 'n skip voltooi het; óf
 - (ii) 6 maande gekrediteerde diens in 'n ondergeskikte hoedanigheid aan boord van 'n skip voltooi het en moet, na die mening van die gesagvoerder van die skip waarop sodanige diens voltooi is, 'n persoon wees wat bekwaam is om vraghanteringspligte veilig te vervul; óf
 - (iii) in 'n botallige hoedanigheid 28 dae lank aan boord van 'n skip intensiewe opleiding ontvang het, goedgekeur deur die Direkteur-generaal, gerig op die skep van 'n algehele besef van die betrokke operasies in verband met gevaarlike vrag en die gepaardgaande gevare.

(2) Die diens aan boord van 'n skip verrig wat in hierdie regulasie vermeld word, word ten volle gekrediteer indien dit verrig word aan boord van 'n skip wat die betrokke gevaarlike vrag vervoer. Slegs die helfte van sodanige diens word gekrediteer indien dit verrig word op 'n skip wat enige ander gevaarlike vrag vervoer.

HOOFSUK 8**HERROEPING EN TITEL****Herroeping van regulasies**

65. Die Eksamenregulasies vir Bekwaamheidsertifikate vir Dekoffisiere, 1985, afgekondig by Goewermentskennisgewing No. R. 2656 van 29 November 1985, word hierby herroep.

Korttitel

66. Hierdie regulasies staan bekend as die Eksamenregulasies vir Bekwaamheidsertifikate vir Dekoffisiere, 1994.

CHAPTER 7**DANGEROUS CARGO ENDORSEMENTS****Additional qualifications for the issue of dangerous cargo endorsements**

64. (1) Persons appointed master and second-in-command of a ship carrying dangerous cargo in respect of whom the Director-General shall issue a Dangerous Cargo Endorsement (Liquefied Gas), Dangerous Cargo Endorsement (Liquid Chemicals) or Dangerous Cargo Endorsement (Petroleum) shall, in addition to any other qualification, have either—

- (a) previously completed 6 months' satisfactory service as master or second-in-command of a ship carrying the appropriate dangerous cargo not more than 36 months before the date that these regulations have come into force and shall be able to produce a testimonial from their employers to that effect; or
- (b) completed a training course for the carrying of the appropriate dangerous cargo approved by the Director-General and either—
 - (i) received in a supernumerary capacity 14 days' shipboard training designed to give an overall appreciation of the appropriate dangerous cargo operations and associated hazards and completed 3 months' accredited shipboard service in a subordinate capacity; or
 - (ii) completed 6 months' accredited shipboard service in a subordinate capacity and be, in the opinion of the master of the ship in which such service is completed, a person competent to carry out cargo handling duties safely; or
 - (iii) received in a supernumerary capacity 28 days' intensive shipboard training approved by the Director-General designed to give an overall appreciation of the appropriate dangerous cargo operations and associated hazards.

(2) The shipboard service referred to in this regulation shall be credited in full if performed on a ship carrying the appropriate dangerous cargo, and shall be credited at half-rate if performed on a ship carrying any other dangerous cargo.

CHAPTER 8**WITHDRAWAL AND SHORT TITLE****Withdrawal of regulations**

65. The Examination Regulations for Certificates of Competency for Deck Officers, 1985, promulgated under Government Notice No. R. 2656 of 29 November 1985 are hereby withdrawn.

Short title

66. These regulations shall be called the Examination Regulations for Certificates of Competency for Deck Officers, 1994.

AANHANGSEL A

VERGELYKING VAN BEKWAAMHEIDSERTIFIKATE

Klas bekwaamheidsertifikaat, uitgereik kragtens die Handelskeepvaartwet, 1951	Ekwivalente klas bekwaamheidsertifikaat uitgereik kragtens hierdie Regulasie
Gesagvoerder (Vreemde Vaart).....	Klas 1 (Bevare Seekaptein)
Hoofnavigasie-offisier	Klas 2
Tweede Navigasie-offisier.....	Klas 3
Gesagvoerder (Kusvaart).....	Klas 4 plus Gesagvoerder (Kortseehandel) bevelvoerings- endossement
Navigasie-offisier (Kusvaart).....	Klas 5

AANHANGSEL B

VOORBEELD VAN WAGHOUDIENSSERTIFIKAAT VIR 'N KLAS 1- OF KLAS 2- SERTIFIKAAT EN VIR 'N BEVELVOERINGSENDOSSEMENT

DEEL 1

Hierby word gesertifiseer dat m.....
op ss./ms..... van.....
tot..... in die hoedanigheid van (1ste) (2de) (3de) (4de) waghoud-offisier
onder my bevel diens gedoen het. Gedurende hierdie tydperk was bogenoemde offisier in volle bevel van 'n wag van
minstens uur uit elke 24 uur terwyl die vaartuig ter see was op onbegrenste*/begrenste*/kort* seereise.

Daarbenewens het hy gereeld ander pligte in verband met die roetine en onderhoud van die skip vervul.

Brugwaghoudienste is gedurende die volgende tydperke en op geen ander tye nie verdubbel:

Gedurende hierdie tydperke het bogenoemde offisier as die *senior/junior van twee Brugwaghoudiensoffisiere gedien.
Gedurende die tydperk diens soos hierbo uiteengesit, is aan bogenoemde offisier—

- *(a) geen verlof tot afwesigheid toegestaan nie;
- (b) verlof tot afwesigheid soos volg toegestaan:

.....
welke tydperk/tydperke* afgetrek is van die totale verlof waarop hy geregtig is.

.....
Handtekening van Gesagvoerder

.....
Datum

DEEL 2

Gedurende die tydperk was die vaartuig in die finale stadiums van konstruksie
en bogenoemde offisier het aan boord gedien.

Handtekening van *Maatskappy se Skeepsuperintendent

.....
Gesagvoerder

.....
Datum

Skrap indien nie van toepassing nie.

*Skrap soos toepaslik.

(Agterkant van Waghoudienssertifikaat)

M..... het vir gemelde tydperk as..... in ss./ms..... onder my bevel gedien.

Sy gedrag gedurende die tydperk ommesydde genoem, was.....

Sy vermoë was

Sy soberheid was.....

.....
Gesagvoerder

.....
Datum

AANHANGSEL C**GESIGTOETSE**

Die eksamendatums en -plekke moet volgens afspraak met die eksaminator by die naaste hawe gereël word.

Die afneem van die toetse

Die doel van hierdie toetse is om te verseker dat die kandidaat se gesigsvermoë skerp genoeg is om hom in staat te stel om die ligte van skepe ter see in die verte raak te sien en te identifiseer. Vir hierdie doel moet hy in die gesigtoetse, beide vir vorm en kleur, sekere minimum standaarde behaal.

'n Gesigtoets bestaan uit 'n lettertoets en 'n lanterntoets wat in daardie volgorde afgeneem word. Die toetse word onder streng toesig van 'n gesigtoetsseksaminator afgeneem, wat aantekening hou van alle foute wat deur die kandidaat in sowel die lettertoets as in die lanterntoets begaan word.

Elke kandidaat wat toegelaat wil word tot 'n eksamen vir 'n eerste bekwaamheidsertifikaat as dekkoffisier of visserman moet die houer wees van 'n gesigtoetscertifikaat wat toon dat hy binne die sesmaandtydperk wat die eksamendatum voorafgegaan het in sowel die lettertoets as die lanterntoets geslaag het.

Vir bekwaamheidsertifikate wat op die eerste een volg, word 'n gesigtoetscertifikaat vereis wat net aan die voorwaardes ten opsigte van die lettertoets voldoen.

Kandidate moet hulle nie haas wanneer hulle die lanterntoets aflê nie. Hulle moet hulle vergewis van die kleure van die ligte voordat hulle die kleure aan die eksaminator noem. Die kandidaat se mededelings bepaal die uitslag van die toets; onoplettendheid kan die kandidaat laat druip en hom dus verhinder om sy gekose loopbaan ter see te volg.

Daar word van kandidate verwag om die toets af te lê wanneer hulle in goeie gesondheid verkeer, anders kan hul gesigskerpte aangetas wees. Kandidate kan die gesigtoets nes hulle verkies met of sonder hulpmiddels aflê ('n gewone bril of kontaklense) maar kandidate wat verkies om die letter- of lanterntoets of albei met sodanige hulpmiddels af te lê, moet 'n bykomende minimum standaard ten opsigte van elke oog sonder hulpmiddels behaal.

A. LETTERTOETS

1. (a) Die lettertoets word volgens die Snellen-beginsel afgeleë deur middel van letterblaaie wat op so 'n manier onregstreeks met behulp van 'n gepoleerde spieël besigtig word dat die letters 'n virtuele afstand van ses meter van die oog af is. Elke blad het sewe reëls waarvan die derde, vierde, vyfde, sesde en sewende reël onderskeidelik met die standaarde 6/24, 6/18, 6/12, 6/9 en 6/6 ooreenstem.
- (b) Elke oog van die kandidaat word afsonderlik getoets.

2. Verlangde standaard van gesigskerpte

- (a) 'n Kandidaat wat verkies om die toets sonder hulpmiddels af te lê, moet al die reëls tot en met die sewende met sy beste oog en al die reëls tot en met die sesde met die ander oog reg aflees.
- (b) 'n Kandidaat wat verkies om die toets met hulpmiddels af te lê, moet eers die toets daarsonder aflê en dan moet hy al die reëls tot en met die vyfde met sy beste oog en al die reëls tot en met die derde met die ander oog reg aflees. Daarna word hy met hulpmiddels getoets en dan moet hy al die reëls tot en met die sewende met sy beste oog en al die reëls tot en met die sesde met die ander oog reg aflees.

3. Toetsmetode

Die toetsblaaie en die beligtingseenheid moet voldoen aan BS 4274-1960 en moet op so 'n manier in 'n kabinet geplaas word dat die middel van elke blad, as dit besigtig word, op ooghoogte is van 'n gemiddelde persoon in 'n sittende houding. Wanneer die kandidaat in die regte houding sit, word een van die blaaie belig en word hy gevra om die letters van links na regs van die boonste tot die onderste reël af te lees.

As die kandidaat met hulpmiddels of daarsonder of in albei gevalle nie daarin slaag om die verlangde standaard te behaal nie, moet 'n bykomende blad vir elke oog aan hom getoon word in daardie deel of dele van die toets waarin hy gedruip het.

As daar na afloop van die lettertoets gemeen word dat die kandidaat die verlangde standaard behaal het, moet hy die lanterntoets aflê, tensy hy oor 'n bekwaamheidsertifikaat beskik waarvoor 'n lanterntoets wat deur die Direkteur-generaal erken word 'n voorwaarde vir uitreiking was.

As daar na afloop van die lettertoets gemeen word dat die kandidaat nie die verlangde standaard behaal het nie, moet die volgende alternatiewe aan hom verduidelik word:

- (a) Die eksamen kan beëindig en 'n druiptertifikaat uitgereik word, en die eksamen kan na 'n tydperk van minstens een maand by betaling van 'n verdere bedrag herhaal word.
- (b) Die kandidaat kan die lanterntoets ook aflê. In so 'n geval word 'n opgawe van al die foute wat in die lettertoets begaan is en al die foute, as daar is, wat in die lanterntoets begaan is, vir sy beslissing aan die Direkteur-generaal gestuur. 'n Lettertoets word partymaal gedruip vanweë 'n gesigsgebrek wat geneesbaar is. Wanneer 'n kandidaat dus nie in 'n lettertoets slaag nie, moet hy aangeraai word om 'n oogarts te spreek sodat dié kan vasstel wat die aard van die gebrek is en of dit genees kan word.

B. LANTERNTOETS

4. Die toets moet afgeneem word in 'n vertrek wat so verdonker is dat dit geen daglig inlaat nie.
5. Donkerteaanpassing. 'n Kandidaat wat hom by donkerte moet aanpas, moet minstens tien minute lank in 'n kamer gehou word wat heeltemal of deels verdonker is.
6. Apparaat. Die lantern vir die toets moet so ontwerp wees dat dit drie kleure naamlik rooi, wit en groen, een-een deur 'n groot opening of twee-twee op 'n keer langs mekaar deur klein openinkies kan vertoon. Wanneer die klein openinkies gebruik word, kan enige kombinasie van die drie kleure of van dieselfde kleur vertoon word. Die lantern moet reg voor 'n spieël staan sodat die voorkant daarvan presies 3,05 m van die spieël af is en die ligte wat in die spieël weerkaats word, duidelik waarneembaar is van waar die kandidaat naby die lantern sit.
7. Toetsmetode. Die toets begin met 'n reeks ligte wat deur die groot opening vertoon word, gevolg deur vier volledige kringlope en een onderbroke kringloop van ligte wat deur die klein openinkies vertoon word. Die kandidaat moet die kleure van die ligte opnoem wanneer hulle verskyn.

C. TOETSRESULTAAT

8. (a) 'n Kandidaat wat geen fout in die lanterntoets begaan nie of wat, wanneer hy na die ligte in die klein openinkies kyk, groen-wit of rooi-wit nie meer as ses maal in vier volledige kringlope verwar nie, word geag in die kleurgesigstoets te geslaag het.
- (b) As die kandidaat in enige stadium van die lanterntoets rooi vir groen aansien of andersom, word hy geag nie in die kleurgesigstoets te geslaag het nie.
- (c) 'n Kandidaat word op 'n toepaslike vorm verwittig dat hy geslaag of gedruip het of dat sy geval vir oorweging verwys is.
- (d) 'n Kandidaat wat nie plaaslik in die lanterntoets slaag nie, word nie hertoets nie behalwe na goeddunke van die Direkteur-generaal by wie regstreeks skriftelik aansoek gedoen moet word.

AANHANGSEL D**VERDUIDELIKENDE OPMERKING BY LEERPLANNE**

Tydens die eksamens moet van die SI-stelsel gebruik gemaak word.

Die leerplanne moet van graad tot graad progressief wees. Daar word altyd aanvaar dat die leerplan vir 'n hoër graad in sowel die skriftelike as die mondelinge eksamens die leerplan vir die ooreenstemmende vak, as daar is, vir sertifikate van 'n laer graad insluit. In die eksamen kan vrae gestel word wat twee of meer van die paragrawe in die leerplan kombineer.

Waar die omvang van die kennis wat van die kandidaat verlang word nie uit die voorgeskrewe leerplan blyk nie, moet dit bepaal word deur 'n werkkomitee wat uit 'n verteenwoordiger van elk van die betrokke opleidingsinrigtings, die Departement van Vervoer en die Nywerheid bestaan.

Alhoewel Engels of Afrikaans nie as 'n aparte vak by hierdie leerplanne ingesluit is nie, word daar van kandidate verwag om goeie gehalte Engels of Afrikaans in hulle beskrywende antwoorde te gebruik en sal die punte wat behaal word, tot op sekere hoogte hulle vaardigheid in die gebruik van Engels of Afrikaans weerspieël.

Hoogstens 20% van die totale getal punte vir elke vak toegeken, kan afgetrek word vir swak uiteensetting, swak grammatika en foutiewe spelling.

Opmerking: In die leerplanne word daar melding gemaak van kennis van die Botsingsregulasies. Hiermee word bedoel die Internasionale Regulasies vir die Voorkoming van Botsings ter See, 1977.

Hierdie regulasies is onderworpe aan wysiging ooreenkomstig die vereistes van internasionale konvensies bekragtig deur die Regering van die Republiek van Suid-Afrika.

AANHANGSEL E**VOORGESKREWE PUNTETOEKENNING EN VERGELYKING VAN TECHNIKON-EN-DEPARTEMENTELE VAKKE**

(Name van technikonvakke in vet druk tussen vierkantige hakies)

KLAS 6—Bekwaamheidsertifikaat (Deel C)

	<i>Tyd</i>	<i>Puntetotaal</i>	<i>Slaagsyfer</i>
1. Praktiese Navigasie, Kaartwerk en Loodsing.....	3 uur	200	120
2. Algemene skeepskennis.....	2 uur	150	90

Mondeling: Soos deur eksaminator gereël.

KLAS 5—Bekwaamheidsertifikaat

	<i>Tyd</i>	<i>Puntetotaal</i>	<i>Slaagsyfer</i>
1. Kaartwerk en Praktiese Navigasie.....	3 uur	200	120
2. Algemene Skeepskennis.....	3 uur	200	120

Mondeling: Soos deur eksaminator gereël.

KLAS 4—Bekwaamheidsertifikaat

	<i>Tyd</i>	<i>Puntetotaal</i>	<i>Slaagsyfer</i>
1. Skeepsargitektuur	3 uur	200	120
[Skeepsargitektuur]			
2. Vragwerk en Skeepspraktyk	3 uur	200	100
[Seevervoer II]			
3. Kaartwerk	3 uur	200	120
[Navigasie II]			
4. Praktiese Navigasie	3 uur	200	120
[Navigasie II]			
5. Mariene Omgewingstudies	3 uur	200	100
[Mariene Omgewingstudies II]			

Mondeling: Soos deur eksaminator gereël.

KLAS 3-Bekwaamheidsertifikaat

	<i>Tyd</i>	<i>Puntetotaal</i>	<i>Slaagsyfer</i>
1. Skeepsargitektuur	3 uur	200	120
[Skeepsargitektuur II]			
2. Vragwerk en Skeepspraktyk	3 uur	200	100
[Seevervoer II]			
3. Kaartwerk	3 uur	200	120
[Navigasie II]			
4. Praktiese Navigasie	3 uur	200	120
[Navigasie II]			
5. Mariene Omgewingstudies	3 uur	200	100
[Mariene Omgewingstudies II]			
6. Toegepaste Wetenskap	3 uur	200	100
[Marinewetenskap I]			
7. Beginsels van Navigasie	3 uur	200	100
[Navigasie]			
8. Wiskunde	2 uur	200	100
(Marinewiskunde I)			

Mondeling: Soos deur eksaminator gereël.

KLAS 2-Bekwaamheidsertifikaat

	<i>Tyd</i>	<i>Puntetotaal</i>	<i>Slaagsyfer</i>
1. Navigasie	3 uur	200	120
[Navigasie III]			
2. Navigasie-inligtingstelsels	3 uur	200	120
[Navigasie-inligtingstelsels III]			
3. Mariene Omgewingstudies	3 uur	200	100
[Mariene Omgewingstudies III]			
4. Vragwerk en Skeepspraktyk	3 uur	200	120
[Seevervoer III]			
5. Skeepsargitektuur	3 uur	200	120
[Skeepsargitektuur III]			
6. Skeepsake en Reg	3 uur	200	100
[Maritieme Reg en Skeepspraktyk III]			

Mondeling: Soos deur die eksaminator gereël.

KLAS 1-Bekwaamheidsertifikaat

	<i>Tyd</i>	<i>Puntetotaal</i>	<i>Slaagsyfer</i>
1. Skeepsake en Reg	3 uur	200	100
[Maritieme Reg en Skeepspraktyk IV]			
2. Navigasie (Vraestel A)	4 uur	200	120
Navigasie (Vraestel B)	3 uur	200	120
[Navigasie IV]			
3. Skeepsargitektuur	3 uur	200	120
[Skeepsargitektuur IV]			
4. Ingenieurswese en Kontrolestelsels	3 uur	200	100
[Skeepsstegnologie II]			
5. Navigasie-instrumentasie	3 uur	200	120
[Navigasie inligtingstelsels IV]			

Mondeling: Soos deur die eksaminator gereël.

ENDOSSEMENT AS GESAGVOERDER (BEGRENSTE HANDEL)

	<i>Tyd</i>	<i>Puntetotaal</i>	<i>Slaagsyfer</i>
1. Skeepsargitektuur	3 uur	200	120
2. Skeepsake en Reg	3 uur	200	120
3. Magnetiese en Girokompas en Navigasiehulpmiddels	2 uur	150	90
4. Skeepsboordwerksaamhede	3 uur	200	120

Mondeling: Soos deur die eksaminator gereël.

ENDOSSEMENT AS GESAGVOERDER (KORTSEEHANDEL)

	<i>Tyd</i>	<i>Puntetotaal</i>	<i>Slaagsyfer</i>
1. Skeepsargitektuur	3 uur	200	120
2. Magnetiese Kompas en Navigasiehulpmiddels	2 uur	150	90

Mondeling: Soos deur die eksaminator gereël.

AANHANGSEL F**DEKOFFISIER KLAS 6 BEKWAAMHEIDSERTIFIKAAT: DEEL A—BEPERKTE HANDEL LEERPLAN VIR MONDELINGE EKSAMEN****Algemeen**

- (a) Die leerplan word so ontwerp dat die kandidate eksamen aflê by wyse van 'n praktiese toets aan boord van 'n vaartuig waarop die kandidaat diens doen, alhoewel enige sodanige eksamen gewoonlik by die eksamensentrums van die Departement afgeneem word.
- (b) Daar word van 'n kandidaat verwag om bewys te lewer van—
 - (i) bedrewenheid in die gebruik van navigasiehulpmiddels wat op die klas vaartuie waarop hy diens verrig, aangebring is;
 - (ii) suksesvolle voltooiing van 'n praktiese kursus in brandbestryding aan boord, 'n praktiese kursus in noodhulp ter see en 'n praktiese kursus in oorlewing ter see, wat die gebruik van opblaasbare reddingsvlote insluit.
- (c) 'n Kandidaat moet ook toon dat hy 'n redelike kennis het van die navigasieverordeninge van toepassing op die bedryfsgebied wat op die bekwaamheidsertifikaat geëndosseer moet word.

AFDELING 1**Praktiese navigasie, kaartwerk en loodsing**

- (a) 'n Basiese kennis van getye en strome en vaar- en seisoensweerpatriene binne die gebied.

- (b) 'n Praktiese demonstrasie van kaartwerk binne die konteks van die toerusting aan boord van die vaartuig, soos volg:
- Om, indien die variasie en die deviasie van die magnetiese kompas verstrek word, die ware koerse tot kompas-koerse te herlei, en omgekeerd.
 - Om die kompaskoers tussen twee posisies te bepaal.
 - Die uitwerking van 'n stroom op spoed.
 - Toelating vir drif.
 - Om, indien die kompaskoers waarin gestuur word, die spoed van die skip en die rigting en snelheid van die stroom verstrek word, die behoue ware koers te bepaal.
 - Om 'n posisie op 'n kaart deur middel van peiling en afstand te bepaal.
 - Om, met inagneming van 'n stroom, die koers te bepaal waarin gestuur moet word.
 - Om, indien die koers waarin gestuur word en die afgelegde afstand verstrek word, die rigting en snelheid van die stroom tussen twee posisies te bepaal.
 - Om 'n posisie op 'n kaart te bepaal deur middel van gelyktydige kruispeilings.
- (c) 'n Eksamen oor inligting op 'n kaart verstrek.
- Verwysing:*
- Boeie.
 - Ligte.
 - Radiobakens.
 - Navigasiehulpmiddels.
 - Diepte en gesteldheid van die seebodem en die gebruik van lodings.
 - Dieptes- en hoogtekontoere.
 - Getystrome, verkeersbane en skeidingsones.
 - Herkenning van die kus.
 - Kaartkorreksie.
- (d) Kandidate moet eksamen aflê oor die keuse van geskikte ankerplekke, die nadering van 'n ankerplek en die binnevaar van smal waters; aan wal gaan in dik en helder weer.
- (e) Die praktiese gebruik van elektroniese navigasiehulpmiddels waarmee 'n vaartuig toegerus is.

AFDELING 2

Praktiese Seemanskap en Seine

- (a) Die vermoë om 'n kompaspeiling of -peilings te neem.
- Die vermoë om kompaspeilings deur middel van oorgangspeilings na te gaan.
 - Hoe om 'n barometer en termometer af te lees en te verstaan.
 - Die versorging en onderhoud van vloeistofkompasse.
 - Die vermyding van elektriese en magnetiese sturings.
- (b) Touwerk en optakeling. Knope, steke en touverbindinge wat gewoonlik gebruik word.
- Bindsele, oorkruisbindsele, toue en kettingstoppers.
 - Kort- en oogsplitsing van driestringtouw.
- (c) Voorbereidings om te begin vaar. Pligte voordat die skip uitvaar; 'n hawe aandoen; 'n dok binnegaan. Langs kaaie, hawehoofde of ander skepe vasmeer en aan boeie vasmaak. Roerbevele. Stuurbevele aan stuurman. Uitwerking van skroewe op die stuur van 'n skip. Die uitwerking van stroom, wind, vlak water en diepgang op manewrering. Hoe om te stop, agteruit te beweeg en te manewreer. Kort draai met 'n skip. Noodmanewers. Hoe om 'n skip in 'n noodgeval voor 'n enkele anker te bring. Gebruik van twee ankers. Man oorboord. Anker sleep. Merker op en die gebruik van 'n gewone loodlyn.
- (d) Ankers, kables, hulle gebruik en stuwing. Kennis van die gebruik van alle dekstoestelle, met inbegrip van noodstuurgerei.
- (e) Volledige kennis van die inhoud en toepassing van die Botsingsregulasies en daardie aanhangsele wat betrekking het op veilige navigasie, soos van toepassing op die handel of operasies waarby die kandidaat betrokke is.

Noodseine; strawwe vir misbruik

Kennis van die inhoud en gebruik van die Suid-Afrikaanse Handelskeepvaartkennisgewings en die Suid-Afrikaanse Vlootkennisgewings aan Seevaarders. Plaaslike boeistelsels; die merk van wrakke.

- (f) (i) Hantering van skepe in stormweer.
Hantering van ontredderde skip.
Ekstra voorsorg wat getref moet word voordat stormweer intree.
- (ii) Hoe om 'n skip op sleeptou te neem en self gesleep te word.
- (g) Die optakeling van 'n loodsleer.
- (h) Pligte van die persoon in beheer van die skip ter see, voor anker en in die hawe.
- (i) Soek-en-reddingswerk.
Hulp aan 'n skip of vliegtuig in nood.
Redding van die passasiers en bemanning van 'n ontredderde skip, of van 'n vliegtuig wat 'n noodlanding op see gedoen het.
Ophaal van bote ter see.
Stappe wat gedoen moet word wanneer 'n skip ontredderd is en in nood verkeer.
Verlating van skip; oorlewingsprosedure.
Kommunikasie met die land; 'n boot op die strand laat loop of land.
Die gebruik van vuurpyle en vuurpylapparaat, soos van toepassing op die vaartuig.
Beveiliging van bemanning en passasiers in die geval van skipbreuk.
Hoe om in reddingsbote en reddingsvlote, aan die lewe te bly.
Kennis in breë trekke van die regulasies betreffende redding- en brandblustoestelle, hul versorging en gebruik.
Maatreëls wat getref moet word wanneer 'n skip per ongeluk beskadig word, met inbegrip van botsing-, stranding- en stormskade en lekkasies, en die belangrikheid van die korrekte gebruik van waterdigte deure.
'n Skip op die strand stuur.
Metodes om 'n brand aan boord van 'n skip te bestry.
Voorkoming van brand ter see en in die hawe.
- (j) Maatreëls ter voorkoming van oliestorting tydens olie-inname of olievragwerk.
- (k) Vermoë om die eenletterseine van die Internasionale Seinkode óf deur middel van vlae óf Morse-kode deur klank of flitsende lig te herken.
- (l) Vermoë om seine deur middel van Morse-kode by wyse van klank of flitsende lig te stuur of te ontvang teen tot ses woorde per minuut.

AFDELING 3**Algemene skeepskennis**

- (a) Die name en funksies van die belangrikste dele van 'n skip. Algemene omskrywings van die belangrikste afmetings. 'n Praktiese begrip van die algemene pompinrigting en die inlaai van ballas, soos van toepassing op die betrokke vaartuig.
- (b) Die betekenis van die uitdrukkings "dryfvermoë" en "ladingsgewig".
- (c) 'n Praktiese kennis van die beginsels van stabiliteit en trim en die faktore wat dit beïnvloed. Die gevaar van gedeeltelik gevulde tenks.
- (d) Algemene beginsels van vragstuwing en -hantering. 'n Algemene kennis van die vervoer van gevaarlike goedere, waar van toepassing in die handel of operasie. Gebruik van verplasing- en ton-per-sentimeterskale. Korreksie vir varswatertoelating.
- (e) Inskrywings moet in die dekjoernaal gemaak word, met inbegrip van verslae in die geval van die besering of dood van 'n bemanningslid of ander personeel aan boord van die skip.
- (f) Wetlike verpligtinge in die geval van strandings, botsings en ander ongevale.
- (g) Laslynmerke. Inskrywings en verslae ten opsigte van vryboord, diepgang en toelatings.
- (h) Sertifikate, met inbegrip van Registrasiesertifikate, wat aan boord van kusvaarders gehou moet word.
- (i) Die wet betreffende die aanmelding van gevare vir navigasie.
- (j) Voorkoming van besoedeling van die see deur skepe. Die hou van rekords ingevolge die Wet op die Voorkoming en Bestryding van Besoedeling van die See deur Olie, Wet No. 6 van 1981, waar van toepassing op die vaartuig.
- (k) Die Beaufort-windskaal

Kennis van basiese weerkunde ten einde in staat te wees om die moontlike veranderinge in die weer weens die beweging van 'n laagdrukstelsel te voorspel en die toestande wat aanleiding tot mis kan gee te identifiseer. Slegs genoeg kennis word vereis om intelligent gebruik te maak van die SAUK se televisie- en radiovoorspellings en van die weervoorspellingskaart van koerante en kaarte wat deur die Weerburo vir kuswaters uitgereik word.

DEEL B—KORTSEEHANDEL**Algemeen**

- (a) Die leerplan word so ontwerp dat die kandidate geëksamineer kan word by wyse van 'n mondelinge eksamen by die Departement se eksamensentrums, alhoewel enige sodanige eksamen deur middel van 'n praktiese toets aan boord van die vaartuig waarop die aansoeker diens verrig, afgeneem kan word.
- (b) Van 'n kandidaat word verwag om bekwaamheid te toon in die gebruik van navigasiehulpmiddels, brandbestrydingstoerusting en reddingstoerusting geïnstalleer op die klas vaartuig waarop hy diens verrig, en in praktiese noodhulp.
- (c) Die leerplan vir hierdie Deel is dieselfde as dié vir Deel A, maar daar word van die kandidaat verwag om 'n meer uitgebreide kennis te hê as wat verwag word vir die eksamen met betrekking tot Deel A.

DEEL C—ONBEGRENSTE HANDEL**AFDELING 1*****Skriftelike vraestel oor Praktiese Navigasie, Kaartwerk en Loodsing (3 uur)***

- (a) Bo en behalwe die leerplan van Praktiese Navigasie, Kaartwerk en Loodsing vervat in Deel A, Afdeling 1, word van 'n kandidaat verwag om sy vermoë te toon om die volgende te bepaal:
 - (i) Die kompasfout en -deviasie deur 'n peiling van die Son en Venus te gebruik.
 - (ii) Die breedtegraad van die skip deur middel van die meridiaanshoogte van die Son en Venus.
 - (iii) Die rigting van die standlyn waarop die skip is en 'n posisie waardeur dit gaan, deur 'n waarneming van die Son of Venus naby of verby die meridiaan.
 - (iv) Die posisie van die skip deur die standlyne te gebruik wat verkry is van twee of meer astronomiese waarnemings, met of sonder meetvaart. Die astronomiese waarnemings kan van die Son, uitgesoekte sterre soos op die seevaartkalender aangedui, en Venus wees.

LET WEL: Vir die berekeninge wat in hierdie eksamen vereis word, kan die kandidaat gebruik maak van waarnemingherleidingstabelle, Norries- of Burtonstabelle of van 'n wetenskaplike rekenaar wat nie vooraf geprogrammeer kan word nie.

AFDELING 2***Skriftelike vraestel oor Algemene Skeepskennis. (3 uur)***

- (a) Bykomend by die leerplan vir Algemene Skeepskennis vervat in Deel A, Afdeling 3:
 - (i) Doeane-prosedures vir die in- en uitklaar van 'n Suid-Afrikaanse skip.
 - (ii) Suid-Afrikaanse en internasionale gesondheidsregulasies. Mediese hulp beskikbaar aan 'n skip ter see.

AFDELING 3***Mondelinge eksamen in Praktiese Seemanskap en Seine***

- (a) Bykomend by die leerplan vir Praktiese Seemanskap en Seine vervat in Deel A, Afdeling 2:
 - (i) Vermoë om peilings te neem met 'n kompas.
 - (ii) Vermoë om 'n mikrometerseksant waarin daar een of meer loodregtestand-, sy- of indeksfoute aangebring is, reg te stel.
 - (iii) Vermoë om die indeksfout van 'n seksant te bepaal.
 - (iv) Vermoë om met 'n mikrometerseksant vertikale en horisontale hoeke te meet en om seksant sowel op as buite die boog af te lees.
 - (v) Vermoë om 'n aneroïedbarometer af te lees en te verstaan.
 - (vi) Vermoë om seine deur middel van Morse-kode by wyse van klank of flitsende lig te stuur en te ontvang teen tot ses woorde per minuut.
 - (vii) Die gebruik van die Internasionale Seinkode en die vermoë om die enkelletterseine van die kode te herken.

AANHANGSEL G**DEKOFFISIER KLAS 5—BEKWAAMHEIDCERTIFIKAAT: LEERPLAN*****Kaartwerk en praktiese navigasie***

(drie uur skriftelik)

Deel A—Kaartwerk

- (a) Om, waar die variasie en die deviasie van die magnetiese kompas of die girofout verstrek word, die ware koerse te herlei tot kompaskoerse, en omgekeerd. Om, waar 'n monsterdeviasietafel verstrek word, die deviasie te bepaal en op grond daarvan die ware koerse tot magnetiese en kompaskoerse te herlei. Om die kompaskoerse tussen twee posisies te bepaal. Die uitwerking van stroom op spoed. Toelating vir drif.

Om, waar die kompaskoers waarin gestuur word, die snelheid van die skip en die rigting en snelheid van die stroom verstrek word, die behoue ware koers te bepaal.

Om die koers te bepaal waarin met inagneming van 'n stroom gestuur moet word. Om, waar die koers waarin gestuur word en die afgelegde afstand verstrek word, die rigting en snelheid van die stroom tussen twee posisies te bepaal.

- (b) Om 'n posisie op 'n kaart te bepaal deur middel van gelyktydige kruispeilings, peilings en afstand, of deur middel van posisionele inligting met radionavigasiehulpmiddels verkry, of deur middel van enige kombinasie, met die aanbring van die nodige korreksies. Die gebruik van kruisnetkaarte.
- (c) Om 'n posisie deur peilings van een of meer voorwerpe met 'n meetvaart tussen hulle, met inagneming van 'n stroom, vas te stel en om te bepaal hoe ver die skip by 'n gegewe punt sal verbyvaar. Die gebruik van standlyne volgens enige metode verkry, met inbegrip van aardstandlyne en standsirkels. Die gebruik van oorgangspeilings.
- (d) Elementêre kennis van deurvaartbeplanning en -uitvoering. Landings in dik en helder weer. Die uitkies van geskikte ankerplekke, nadering van 'n ankerplek en die binnevaar van smal waters. Die gebruik van vernymmerke en horisontale en vertikale gevaarhoeke. Die afstand van ligte wat gesien kan word.
- (e) Om die tyd en hoogte van hoog- en laagwater by 'n standaard en sekondêre hawe deur middel van getyverskille te bepaal, met gebruikmaking van die "Admiralty Tide Tables" Vol. 2; die gebruik van getykrommes soos in die "Admiralty Tide Tables" gepubliseer.
- (f) Die vertolking van 'n kaart of plan; veral die gegewe inligting oor ligte, boeie, radiobakens en ander navigasiehulpmiddels, diepte- en hoogtekontoere; getystrome; verkeersbane en skeidingsones. Herkenning van die kus en radarantwoordbakens.

Kaartkorreksie.

Dieptes en gesteldheid van die seebodem. Die gebruik van lodings.

Opmerkings: In hierdie vraestel kan vroe gestel word wat beskrywende antwoorde sowel as werk op die kaart wat voorsien word, vereis.

Deel B — *Praktiese navigasie*

- (a) Praktiese vroe oor platkaart- en Mercatornavigasie.
- (b) Die gebruik van die koppelkoersmetode om die skip se posisie op 'n gegewe tydstop te bepaal indien die kompas-koers, -variasie, -deviasie en die meetvaart soos deur die log aangegee of volgens tyd of geskatte spoed bereken, verstrek word en daar met die uitwerking van wind en stroom rekening gehou word.
- (c) Bepaling van die kompasfout deur middel van die waarneming van hemelliggame en, vir 'n magnetiese kompas, die deviasie vir die boegrigting.
- (d) Bepaling van die breedtegraad deur middel van die meridiaanshoogte van die Son, Maan of 'n ster.

KLAS 5 — *Algemene Skeepskennis* (drie uur skriftelik)

- (a) Algemene begrippe van skeepsbou en van planne en gegewens wat aan boord van 'n skip beskikbaar is.
 - Algemene pompinrigtings.
 - Algemene omskrywings van hoofafmetings. Die name van die vernaamste dele van 'n skip.
- (b) Algemene begrip van:
 - Verplasing.
 - Ladingsgewig.
 - Dryfvermoë, reserwedryfvermoë, begrip van die fundamentele optrede in die geval van gedeeltelike verlies van ongeskonde dryfvermoë.
- (c) Gebruik van verplasing- en ton-per-cm-dompelskale om massa van vrag of ballas volgens diepgang of vryboord te bepaal.
 - Laslynmerke
 - Uitwerking van die relatiewe digtheid van water op diepgang en vryboord.
 - Toelating vir varswater.
- (d) Algemene begrip van —
 - swaartepunt;
 - dryfpunt;
 - metasenterhoogte;
 - oprighefkrag;
 - oprigmoment.

- (e) Kennis van die IMO-aanbevelings aangaande skeepstabiliteit en die gebruik van stabiliteit- en hidrostatiese gegewens aan skepe verskaf, met inbegrip van stabiliteitsgegewens in vereenvoudigde vorm. Die uitwerking van die byvoeg en wegneem van gewigte. Die gevaar van gedeeltelik gevulde tenks, met verwysing na die onderverdeling daarvan.
- (f) Die opstuiging van 'n skip vir die laai en aflaai van vrag, die gebruik van laaibome, windasse en krane.
- (g) Die instel van pyplyne op olieproduktevervoerders.
- (h) Die stuwing en bevestiging van vrag, met inbegrip van stortvrag.
- (i) Kennis van die veiligheidsmaatreëls tydens die laai en aflaai van olie, chemikalieë en ander gevaarlike kommoditeite by die groot maat. Ventilasiestelsels van ruime en tenks.

KLAS 5—*Mariene Omgewingstudies* (Mondeling)

- (a) Hoe om 'n aneroïedbarometer, termometer, hidrometer en higrometer af te lees en te verstaan. Die instrumente wat deur die Weerburo verskaf word, word as standaard gebruik.
- (b) Barometerdruk; die gebruik van barometrieë waarnemings saam met weertekens.
- (c) Die Beaufort-windskaal. Metodes vir die skatting van die rigting en die krag van die wind ter see.
- (d) Die kenmerke van, en die weer wat gepaard gaan met die vernaamste druksels, bv. antiskilone en laedrukstelsels. Verhouding tussen drukverspreiding en wind. Die Wet van Buys Ballot.
- (e) Kennis van die weerinligting wat beskikbaar is vir skeepvaart in die kusgebied tussen die Kuneneriviermonding en Punto da Ouro.
- (f) Kennis van die weerberiggewingsprosedures vir skepe.
- (g) Kennis van plaaslike —
 - (i) strome;
 - (ii) seisoensweerpatrone;
 - (iii) voorkoms van abnormale golwe.

KLAS 5—*Mondeling en prakties*

Deel A

- (a) Volledige kennis van die inhoud en toepassing van die Botsingsregulasies.
- (b) Nood- en loodsseine; strawwe vir misbruik.
- (c) 'n Behoorlike kennis van die beginsels van navigasiewaghou ter see en voor anker soos neergelê deur die IMO. Pligte van die dekkoffisiere in die hawe.
- (d) Kennis van die inhoud en toepassing van die Departement van Vervoer se Handelskeepvaartkennisgewings, die Britse Admiraliteit se Notices to Mariners en die Suid-Afrikaanse Vlootkennisgewings aan Seevaarders.
- (e) Die Internasionale Vereniging van Vuurtoringowerhede (IALA) se boeiestelsel; wrakmerkstelsel.
- (f) Code of Safe Working Practices for the Safety of Merchant Seamen.
- (g) Verantwoordelikhede ingevolge plaaslike wetgewing met betrekking tot die voorkoming van besoedeling deur skepe.

Deel B

- (a) Hoe om 'n asimutspieël, pelorus of ander instrument te gebruik vir die neem van peilings.
- (b) Hoe om 'n mikrometerseksant te gebruik vir die meet van vertikale en horisontale hoeke; hoe om 'n seksant sowel op as buite die boog af te lees.
- (c) Gebruik, versorging en beperkings van die magnetiese en toekompas en verwante toerusting, met inbegrip van die stuuroutomaat.
- (d) Die optakeling van 'n skip, metodes om die sterktegraad en veilige werkklas van toue te bepaal, met inbegrip van sintetiese vesel- en draadtoue.
- (e) Stuwing en bevestiging van vragte. Regulasies en aanbevelings betreffende die vervoer daarvan.
- (f) Voorbereiding om te begin vaar. Pligte voordat skip uitvaar, 'n hawe aandoen, 'n dok binnegaan. Langs kaaie, hawehoofde of ander skepe vasmeer en aan boei vasmaak.
- (g) Roerbevele. Stuurbevele aan stuurman. Uitwerking van skroewe op die stuur van 'n skip. Stop, tru en manoevreer in die omgewing van loodsvaartuie en ander voertuie. Opneem van die loods. Kort draai. Noodmanoeuvres. Hoe om 'n skip in 'n noodgeval voor 'n enkele anker te bring. Man oorboord.
- (h) Ankers, kables; hulle gebruik en stuwing.

- (i) Elementêre kennis van skeepsmasjinerie. Kennis van die gebruik van alle dektostelle, met inbegrip van noodstuur-gerei.
- (j) Die gebruik en versorging van reddingstoerusting. Die hantering van bote en oorlewingsvaartuie; die ophaal van bote ter see. 'n Boot op die strand laat loop of land. Hoe om in reddingsbote en oorlewingsvaartuie aan die lewe te bly. Soek-en-reddingsprosedures.
- (k) Die gebruik en versorging van brandblustoestelle, met inbegrip van die rookhelm en selfstandige asemhaal-apparaat.
- (l) Dril oefeninge en inspeksies. Organisasie van noodspanne.
- (m) Herkenning van soorte skepe.
- (n) Die eksaminator kan aan die kandidaat vrae stel wat uit die skriftelike werk voortspruit, as dit vanweë swak prestasie deur die kandidaat nodig geag word.

KLAS 5—Kommunikasie (Mondeling en prakties)

- (a) Uitstuur en ontvang van seine—
 - (i) in Morse-kode met flitslamp, tot ses woorde per minuut; en
 - (ii) deur die "Internasionale Seinkode" te gebruik.
- (b) 'n Redelike kennis van die GMDSS (Global Maritime Distress and Safety System) en die toerusting vir soek-en-reddingskommunikasie.

AANHANGSEL H

DEKOFFISIER KLAS 4—BEKWAAMHEIDCERTIFIKAAT: LEERPLAN

KLAS 4—SKEEPSARGITEKTUUR (3 UUR SKRIFTELIK)

DEEL A—SKEEPSKONSTRUKSIE

- (a) Algemene begrippe van soorte skepe en hul konstruksie, en van planne wat aan boord van 'n skip beskikbaar is. Algemene omskrywings van hoofafmetings. Die identifisering en name van die vernaamste dele van 'n skip.
- (b) Van die kandidaat word verwag om sy praktiese vertroudheid te toon met—
 - spantestelsels;
 - balke en balkknieë;
 - waterdigte skotte;
 - luikopeninge en afsluittoestelle;
 - roere;
 - stuurgerei;
 - huid- en dekbeplating;
 - dubbele bome en piektenks;
 - kimme;
 - sy- en vleueltenks;
 - skroefraam;
 - skroewe en skroefasse;
 - skroefaskokers;
 - peilkokers;
 - lugtype;
 - algemene pompinrigtings;
 - verstewiging en versterking om hyging, stamp en langsspanning te weerstaan;
 - die oorsaak en voorkoming van korrosie in 'n skip se bouwerk.
- (c) Algemene begrippe van sweiswerk, klinkwerk en vlamsnywerk.

DEEL B—SKEEPSTABILITEIT

- (a)
 - (i) Die betekenis van die uitdrukkings blokkoeffisiënt, verplasing, ladingsgewig, digtheid, relatiewe digtheid, beginsel van Archimedes, flottasie.
 - (ii) Die uitwerking van digtheid van water op diepgang en vryboord. Toelating vir varswater. Die seehidrometer en sy aanwending.
- (b) Die gebruik van Simpson se stellings in die berekening van oppervlaktes.
- (c) Gebruik van verplatings- en ton-per-cm-dompelskale om gewig van vrag of ballas volgens diepgang of vryboord te bepaal. Laslynmerke.

Dryfvermoë, reserwedryfvermoë, begrip van die fundamentele optrede in die geval van gedeeltelike verlies van ongeskonde dryfvermoë.

- (d) (i) Algemene begrip, met omskrywings van—
 swaartepunt; stabiele, onstabiele en neutrale ewewig;
 dryfpunt;
 metasenterhoogte;
 oprighefkrag;
 oprigmoment.
- (ii) Kennis van die IMO-aanbevelings ten opsigte van skeepstabiliteit en die gebruik van stabiliteit- en hidrostatiese gegewens aan skeepse verskaf.
- Die uitwerking van die byvoeging en verwydering van gewigte.
- Die gevaar van gedeeltelik gevulde tenks.

- (e) 'n Kennis van die inligting aan boord ten opsigte van skuifkragte en buigmomente.

KLAS 4—VRAGWERK EN SKEEPSPRAKTYK (3 uur skriftelik)

- (a) Die optuiging van 'n skip vir die laai en aflaai van vrag, die gebruik van laaibome, windasse en krane.
- (b) Die stuwling, skeiding en garnering van vragte, met inbegrip van massavrag.
- Oorsake van sweet, en voorsorgmaatreëls voor, tydens en na stuwling ter voorkoming van skade weens sweet.
- (c) Kennis van die veiligheidsmaatreëls tydens die laai en aflaai van olie, chemikalieë en ander gevaarlike kommoditeite in groot maat. Die instel van pyplyne op olieproduktevervoerders.
- (d) Berekening van massaruimte deur deelvrag in beslag geneem, en van oorblywende ruimte. Herleiding van massa-maat van vrag tot ruimtemaat en omgekeerd. Die opstel en gebruik van vragplanne.
- (e) Ventilasiestelsels van ruime en tenks.
- (f) Voorsorgmaatreëls by die binnegaan van vragruime, ballastenks en onbesette ruime.
- (g) 'n Algemene kennis van dokumentasie van vrag, met inbegrip van stuurmanskwitansies, seevragbriewe, lysse van gevaarlike goedere, geleibriewe, skeepsmannifeste en huurkontrakte.
- (h) Voorsorgmaatreëls wat getref moet word wanneer sweiswerk en vlamsnywerk aan boord gedoen word.

KLAS 4—Kaartwerk (3 uur skriftelik)

- (a) Om, waar die variasie en die deviasie van die magnetiese kompas of die girofout verstrek word, die ware koerse te herlei tot kompaskoerse, en omgekeerd.
- Om, waar 'n monsterdeviasietabel verstrek word, die deviasie te bepaal en op grond daarvan die ware koerse tot magnetiese en kompaskoerse te herlei.
- Om die kompaskoerse tussen twee posisies te bepaal.
- Die uitwerking van stroom op spoed.
- Toelating vir drif.
- Om, waar die kompaskoerse waarin gestuur word, die snelheid van die skip en die rigting en snelheid van die stroom verstrek word, die behoue ware koerse te bepaal.
- Om die koerse te bepaal waarin met inagneming van 'n stroom gestuur moet word.
- Om, waar die koerse waarin gestuur word en die afgelegde afstand verstrek word, die rigting en spoed van die stroom tussen twee posisies te bepaal.
- (b) Om 'n posisie op 'n kaart te bepaal deur middel van gelyktydige kruispeilings, meervoudige peilings, peilings en afstand, of deur middel van posisionele inligting met radionavigasiehulpmiddels verkry, of deur middel van enige kombinasie, met die aanbring van die nodige korreksies.
- Die gebruik van kruisnetkaarte.
- (c) Om 'n posisie deur peilings van en of meer voorwerpe met die meetvaart tussen hulle, met inagneming van 'n stroom, vas te stel en om te bepaal hoe ver die skip by 'n gegewe punt sal verbyvaar. Die gebruik van standlyne volgens enige metode verkry, met inbegrip van aardstandlyne en standsirkels. Die gebruik van oorgangspeilings.
- (d) Elementêre kennis van deurvaartbeplanning en -uitvoering. Landings in dik en helder weer. Die uitkies van geskikte ankerplekke, nadering van 'n ankerplek en die binnevaar van smal waters. Die gebruik van vermymerke, en horisontale en vertikale gevaarhoeke. Die afstand van ligte wat gesien kan word.
- (e) Om die tyd en hoogte van hoog- en laagwater by 'n standaard en sekondêre hawe deur middel van getyverskille te bepaal, met gebruikmaking van die "Admiralty Tide Tables" Volume I en II.

Die gebruik van tafels en getykrommes om die tyd wanneer die gety 'n gegewe hoogte bereik of die hoogte van die gety op 'n gegewe tyd te bepaal, en dan op grond daarvan die benaderde korreksie wat aangebring word aan lodings of aan seekaarthoogtes van kusvoorwerpe.

(f)

Die vertolking van 'n kaart of plan, veral die gegewe inligting oor boeie, ligte, radiobakens en ander navigasiehulpmiddels; diepte- en hoogtekontoere; getystrome; verkeersbane en skeidingsones. Herkenning van die kus en radarantwoordbakens.

Kaartkorreksies.

Dieptes en gesteldheid van die seabodem. Die gebruik van lodings.

Klas 4—Praktiese Navigasie (3 uur skriftelik)

- (a) Praktiese probleme in verband met platkaart-, Mercator-, groot sirkel- en saamgestelde navigasie.
- (b) Die gebruik van die koppelkoersmetode om die skip se posisie op 'n gegewe tydstip te bepaal indien die kompas-koers, -variasie, -deviasie en die meetvaart soos deur die log aangegee of volgens tyd of geskatte spoed bereken, verstrekk word en daar rekening gehou word met die uitwerking van wind en stroom, as daar is.
- (c) Bepaling van die breedtegraad deur middel van die meridiaanshoogte van 'n hemelliggaam, bokant of onderkant die Pool. Die breedtegraad deur waarneming van Polaris.
- (d) Om deur middel van die waarneming van 'n hemelliggaam naby of buite die meridiaan die rigting van die standlyn en 'n punt waardeur dit loop, te bepaal.
- (e) Die gebruik van sterrekaarte en -tabelle vir die voorafberekening van die asimut en die hoogte van hemelliggame.
- (f) Bepaling van 'n posisie deur gebruikmaking van standlyne verkry uit twee of meer waarnemings met of sonder meetvaart.
- (g) Bepaling van die ware peiling van 'n hemelliggaam, die kompasfout en aan die hand daarvan die deviasie van die magnetiese kompas vir die boeigrigting.
- (h) Bepaling van die benaderde tyd (tot die naaste minuut) van die meridiaansgang van 'n hemelliggaam en die opkoms van die Son en die Maan.
- (i) Berekening van 'n benaderde hoogte vir die instel van die sekstant om die meridiaanshoogte van 'n hemelliggaam vas te verkry.

Klas 4—Mariene Omgewingstudies (3 uur skriftelik)

- (a) Die beginsels van drukmeting. Die gebruik van die standaardstelmerk. Kennis van die aneroïedbarometer en die barograaf.
- (b) Die beginsel van die termometer, maksimum- en -minimumtermometers.
See- en lugtemperatuurwaarnemings en voorsorgmaatreëls wat getref moet word.
Die beginsel van die higrometer, waarnemings wat gedoen moet word om 'n relatiewe humiditeit te verkry.
Versorging van en aandag aan instrumente.
- (c) Die Beaufort-windskaal. Metodes vir die skatting van die rigting en die krag van die wind ter see.
- (d) Kennis van die verspreiding van gemiddelde druk.

Daaglikse en seisoensveranderings in atmosferiese druk. Heersende winde. Plaaslike en streekuitwerking van verwarming en afkoeling, land- en seebriese, moesons. Katabatiese winde.

- (e) Die kenmerke van, en die weer wat gepaard gaan met die vernaamste drukstelsels, bv. antisiklone, laedrukstelsels, permanente en halfpermanente hoë- en laedrukgebiede. Verhouding tussen drukverspreiding en wind. Lugmassas en hulle eienskappe. Die Wet van Buys Ballot.
- (f) Gebruik van barometriesse waarnemings by 'n enkele stasie saam met weertekens.
- (g) Waterdamp in die atmosfeer, verdamping, kondensasie, presipitasie; betekenis van versadiging, relatiewe humiditeit, doupunt; elementêre kennis van atmosferiese stabiliteit en vervaltempo; formasie en klassifikasie van wolke, mis, newel en dou. Dynserigheid.
- (h) Kennis van die gebied, volume en verspreiding van die oseane en hul belangrikheid vir weerkunde. 'n Algemene kennis van bodemtopografie en die kenmerke van seewater. 'n Algemene kennis van die uitwerking van besoedeling op die mariene omgewing.
- (i) Kennis van die tipes weerberigte wat deur meteorologiese organisasies vir skeepvaart beskikbaar gestel word. Die kodering en dekodeering van berigte deur gebruik van die Weerburo se handleiding getitel "Weerkode vir Skepe". Kennis van die algemene struktuur van weerberiggewing, bv. die keuse van skepe, weerskepe, skeepstasies.

Klas 4—Mondeling en prakties**Deel A**

- (a) Volledige kennis van die inhoud en toepassing van die Botsingsregulasies.
- (b) Nood- en loodsseine; strawwe vir misbruik.
- (c) 'n Behoorlike kennis van die beginsels van navigasiewaghou ter see en voor anker soos neergelê deur die IMO. Pligte van die dekkoffisiere in die hawe.
- (d) Kennis van die inhoud en toepassing van die Departement van Vervoer se Handelskeepvaartkennisgewings, "Admiralty Notices to Mariners" en die Suid-Afrikaanse Vlootkennisgewings aan Seevaarders.
- (e) IALA-boeiestelsel; wrakmerkstelsel.
- (f) "Code of Safe Working Practices for the Safety of Merchant Seamen".
- (g) Verantwoordelikhede ingevolge internasionale konvensies vir die voorkoming van besoedeling deur skepe.

Deel B

- (a) Hoe om 'n barometer, termometer, hidrometer en higrometer af te lees en te verstaan. Die instrumente wat deur die Weerburo verskaf word, word as standaard gebruik.
- (b) Hoe om 'n asimutspieël, pelorus of ander instrument te gebruik vir die neem van peilings.
- (c) Hoe om 'n sekstant te gebruik vir die meet van vertikale en horisontale hoeke; hoe om 'n sekstant sowel op as buite die boog af te lees.
- (d) Hoe om 'n sekstant waarin daar een of meer loodregtestand-, sy- of indeksfoutte aangebring is, reg te stel.
- (e) Hoe om die indeksfout van 'n sekstant te bepaal.
- (f) Hoe om die chronometerfout vas te stel.
- (g) Gebruik, versorging en beperkings van die magnetiese en tolkompas en verwante toerusting, met inbegrip van die stuuroutomaat.
Die optakeling van 'n skip, metodes om die sterktegraad en veilige werkklas van toue te bepaal, met inbegrip van sintetiesevesel- en draadtoue. Daar kan ook aan kandidate vrae gestel word oor die kwalifiserende eksamenleerplan vir die uitreiking van 'n sertifikaat as Bekwame Dekseeman.
- (h) Stuwings en bevestigings van vragte. Regulasies en aanbevelings betreffende die vervoer daarvan.
- (i) Voorbereiding om te begin vaar. Pligte voordat skip uitvaar, 'n hawe aandoen, 'n dok binnegaan. Langs kaaie, hawehoofde of ander skepe vasmeer en aan boei vasmaak.
- (j) Roerbevele. Stuurbevele aan stuurman. Uitwerking van skroewe op die stuur van 'n skip. Stop, tru, en manewreer in die omgewing van loodsvaartuie en ander vaartuie. Opneem van 'n loods. Kort draai. Noodmanewre. Hoe om 'n skip in 'n noodgeval voor 'n enkele anker te bring. Man oorboord.
- (k) Dril oefeninge en inspeksies. Organisasie van noodspanne.
- (l) Ankers, kables, hulle gebruik en stuwings.
- (m) Elementêre kennis van skeepsmasjinerie.
Kennis van die gebruik van alle dekktoestelle, met inbegrip van noodstuurgerei.
- (n) Die gebruik, versorging en instandhouding van alle reddingstoerusting en brandbestrydingstoestelle, ligte en klankseinapparaat.
- (o) Soek-en-reddingsprosedures.
Daar kan ook aan kandidate vrae gestel word oor die kwalifiserende eksamenleerplan vir die uitreiking van 'n Sertifikaat van Bekwaamheid in Oorlewingsvaartuie.
- (p) Die eksaminator kan aan die kandidaat vrae stel wat uit die skriftelike werk voortspruit, indien dit nodig geag word vanweë swak prestasie deur die kandidaat.

Klas 4—Kommunikasie (Mondeling en prakties)

- (a) Die uitstuur en ontvang van seine—
 - (i) in Morse-kode met flitslamp tot ses woorde per minuut; en
 - (ii) deur die Internasionale Seinkode te gebruik.
- (b) 'n Redelike kennis van GMDSS (Global Maritime Distress and Safety System) en die toerusting vir soek- en -reddingskommunikasie.

AANHANGSEL I**DEKOFFISIER KLAS 3—BEKWAAMHEIDSERTIFIKAAT: LEERPLAN****Klas 3—Skeepsargitektuur**

(Leerplan soos vir Klas 4—Skeepsargitektuur)

Klas 3—Vragwerk en Skeepspraktyk

(Leerplan soos vir Klas 4—Vragwerk en Skeepspraktyk)

Klas 3—Kaartwerk

(Leerplan soos vir Klas 4—Kaartwerk)

Klas 3—Praktiese Navigasie

(Leerplan soos vir Klas 4—Praktiese Navigasie)

Klas 3—Mariene Omgewingstudie

(Leerplan soos vir Klas 4—Mariene Omgewingstudies)

Klas 3—Toegepaste Wetenskap (3 uur skriftelik)

Van kandidate kan verwag word om hul begrip van fisiese beginsels te toon deur vrae wat berekening sonder bewys behels en deur vrae oor die praktiese toepassing van daardie beginsels, veral ten opsigte van instrumente of stelsels ter see gebruik.

Van kandidate sal verwag word om eerder begrip van en insig in fisiese beginsels te toon as om formele, gememoriseerde beskrywings of stellings van wette en reëls te verstrek.

(a) Warmte

Meting van temperatuur-, termometers, termokoppels. Oordrag van warmte; geleiding, konveksie, uitstraling.

Uitsetting van vaste stowwe en vloeistowwe, uitsettingskoëffisiënte, spesifieke warmte, latente warmte.

Eienskappe van gasse; Boyle se Wet, Charles se Wet. 'n Eenvoudige behandeling van isotermiese en adiabatiese uitsetting en kompressie van gasse; beginsels van verkoeling.

(b) Lig

Wette van weerkaatsing; vlakspieël.

Wette van straalbreking; indeks van straalbreking, totale interne weerkaatsing.

Prismas, dun lense-; 'n grafiese behandeling van die vorming van beelde deur lense.

(c) Golfteorie

Eenvoudige harmoniese beweging; golfbeweging, die rolbeweging van skepe; superposisie, resonansie.

Getye.

Gedempte en gedwonge ossillasie.

Klank.

Golfbeweging; frekwensie, snelheid, golflengte en hulle verwantskap.

Produksie en voortplanting van klank.

Uitwerking van wind en temperatuur op die snelheid van klank. Faktore wat die snelheid van klank in gasse en vloeistowwe beïnvloed.

Refleksie, eggo's. Doppler-effek.

(d) Magnetisme

Teorie van magnetisme. Wette van magnetisme.

Retentiwiteit, histeresekrommes vir ferromagnetiese materiaal.

Poolsterkte, veldsterkte, magnetiese moment en koppel, defleksie van 'n gemagnetiseerde naald.

Aardmagnetisme en magnetiese elemente. Variasie.

(e) Elektrisiteit

Die aard van 'n elektriese stroom. EMK, stroom, weerstand, hul uitwerking en onderlinge verhouding, elektriese potensiaal. Isolators en isolering, elektriese en magnetiese velde geassosieer met elektriese potensiaal en strome. Kapasitansie.

Die verwarmingseffek van 'n stroom; krag en die verhouding daarvan tot stroom en weerstand. Die magnetiese veld deur 'n stroom veroorsaak en die uitwerking daarvan.

Die uitwerking van 'n stroomdraende geleier in 'n magnetiese veld.

Chemiese effekte; die effek van die deursending van stroom deur 'n gelei-oplossing.

Primêre en sekondêre selle; batterye.

Wisselspannings en -strome in breë trekke; frekwensie- en faseverwantskap, kruin-, oombliks- en w.g.k-waardes.

Eenvoudige WS- en GS-kring. Sekerings en stroombreektoestelle. Die uitwerking van oop kringe, kortsluitings en lekkasie; die uitwerking van vullis en vog. Beginsels van elektriese generators en motore. Skeepsboordkragvoorsiening in breë trekke.

Noodkragbronne. Veiligheidsmaatreëls wat nagekom moet word wanneer elektriese toerusting hanteer word, met inbegrip van reserwedele wat aan boord gevoer word.

(f) *Radiobeginsels*

Tipiese antennestelsels, met inbegrip van hul vertikale en horisontale stralingspatrone.

(g) *Toegepaste chemie*

Korrosie; inwerking van ongelyksoortige metale op mekaar.

Ontbranding, geïnduseerde en spontane ontbranding. Flits- en ontstekingstemperature.

Plofmengsels, chemiese verandering toe te skryf aan oorverhitting.

Brandblussing; poeier, skuim, gasgedrewe water, trae gasse.

(h) *Statika*

Samestelling en ontbinding van kragte. Beginsel van momente. Spanning, vervorming, skuifkragte en buigmomente van eenvoudiggestutte balke met en sonder laste.

Eenvoudige masjiene, wenasstelsels, hefboom, skroefdomkrag, katrolstelsels; meganiese voordeel, snelheidsverhouding, doeltreffendheid. Druk in vloeistowwe; druk op 'n diepte, stukrag.

(i) *Dinamika*

Samestelling en ontbinding van snelhede en versnelling. 'n Begrip van Newton se bewegingswette, beweging onder swaartekrag, arbeid, krag, kinetiese en potensiaalenergie, momentum, wrywing en wrywingskoëffisiënt, met inbegrip van eenvoudige illustrerende berekenings. Rotasie.

Klas 3—Beginsels van Navigasie (3 uur skriftelik)

- (a) Die fatsoen van die aarde. Pole, ewenaar, meridiane, breedtesirkels. Posisie volgens breedte- en lengtegraad. Rigting, peiling, afstand, meeteenhede. Breedteverskil, lengteverskil, afwyking, middelbare breedte, die verskil en die verband tussen die meridiaandeel. Grootsirkels, grootsirkelkoers en -afstand, kleinsirkels op 'n bol.
- (b) Die hemelruim; omskrywings in verband met die hemelruim; skynbare beweging in die hemelsfeer. Deklinasie. Asimut. Sterre-uurhoek. Die posisie van 'n liggaam op die hemelsfeer; asimut met hoogte of deklinasie met sterre- of plaaslike uurhoek. Die opkoms, hoogtepunt en ondergang van hemelliggame.
- (c) Die sonnestelsel, aarde-maan-stelsel. Die beweging van die planeet. Die aarde se omwenteling en bewegings in sy baan, middelbare son, die sonneweg, eerste punt van die Ram. Sonsopkoms, sons- ondergang, skemer tydens nagewening en sonstilstand.
- (d) Tyd; Greenwich- en ander standaardtyd, sonetyd, middelbare tyd, skynbare tyd, sterretyd, tydseffening, verband tussen lengtegraad en tyd.
- (e) Plaaslike uurhoek van 'n hemelliggaam in tyd en in 'n boog. Greenwich-uurhoek van die son, maan, planeet en die Ram.
- (f) Korreksie van sekstanthoogtes; duiking, straalbreking, horisontale parallaks, hoogteparallaks, halwe middellyn en vergroting.
- (g) Geografiese posisie van 'n hemelliggaam. 'n Posisiesirkel en die praktiese toepassing daarvan, dit wil sê standlyn. Hoogteverskil.
- (h) Die gebruike en eenvoudige kenmerke van Mercator- en gnomoniese kaart. Lengte- en breedteskale; die meting van afstand. Loksodrome. Grootsirkels en saamgestelde grondkoerse.
- (i) Die verband tussen getye en die maangestalte.

Klas 3—Wiskunde (3 uur skriftelik)**(a) Algebra**

Definisies en prosesse. Teorie van indekse. Eenvoudige vergelykings, probleme wat tot eenvoudige vergelykings lei. Ontwikkeling van formules, transposisie en evaluering. Breuke. Faktore. Gelyktydige vergelykings van die eerste orde waarby twee of drie onbekendes betrokke is, probleme wat tot gelyktydige vergelykings lei. Die oplossing van vierkantsvergelykings, probleme wat tot vierkantvergelykings lei. Grafieke. Referensieasse. Reghoekige en poolkoördinate. Die konstruksie en vertolking van statistiese grafieke en diagramme. Grafieke van funksies, linieër, algebraïes en trigono-metries 0° – 360° , gradiënt, veranderingstempo, maksimum en minimum punte. Verhouding, eweredigheid en variasie, eenvoudige probleme.

(b) Gewone logaritmes

Die aanwending van logaritmes tot enige grondtal. Berekenings waarby vermenigvuldiging en deling deur middel van logaritmes, magte en wortels betrokke is. Eksponensiale vergelykings.

(c) Oppervlakte- en volumeberekening

Oppervlakte en omtrekke van die reghoek, driehoek en sirkel. Volume en oppervlakte van wig, piramide, silinder, sfeer, keël en prismatiese blok en probleme in verband daarmee.

(d) Meetkunde

Die konstruksie van vlakdriehoeke. Kongruensie van driehoeke; gelykvormigheid van driehoeke. Die reghoekige driehoek. Eienskappe van som van hoeke van driehoeke en poligone. Buitehoekeienskap. Ewewydige lyne en transversale. Eienskappe van sirkels, koorde en raaklyne. Hoek in 'n halfsirkel; hoeke deur enige koord van 'n sirkel onderspan. Kragte, resulterende kragte en hul komponente. Die gebruik van vektors om grootte en rigting aan te dui; vektoraddisie, gebruik van die vektordriehoek. Eienskappe van die ellips en hiperbool van seevaarkundige belang.

(e) Driehoeksmeting

Meting van hoeke. Boogmaat. Driehoeksmetingverhoudings tot en met een omwenteling. Haversinus. Verband tussen verhoudings. Komplementêre en supplementêre hoeke en hul verhoudings. Eenvoudige identiteite en driehoeksmetingvergelykings. Oplossing van reghoekige en skeefhoekige vlakdriehoeke, met inbegrip van praktiese probleme van seevaarkundige belang.

(f) Boldriehoeksmeting

Eienskappe van boldriehoeke. Oplossing van skeefhoekige, reghoekige en kwadrantboldriehoeke.

Klas 3—Mondeling en prakties

(Leerplan dieselfde as vir Klas 4—Mondeling en prakties)

Klas 3—Kommunikasie

(Leerplan dieselfde as vir Klas 4—Kommunikasie)

AANHANGSEL J**DEKOFFISIER KLAS 2—BEKWAAMHEIDCERTIFIKAAT: LEERPLAN****Klas 2—Navigasie (3 uur skriftelik)**

(a) Wanneer die kus in enige omstandighede genader word.

(b) Die beplanning van 'n kusvaart of die binnegaan van 'n hawe. Bevestiging van posisie. Die uitkies van geskikte ankerplekke.

(c) Uitvoering van 'n deurvaart. Monitering van vordering. Die uitwerking van beperkings soos weer en gety, verkeer, en die toestand van die skip se toerusting.

(d) Die gebruik van vaarvoorskrifte en ander publikasies wat betrekking het op kusnavigasie, wat op Suid-Afrikaanse Handelskepe gehou moet word, met inbegrip van die "Admiralty Tide Tables" Volumes 1 en 2.

(e) Astronomiese navigasie soos in paragrawe (c) tot (i) van Praktiese Navigasie—Klas 4.

(f) Probleme met grootsirkels- en saamgestelde koersvaart.

Opmerking

In hierdie vraestel sal vrae gestel word wat beskrywende antwoorde sowel as werk op die kaart wat voorsien word, vereis.

Klas 2—Navigasie-inligtingstelsels (3 uur skriftelik)

- (a) Die gebruik van navigasiehulpmiddels, met inbegrip van radar, die eggolood en visuele hulpmiddels, in kusnavigasie en loodsing, met inbegrip van die gebruik van radar om botsings te voorkom.
- (b) Posisiebepaling, vaste en veranderlike foute, waarskynlikheidsgebied. Hoe om 'n skip se posisie te bepaal deur twee of meer waarnemings van enige tipe, met of sonder meetvaart.
- (c) Die gebruik en begrip van navigasiehulpmiddels, met inbegrip van die radio- en elektroniese hulpmiddels waarmee die meerderheid handelskepe toegerus is. Die doel met die vrae is om te bepaal of die kandidaat 'n behoorlike begrip het van die basiese beginsels en van die werking van hierdie hulpmiddels, en of hulle ten volle daarvan kan gebruik maak terwyl hulle die beperkings daarvan beseft.

Opmerking:

'n Vraag oor radaruitstipping kan in die vraestel gestel word.

Klas 2—Mariene Omgewingstudies (3 uur skriftelik)

- (a) Lugmassas; algemene begrippe van oorsprongstreke, klassifikasie en eienskappe. Struktuur van laag-drukgebiede, algemene verspreiding van die weer in 'n laedrukgebied. Fronte; die frontteorie van die formasie van laedrukgebiede, okklusies, geokkludeerde laedrukgebiede, sekondêre laedrukgebiede, laedrukgebiedfamilies.
- (b) Adiabatiese veranderings in die atmosfeer. Droë, versadigde en omgewingsvervaltempo's. Stabiliteit, onstabiliteit en voorwaardelike onstabiliteit. Die ontwikkeling van donderstorms.
- (c) Volledige kennis van die ontwikkeling en afname van tropiese werwelstorms, hul lokaliteite, name, seisoene, bane en daarmee gepaardgaande weer, voorspelling van hul waarskynlike beweging. Navigasie in die omgewing van, en die reëls vir die ontwyking van tropiese storms. Verslae wat kragtens internasionale konvensies opgestel moet word.
- (d) Kennis van die inligting beskikbaar in die Suid-Afrikaanse Weerburo se handleiding getiteld Weerkode vir Skepe. Gebruik van 'n sinoptiese kaart om die weer op bepaalde punte af te lei en om die waarskynlike veranderings oor seegebiede te voorspel. Faksimileeweerkaarte en die nut daarvan.
- (e) Die vernaamste oseaanstrome; hul name en eienskappe. Oorsake van oseaanstrome, algemene oppervlaksirkulering van die oseaan, direkte en indirekte uitwerking van heersende winde, gradiëntstrome, seisoensveranderings in die algemene sirkulasie. Opwelling en die gevolge daarvan.
- (f) Die oorsake en eienskappe van oseaangolwe, getybolwe, golwe en branders.
- (g) Die vernaamste tipes dryfys en hulle oorsprong. Algemene grense van ys in albei halfronde, seisoensontwikkeling en terugsmelting, beweging van ysberge. Navigasie in die nabyheid van ys. Verslae wat kragtens internasionale konvensies opgestel moet word.
- (h) 'n Algemene kennis van die vernaamste mariene bronne en die benutting daarvan. 'n Algemene kennis van die algemene visvanggebiede en algemene visvangmetodes.

Klas 2—Vragwerk en Skeepspraktyk (3 uur skriftelik)

- (a) Organisering en opleiding van bemanning vir sowel roetine- as noodpligte. Skadebeheer- en brandbestrydingsplanne; noodstasielyste, veiligheid van personeel gedurende normale bedryfspilte. Kennis van die Maritieme Beroepsveiligheidsregulasies en hul verwante gebruikskodes.
- (b) Voorbereiding vir veiligheidstoerusting-, veiligheidskonstruksie-, laslyn- en klassifikasieopnames; kennis van die betekenis van die uitgereikte sertifikate.
- (c) Inspeksie en onderhoud van die skip en sy toerusting, met inbegrip van die doel, gebruik en werking van 'n beplande onderhoudstelsel. Algemene herstelwerk, voorbereiding van herstelwerklyste. Droogdokroetine. Eienskappe en gebruike van verwe, harse en ander beskermende bedekkings.
- (d) Algemene beginsels van die stuwling en hantering van alle tipes vrag, breedvoeriger as wat vir die laer grade vereis word, met inbegrip van voorbereidings vir die vervoer en versorging daarvan in oorvaart. Berekenings met betrekking tot stuwling (droë sowel as vloeibare vrag) en die gebruik van vraghanteergerei.
- (e) Kennis van die regulasies betreffende die vervoer en hantering van vrag, met inbegrip van 'n algemene kennis van gevaarlike vragte. Internasionale gebruikskodes. Mediese noodhulpgids vir gebruik by ongelukke waarin gevaarlike goedere betrokke is.
- (f) Ballaslading. Die skoonmaak en ontgassing van tenks. Kim- en ballaslynstelsels. Pypaanlegte op massavloeiostofdraers. 'n Praktiese kennis van die inhoud en toepassing van die huidige toepaslike tenkskipveiligheidshandleidings. Terme en omskrywings wat gebruik word om die eienskappe van gewone olievragte soos ru-olie, middeldistillate en nafta te beskryf. Bo-oplaaiprosedures. Regulasies met betrekking tot die voorkoming van besoedeling.

- (g) Metodes vir die laai en stuwng van vragitems wat spesiale hanteringsreëlings vereis. Die gebruik van twee laaibome, klimtolgewys. Optakeling van swaailaaibome.
- (h) Vasmaak en bevestiging van vrag, met inbegrip van dekvrug. Voorsiening van veilige toegang. Loopbrue oor dekvrug. Kennis van die Handelskeepvaartregulasies in verband met die Inneem van Steenkool en die Laai en Aflaai van Skepe, 1961, met inbegrip van die periodieke toetsing van vraghanteringstoerusting. Die masjinerieregister.
- (i) Die hantering van swaar gewigte met spesiale verwysing na die tipe en sterkte van gerei wat gebruik word.
- (j) Kennis van die Laslynreëls soos van toepassing op die werking van die skip; die belangrikheid van die onderskeie sones en seisoensgebiede; voorbereiding vir jaarlikse opname.
- (k) Die vermoë om 'n berekening te maak van die maksimum hoeveelheid vrag wat gelaai moet word, hetsy volgens massa of volume.

Klas 2—Skeepsargitektuur (3 uur skriftelik)

- (a) 'n Vollediger kennis van die beginsels van skeepsbou as wat vir Skeepsargitektuur—Klas 4 vereis word. Midskeepse deursnee van eendek- en tussendekskepe, met inbegrip van skepe vir die vervoer van onverpakte vrag, houterskepe en vervoerders van gespesialiseerde produkte. Funksies, konstruksie en verstewiging van waterdigte skotte, met inbegrip van botsingskotte. Agterstewestruktuur. Konstruksie, verstewiging en sluitinrigtings van luikopeninge en bobou, tenkopeninge, waterdigte deure en rompdeure. Skroefaskokers.
- (b) Algemene begrippe van sweisprosesse in konstruksie- en herstelwerk, soorte sweiswerk, gewone foute, visuele ondersoek van sweiswerk. Die toets van tenks en ander waterdigte dele. Korrosiebeheermetodes.
- (c) Moderne metodes om die uitwerking van verskillende toestande by die inlaai van vrag en ballas op die skip se struktuur te bepaal. Metodes om te kompenseer vir sterktediskontinuiteit, lokale en spesiale versterking.
- (d) Skuifkragte en buigmomente. Spannings teweeggebring deur skuiwing en buiging. Hoe om eenvoudige vrag-, skuifkrag- en buigmentkrommes te verkry.
- (e) Bepaling van die posisie van die swaartepunt van 'n skip vir verskillende laai- en ballastingstoestande. Die uitwerking op die posisie van die swaartepunt wanneer gewigte bygevoeg, verwyder, verskuif of gehang word. Berekening van die virtuele styging in die posisie van die swaartepunt weens tenks wat nie vol is nie. Dwars- en langsmetasenters, metasenterhoogte. Aanvangstabiliteit en die beperking daarvan tot klein hellingshoeke. Veranderings in stabiliteit gedurende 'n seereis. Uitwerking van 'n verskuiwing van vrag of soliede ballas. Stywe en rank skepe.
- (f) Berekening van trim en diepgang weens die laai, aflaai en verskuiwing van gewigte. Die uitwerking van slagsy en trim op stabiliteit. Stabiliteit en trim by droogdokking.
- (g) Die gebruik van stabiliteit-, hidrostatiese en spanningsgewens wat aan skepe verskaf word. Begrip van die faktore wat die fatsoen van die kromme van statiese stabiliteit beïnvloed en die betekenis van die oppervlakte onder die kromme, met inbegrip van die berekening daarvan. Die gebruik van stabiliteitsgewens. Graanverskuiwingsmomente.
- (h) Die gebruik van Simpson se reëls vir die berekening van oppervlaktes, volumes en sentroïede.
- (i) Weerstand en aandrywing: Vergelyking van huidwrywingsweerstand van die romp met 'n model teen verskillende snelhede, $RF = f.s.v.$ en residuele weerstand. Admiraliteits- en brandstofkoëffisiënte. Verhouding tussen die spoed van 'n vaartuig en brandstofverbruik met konstante verplasing, aannemende dat weerstand varieer met (spoed)². 'n Elementêre behandeling van skroef en eenvoudige probleme betreffende skroefsteek, steekverhouding, skynbare glip, werklike glip, volgroom, stukrag en krag.

Klas 2—Skeepsake en Reg (3 uur skriftelik)

Hierdie vraestel dek aspekte van 'n Hooffoffisier se handelspligte wat nie elders geëksamineer word nie, en behels ook voldoende bekendstelling met die Gesagvoerder se Skeepsake en Maritieme Reg ten einde die Hooffoffisier in staat te stel om tydelik bevel oor te neem van die vaartuig in die geval van die Gesagvoerder se ongesteldheid of dood.

- (a) Kennis van—
 - (i) die stappe wat gedoen moet word by bevelsaanvaarding;
 - (ii) die registrasiesertifikaat en die wetlike betekenis daarvan;
 - (iii) sertifikate en ander dokumente wat ingevolge Suid-Afrikaanse wetgewing of internasionale konvensies op 'n skip moet wees;

- (iv) prosedures by aankoms en vertrek;
 - (v) die amptelike skeepsjoernaal en inskrywings wat daarin gemaak moet word; en
 - (vi) huidige wetgewing betreffende die daaglikse bedryf van handelskepe, met spesifieke verwysing na Hoofstuk 4 van die Handelskeepvaartwet.
- (b) Dokumentasie van vrag, met inbegrip van stuurmanskwitansies, seevragbriewe, lysste van gevaarlike goedere, geleibriewe, skeepsmanifeste en huurkontrakte.
- (c) Die Gesagvoerder se pligte en verpligtinge ten opsigte van—
- (i) stranding, botsing of ander ongevalle;
 - (ii) die aanmelding van gevare vir navigasie;
 - (iii) verkeersverdelingskemas; en
 - (iv) navigasie in hawegebiede.
- (d) Akkommodasie vir die bemanning. Skeepshigiëne en die welsyn van die bemanning. Inspeksies en verslae. Prosedures in geval van ongesteldheid of 'n ongeluk. Die aard en bron van mediese bystand ter beskikking van 'n skip ter see. Beroking en plaagbestryding. Suid-Afrikaanse en internasionale gesondheidsregulasies.
- (e) Die voorkoming van besoedeling en die hou van rekords.
- (f) Kennis van personeelbestuur, organisasie en opleiding aan boord van 'n skip.
- (g) 'n Inleiding tot die internasionale maritieme reg soos beliggaam in internasionale ooreenkomste en konvensies soos hulle die besondere verpligtinge en aanspreeklikhede van die gesagvoerder raak, in die besonder dié wat betrekking het op veiligheid en beskerming van die mariene omgewing.

Klas 2—Mondeling en prakties

Deel A

- (a) Volledige kennis van die inhoud en toepassing van die Botsingsregulasies.
- (b) 'n Behoorlike kennis van die beginsels van navigasiewaghou ter see en voor anker soos neergelê deur die IMO.
- (c) Kennis van die inhoud en gebruik van die Britse "M"-kennisgewings.
- (d) IALA-boeiestelsel; wrakmerkstelsel.
- (e) Kennis van die regulasies betreffende reddings- en brandbestrydingstoestelle.
- (f) 'n Deeglike kennis van seek-en-reddingsprosedures.

Deel B

- (a) Die gebruik en versorging van alle dek- en bodektoestelle en -toebehore, met inbegrip van wenasse, kaapstanders, windasse, davits, touleiers, noodstuurgerei en toebehore wat tussen die anker en die kettingbak gebruik word.
- (b) Ankers: Verskillende tipes ankers en die voor- en nadele van elk. Kables en die versorging daarvan. Voorbereidsels vir ankering. Ankering met 'n enkele anker, en gebruik van 'n tweede anker. Klaring van 'n onklaar anker en kluis. Ankering in 'n stroomstreek en in beperkte vaarwater. Vasmeer. 'n Anker laat hang. Kables wat breek en glip. Om te begin vaar. Die uitneem van 'n anker met bote.
- (c) Uitwerking van strome, wind, vlak water en diepgang op maneuvring. In riviere en hawens maneuvreer. Met of sonder die gebruik van sleepbote langs kaaie en olie-eindpunte aanlê of daarvandaan vertrek.
- (d) Hantering van skepe in stormweer. Metodes om 'n skip wat ontredder of buite beheer is uit die golfdal te hou en om die lynwaartse dryf te verminder. Die hantering van 'n ontredder skip. Bykomende voorsorg wat getref moet word voordat stormweer intree.
- (e) Voorsorgmaatreëls wanneer 'n skip op die strand laat loop word. Maatreëls wat getref moet word voor en na stranding. Die vlotmaak van 'n gestrande skip met of sonder bystand. Optrede na 'n botsing. Tydelike toestop van lekplekke. Maatreëls vir die beskerming en veiligheid van passasiers en bemanning in 'n noodgeval.

Beperking van skade en berging van die skip na 'n brand of ontploffing. Verlating van skip. Noodstuur, optakeling en gebruik van noodstuurgerei en die maniere om 'n noodroep op te takel wanneer moontlik. Redding van persone vanaf 'n skip in nood of vanaf 'n wrak. Optrede wanneer 'n persoon oorboord val. Metodes van brandbestryding aan boord van 'n skip. Die organisasie van, en die uitreik van bevele aan spanne om brande te bestry en om reddingsbote en -vlotte in gereedheid te bring.

- (f) Voorbereidings vir inbring in droogdok en ontdokking. Gebruik van stutte, kimblokke en kimstutte.
- (g) Maatreëls wat getref moet word om die uitstort van olie te voorkom gedurende vragwerk, die inneem van bunkerolie of die oorbring van olie.
- (h) Die praktiese gebruik van die planne, tekeninge en gegewens wat aan 'n skip voorsien word, bv. die tuigplan, algemene inrigting, verplasingplan, veiligheidsplan en hidrostatiese en maneuvreergegewens.
- (i) Die eksaminator kan aan die kandidaat vrae stel wat uit die skriftelike werk voortspruit, indien dit nodig geag word vanweë swak prestasie deur die kandidaat.

Klas 2—Kommunikasie (Mondeling en prakties)

- (a) Uitstuur en ontvang van seine—
 - (i) in Morse-kode met flitslamp, tot ses woorde per minuut; en
 - (ii) deur die Internasionale Seinkode te gebruik.
- (b) Vollediger kennis as vir Klas 4—Kommunikasie word verlang ten opsigte van toerusting wat vir die GMDSS (Global Maritime Distress and Safety System) en vir seek-en-reddingskommunikasie gebruik word.

AANHANGSEL K

DEKOFFISIER KLAS I (BEVARE SEEKAPTEIN)—BEKWAAMHEIDSERTIFIKAAT: LEERPLAN

Klas 1—Skeepsake en Reg (3 uur skriftelik)

Die regskennis wat vereis word, word beperk tot 'n begrip van die internasionale konvensies, wette, owerheidsregulasies en gebruikskodes, wat op skeepvaart van toepassing is, en op die handelswette wat 'n gesagvoerder moet ken ten einde die sake van 'n skip te behartig.

- (a) Registrasie van skepe. Die registrasiesertifikaat en die wetlike betekenis daarvan.
- (b) Sertifikate en ander dokumente wat op 'n skip moet wees; hul gebruik, hoe hulle verkry word en (indien van toepassing) hoe lank hulle geldig is.
- (c) 'n Omvattende kennis van Hoofstuk 4 van die Handelskeepvaartwet.
- (d) Die amptelike skeepsjoernaal en die wet betreffende inskrywings. Inskrywings en verslae ten opsigte van vryboord, diepgang en toelatings. Oortredings met betrekking tot wangedrag waardeur die skip in gevaar gestel word en teen persone aan boord. Dissipline en optrede in die geval van dissiplinêre oortredings. Siviele aanspreeklikheid vir sekere oortredings.
- (e) Doeanekantoorprosedure vir in- en uitklaring van skip. Die funksie van skeepsagente.
- (f) Die veiligheid van die skip, bemanning en passasiers. Hulp aan skepe in nood. Pligte in die geval van stranding, botsing of 'n ander ongeval. Sleepvaart en berging.
- (g) Die wet met betrekking tot navigasie, met inbegrip van die voorkoming van botsings, die aanmeld van gevare vir navigasie, en ongevallen ter see. Verpligte en nie-verpligte loodsing. Die samestelling en magte van howe van marine-ondersoek, en van opnemingshowe.
- (h) Begrip van die algemene beginsels van kontrakreg.
- (i) 'n Algemene kennis van skeepvaartpraktik en -dokumente, veral huurkontrakte, seevragbriewe en geleibriewe. 'n Begrip van die hoofklousules in 'n bevrachtingskontrak. Lêdae, oorlêgeld en versending (met inbegrip van berekenings). Die wet betreffende die vervoer van vrag en die skeepseienaar se aanspreeklikheid en verantwoordelikhede. Proteste, vragopnames, seewaardigheidsertifikate.
- (j) 'n Oorsigtelike kennis van die uitdruklike en stilswyende voorwaardes en statutêre bepalings wat in 'n seeversekeringskontrak vervat is. Partikuliere awery, algemene awery. Prosedure by 'n vlughawe. Lloyd se agente. Beskermings- en vrywaringsklubs.
- (k) Agtergrondkennis van Suid-Afrikaanse en internasionale organisasies wat met skeepvaart te doen het. Veiligheidskonvensies en nasionale wetgewing.

Klas 1—Navigasie

Die eksamen is in twee vraestelle, A en B ingedeel.

Vraestel A, wat in 'n praktiese oefening in deurvaartbeplanning is, duur 4 uur. Daar word verwag dat die kandidaat die eerste uur sal wy aan die beoordeling van die projek aan die hand van die inligting wat voorsien is.

Vraestel B, wat 'n skriftelike vraestel van drie uur is, bevat verskeie vrae oor navigasie en verwante onderwerpe.

Vrae kan gestel word oor enige aspek van navigasie wat in die laer grade behandel word, met inbegrip van aangeleenthede wat pertinent met navigasie te doen het en in ander vakke gedek word.

Van kandidate word daar verwag om volle begrip te hê van die betrokke tegnieke en hulle moet in staat wees om die onderskeie aspekte met mekaar in verband te bring, en hulle vermoë te toon om ten volle gebruik te maak van al die navigasie- en meteorologiese inligting wat tot 'n skip se Gesagvoerder se beskikking is, met inbegrip van sy eie waarnemings.

Vraestel A

- Seereisbeplanning; die keuse van oseaanroetes. Beginsels van weerroetebepaling, gebruik van prognostiese oppervlak-, weer- en golfkaarte. Gebruik van stroomatlas en ander kaarte en navigasiepublikasies van belang vir oseaannavigasie.
- Beplanning en uitvoering van 'n kusvaart. Nadering van die kus. Nadering en binnevaart van 'n hawe.
- Navigasie in loodsvaarwaters, hetsy met of sonder 'n loods aan boord.
- Die nadering en deurvaar deur verkeersverdelingskemas en aangrensende gebiede.

Vraestel B

- Die optimum koers en spoed vir twee skepe wat wil rendezvous hou.
- Soek-en-reddingsprosedures.
- Navigasieprosedures wanneer see-installasies genader word en wanneer met helikopters of klein vaartuie gewerk word.
- Navigasie in uiterste weerstoestande.
- Die vertolking en gebruik van navigasie- en weerkundige inligting.
- Die vertolking en gebruik van inligting met behulp van navigasiehulpmiddels verkry, met inbegrip van die gebruik van radar ter voorkoming van botsings.
- Voordele en nadele van verskeie navigasiesistels en -metodes; oorwegings wat die keuse van navigasiesistels vir verskillende bedrywe en geografiese gebiede ten grondslag lê.

Klas 1—Skeepsargitektuur (3 uur skriftelik)

- Soorte skepe. Algemene begrippe van sterkte en bou met betrekking tot die besondere doel waarvoor hulle gebruik word, met inbegrip van gespesialiseerde vervoerders. Die gebruik van spesiale soorte staal, aluminium en brandbestande materiale in skepsbou. Beginsels van skadebeheer. Reëlings om die verspreiding van brand in die bobou te beperk.
- 'n Praktiese kennis van die volgende:
 - Klassifikasie van skepe.
 - Periodieke opnames vir behoud van klas.
 - Tonnemaatsertifikate en hul doel.

Vereistes van die Laslynreëls; tydperk en voorwaardes van geldigheid van sertifikaat; 'n begrip van daardie aspekte van die toewysingsvoorwaardes wat 'n invloed het op die stabiliteit en seewaardigheid van 'n skip; die konstruksieregulasies vervat in SOLAS 74 en die opnames wat daarkragtens vereis word.
- Permeabiliteit van 'n kompartement. Die uitwerking van 'n lek onderin en oorstroming (ent- of midskeepse kompartemente, op of van die middellyn af).
- 'n Omvattender kennis van stabiliteit as wat vir Skeepsargitektuur-Klas 2 vereis word en daarbenewens stabiliteit by matige en groot slagsyhoëke; die bepaling van dinamiese stabiliteit met behulp van S-O-kromme; lolhoek; die verskuiwing of toevoeging van gewigte met SM nul; die uitwerking van wind en golwe.
- Skeepsstabiliteit ter see.
 - Gevare vir 'n skip met 'n groot slagsy. Voorsorgmaatreëls by oprigting. Dekvragte, eensoortige vrag en vrag wat kan skuif. Inlaai van ballas met die oog op stabiliteit. Die uitwerking van rompbreedte en vryboord op stabiliteit.
- Die hellingsproef. Omvattende kennis van die hidrostatiese, stabiliteits- en spanningsgegewens wat aan skepe verskaf word.
- Vlakwatereffek. Interaksie tussen skip en skip en tussen skip en land. Draaikring. Slagsyhoek tydens die draaiproses; die uitwerking op stabiliteit.
- Breedvoeriger kennis as wat vir Klas 2 vereis word van buigspanning in die ballas en gelaaide toestande ter see. Wringspanning.

Klas 1 — Ingenieurswese en Beheerstelsels (3 uur skriftelik)

- (a) Die betekenis van skeepsiengenieursweseterme in algemene gebruik.
- (b) Algemene kennis van diesel- en turbinemasjienerie, skeepsketels, ontwikkelaars, pompe, kondensators en verdampers. Transmissie van hoofmasjienkrag. Stuurstelsels. Maneuvreerprosedures.
- (c) Begrip van die toepassing ter see van die eienskappe van gasse. Stelsels vir die vervoer van bevrore vrugte en van vloeibare gasse.
- (d) Algemene beginsels van afstandbeheerstelsels. Soorte kontroles en die metodes wat by pneumatiese, elektriese en hidrouliese beheerstelsels vir die hoofmasjien, pompe en kleppe gebruik word. Inligtingstelsels en beelde; data-aantekening, bybehorende alarm- en faalveilige stelsels. Brugbeheer van hoofmasjiene. Boegstutkragseenhede en ander maneuvreerhulpmiddele nie in die leerplan vir Klas 1 — Navigasie-instrumentasie gedek nie. Tenk- en diepgangmeters. Stabiliseerders.
- (e) Brandopsporings- en -blusstelsels en prosedures; algemene beginsels en praktiese toepassing; vermoëns en beperkings van die onderskeie stelsels.
- (f) Besoedeling: die voorsiening en bedryf van toerusting ooreenkomstig die vereistes van die MARPOL-konvensie.

Klas 1 — Navigasie instrumentasie (3 uur skriftelik)

- (a) Die gebruik en begrip van die hulpmiddels vir navigasie, met inbegrip van al die radio- en elektroniese hulpmiddels wat op die meerderheid van die handelskepe geïnstalleer is. Vrae sal daarop gerig wees om te verseker dat kandidate 'n behoorlike begrip van die belangrike beginsels en werking van hierdie hulpmiddels het en hulle moontlikhede ten volle kan gebruik, terwyl die tekortkominge daarvan beseef word.
- (b) Die uitwerking van stelselmatige en lukrake foute in posisiebepaling volgens enige metode.
- (c) Die bou, plasing, versorging en instandhouding van die magnetiese kompas en verwante toerusting. Oorsake van deviasie, die opstel van 'n deviasietabel. Koëffisiënte A, B, C, D en E. Die evaluering van die benaderde koëffisiënte aan die hand van gegewe data en hulle verhouding tot die deviasie. Skatting, sonder berekening, van die uitwerking van permanente en geïnduseerde magnetisme. Beginsels van kompasstelling en stelmetodes. Hellingsfout. Gaussfout en retentiewe fout. Die uitwerking van breedtegraadverandering op deviasie.
- (d) Beginsel van die tolkompas. Foute geassosieer met die tolkompas, met inbegrip van breedte-, koers- en snelheidsfout en -korreksie, ballistiese defleksie en sy verband met verandering in snelheidsfout; tol-foute en hoe dit geminimaliseer word. Die vernaamste dele van 'n tolkompas; fundamentele verskille in die bou en werking van die bekender tolkompasse.
- (e) Werkbeginsels en gebruik van die tolkompas en die magnetiese sendkompas; herhalerstelsels; stuuroutomaat; projektorkompas; draaitempoaanwysers.
- (f) Beginsel en praktiese toepassing van eggolodingstoestelle, logge en speedwysers.
- (g) 'n Oorsigtelike kennis van die teorie van toepassing op satellietbane, soorte bane en satelliete in marietime toepassings.
- (g) 'n Oorsigtelike kennis van onlangse ontwikkelings op die gebied van navigasiehulpmiddels.

Klas 1 — Mondeling en prakties

- (a) Uitsonderlike omstandighede.
 - (i) Verlies van roer en/of skroef.
 - Noodstuurreëlins.
 - Stappe wat gedoen moet word na 'n botsing of enige skade wat opgedoen is.
 - Stappe wat gedoen moet word wanneer 'n skip op die grond vasloop—metodes om dit weer vlot te maak, opnames na vlotmaking.
 - 'n Skip op die strand stuur.
 - (ii) Stappe wat gedoen moet word wanneer 'n skip ontredder is en in nood verkeer.
 - Beveiliging van passasiers en bemanning in geval van skipbreuk.
 - Verlating van skip; oorlewingsprosedure.
 - Verlating van 'n vergane skip.
 - Kommunikasie met die land.
 - (iii) Hulp aan 'n skip, boot of vliegtuig in nood. Die gebruik van rigtingbepaling vir aanpeiling op 'n ongeval.

Redding van die passasiers en bemanning van 'n ontredderde skip of boot, of van 'n vliegtuig wat 'n noodlanding op see gemaak het. Die tewaterlating van reddingsbote.

- (iv) Maneuvers in slegte weer. Gebruik van olie. Voorsorgmaatreëls wanneer voor anker en ter see. Ankering en die gebruik van ankers en kables in alle omstandighede. Nadering van riviere en hawens en manewering daarin. Nadering van seewaartse laaipunte in oopseetoestande.

- (v) Die sleep en op sleeptou neem van 'n skip.

- (vi) Navigasie in die omgewing van ys.

- (vii) Droogdokking. Kimblokke.

Algemene prosedure en voorsorgmaatreëls wat getref moet word. Verspreiding van massa.

Droogdokking met volle vrag vir inspeksie van skroewe en asse.

Vlotlating van skip.

- (viii) Doen 'n hawe aan met 'n beskadigde skip en/of vrag, beide vanuit 'n sake- en tegniese oogpunt.

- (ix) Beveiliging van vrag.

- (x) Voorkoming van brand ter see en in die hawe. Metodes wat gebruik word om die verspreiding van brand te voorkom. Optrede om die verspreiding van brand te voorkom. Uitvoerige kennis van die gebruik van brandblustoestelle en die voorsorgmaatreëls wat by die gebruik daarvan getref moet word.

- (b) Metodes van plaagbestryding en van beroking van ruime en woonruimtes; veiligheidsmaatreëls by die toepassing van verskillende metodes.

- (c) Kompensering en instelling van kompas; vrae kan aan kandidate gestel word oor die praktiese instelling van die magnetiese kompas deur gebruik te maak van 'n skeepskompashouer en kompas.

- (d) Brugprosedures ter see en in die hawe, en gedurende aanlê of vasmeer.

- (e) Botsingsregulasies en ander items in Deel A van die leerplan vir Klas 4 Mondeling en Parkties gespesifiseer.

- (f) Haweradio-inligtingsdienste. Kennis van die soorte diens wat beskikbaar is om vaartuie wat hawens binnekom en aanlê behulpsaam te wees, soos aangedui in die Admiraliteitslys van Radioseine *Port Operations and Vessels Traffic Management and Information Services*.

- (g) Die eksaminator kan die kandidaat vrae vra wat uit die skriftelike werk ontstaan, indien dit nodig geag word vanweë swak prestasie deur die kandidaat.

AANHANGSEL L

ENDOSSEMENT AS GESAGVOERDER (BEGRENSTE HANDEL): LEERPLAN

Endossement as Gesagvoerder (Begrenste Handel): Skeepsargitektuur (3 uur skriftelik)

- (a) Vollediger kennis van die grondbeginsels van skeepskonstruksie as wat vir Skeepsargitektuur—Klas 4 vereis word.
- (b) Spanning en vervorming van skepe in 'n seegang as gevolg van die inlaai van vrag en ballas. Kennis van daardie dele van 'n skip wat spesiaal versterk is om sodanige spanning te weerstaan. Metodes waarvolgens vergoed word vir diskontinuiteit van sterkte. Die toets van tenks en ander waterdigte dele. Korrosie-beheermetodes.
- (c) Die gebruik van stabiliteit- en hidrostatiese gegewens wat aan skepe verskaf word. Aanvangstabiliteit en die beperking daarvan tot klein slagsyhoëke.
Begrip van die faktore wat die fatsoen van die kromme van statiese stabiliteit beïnvloed en die betekenis van die oppervlakte onder die kromme.
die berekening van oppervlaktes en volumes volgens Simpson se eerste en tweede reël.
- (d) Die bepaling van die swaartepunt van 'n skip vir verskillende toestande by die inlaai van vrag en ballas. Die uitwerking op die posisie van die swaartepunt wanneer gewigte bygevoeg, verwyder, verskuif of gehang word.
- (e) Dwarsmetasenter, metasenterhoogte. Die vry oppervlak van vloeistowwe en die uitwerking daarvan op stabiliteit, met spesiale aandag aan die onderverdeling van tenks.

- (f) Berekening van diepgang en trim weens die laai, aflaai of verskuiwing van gewigte (MCTC en CF gegee).
- (g) Veranderinge in stabiliteit gedurende 'n seereis, met inbegrip van die uitwerking van 'n verskuiwing van vrag of soliede ballas.
- (h) Laslyn; begrip van daardie aspekte van die toewysingsvoorwaardes wat die stabiliteit en seewaardigheid van 'n skip beïnvloed.

Endossement as Gesagvoerder (Begrenste Handel): Skeepsake en Reg (3 uur skriftelik)

- (a) Kennis van die volgende:
 - (i) Die stappe wat gedoen moet word by bevelsaanvaarding.
 - (ii) Die registrasiesertifikaat en die wetlike betekenis daarvan.
 - (iii) Sertifikate wat op Suid-Afrikaanse skepe moet wees. Prosedure vir die verkryging van sertifikate, met inbegrip van periodieke opnames en inspeksies en geldigheidstydperke.
 - (iv) Die amptelike skeepsjoernaal en die inskrywings daarin.
- (b) Indiensneming en ontslag van bemannings. Bemanningskale. Ooreenkoms met die bemanning. Dissipline en optrede in die geval van dissiplinêre oortredings.
- (c) Doeane kantoorprosedure vir die in- en uitklaring van 'n Suid-Afrikaanse skip.
- (d) Dokumentasie van vrag, met inbegrip van stuurmanskwitansies, seevragbriewe, lysste van gevaarlike goedere, geleibriewe en vragplanne.
- (e) Die veiligheid van die skip, bemanning en passasiers.
 - Hulp aan skepe in nood.
 - Pligte in geval van stranding, botsing of 'n ander ongeval.
 - Berging.
- (f) Die wet betreffende die aanmelding van gevare vir navigasie.
- (g) Besoedeling; die Gesagvoerder se pligte, verpligtinge en aanspreeklikhede, met inbegrip van die hou van rekords.
- (h) 'n Oorsigtelike kennis van die Gesagvoerder se verpligtinge ten opsigte van seeversekering en die kontrak vir die vervoer van goedere per skip. Protes, vragopnames, seewaardigheidsertifikate. Algemene awery.
- (i) Kennis in breë trekke van die Gesagvoerder se verpligtinge ten opsigte van loodsing.
- (j) Suid-Afrikaanse en internasionale gesondheidsregulasies. Mediese bystand ter beskikking van 'n skip ter see.
- (k) Kennis van die Maritieme Beroepsveiligheidsregulasies en hul verwante gebruikskodes.
- (l) Die samestelling en magte van howe van marine-ondersoek en opnemingshowe.

Endossement as Gesagvoerder (Begrenste Handel): Magnetiese en tolkompasse en navigasiehulpmiddels (3 uur skriftelik)

- (a) Die aarde se magneetveld, pole en ewator. Die aarde se totale magnetiese krag, inklinasiehoek, horisontale en vertikale komponente. Variasie.
- (b) Deviasie, die oorsaak en uitwerking daarvan. 'n Begrip van die uitwerking van halfpermanente en geïnduseerde magnetiese velde op die deviasie van die kompas.

Metodes wat gebruik word om vir hierdie uitwerkings te vergoed.

- (c) Die plasing van magnetiese kompasse met inagneming van die nabyheid van magnetiese materiaal en elektriese toestelle. Voorsorgmaatreëls wat getref moet word met betrekking tot elektriese bedrading in die nabyheid van die kompas.
- (d) Die bepaling van die magnetiese peiling van 'n voorwerp in die verte deur middel van kompaspeilings wat geneem is op afstandgelyke koerse, en om 'n deviasietabel saam te stel.
- (e) Die beginsels van die vrytollende girokoop.
 - Oorhelling en dryf.
 - Presessie. Beheer en demping. Korreksie vir breedtegraad-, koers- en snelheidsfout.
 - Versorging en onderhoud van verskillende tipes kompasse.

- (f) Die praktiese toepassing van elektroniese en radiohulpmiddels vir navigasie.
Insig in en vertolking van data.
Posisiebepaling; vaste en veranderlike foute, waarskynlikheidsgebied. Die gebruik van radar as 'n hulpmiddel om botsings te vermy.
- (g) Die gebruik van navigasiepublikasies en -inligting wat gewoonlik aan skepe verskaf word of tot hulle beskikking is.

Endossement as Gesagvoerder (Begrenste Handel) Werkzaamhede aan boord (3 uur skriftelik)

- (a) Organiserings en opleiding van bemanning vir sowel roetine- as noodpligte. Skadebeheer- en brandbestrydingsplanne; noodstasielyste. Veiligheid van personeel gedurende normale bedryfspligte. "Code of Safe Working Practices for the Safety of Merchant Seamen".
- (b) Inspeksie en onderhoud van die skip en sy toerusting, met inbegrip van die doel, gebruik en werking van 'n beplande onderhoudstelsel. Algemene herstelwerk, voorbereiding van herstelwerklyste. Droogdokroetine. Eienskappe en gebruike van verwe, harse en ander beskermende bedekkings.
- (c) Algemene beginsels van die stuwings en hanterings van alle tipes vrags, met inbegrip van voorbereidings vir die vervoer en versorging daarvan in oorvaart. Berekenings met betrekking tot stuwings (droë sowel as vloeibare vrags) en die gebruik van vraghanteergerei.
- (d) Ballaslading. Die skoonmaak en ontgassing van tenks. Kim- en ballaslynstelsels. Pypaanlegte in vervoerders wat onverpakte olie vervoer.
- (e) Kennis van die regulasies wat betrekking het op die vervoer en hantering van vrags, met inbegrip van algemene kennis van gevaarlike vrags. Die internasionale gebruikskodes. Mediese noodhulpgids vir gebruik by ongelukke waarin gevaarlike goedere betrokke is.
- (f) Kennis van die Laslynreëls soos van toepassing op die werking van die skip; die belangrikheid van die onderskeie sones en seisoensgebiede. Die vermoë om 'n berekening te maak van die maksimum hoeveelheid vrags wat gelaaai moet word, hetsy volgens massa of volume.
- (g) Metodes vir die laai en stuwings van vragsitems wat spesiale hanteringsreëlings vereis. Die gebruik van klimtoltoerusting. Optakeling van swaailaai-bome. Vasmaak en bevestiging van vrags, met inbegrip van dekvrag. Voorsiening van veilige toegang. Loopbrûe oor dekvrag. Kennis van die Handelskeepvaartregulasies in verband met die laai en aflaai van steenkool, met inbegrip van die periodieke toetsing van vraghantestoeuings. Die masjinerieregister.
- (h) Voorbereiding vir veiligheidstoeuings-, veiligheidskonstruksie-, laslyn- en klassifikasieopnames; kennis van die betekenis van die uitgereikte sertifikate.

Endossement as Gesagvoerder (Begrenste Handel) – Mondeling en prakties

Deel A

- (a) Volledige kennis van die inhoud en toepassing van die Botsingsregulasies.
- (b) Nood- en loodsseine, strawwe vir misbruik.
- (c) Behoorlike kennis van die beginsels van navigasiewaghou ter see en voor anker soos deur die IMO neergelê.
- (d) Kennis van die inhoud en gebruik van die Departement van Vervoer se Handelskeepvaartkennisgewings, "Admiralty Notices to Mariners" en S.A.V.-kennisgewings aan Seevaarders.
- (e) IALA-boei-stelsel; wrakmerkstelsel.
- (f) Kennis van die regulasies betreffende lewensredding- en brandbestrydingstoestelle.
- (g) Kennis van die Regulasies in verband met die Veiligheid van Navigasie.
- (h) Kennis van die soorte diens wat beskikbaar is in die Admiraliteitslys van Radioseine *Port Operations and Vessel Traffic Management Information Services*.

Deel B

- (a) Die gebruik en versorging van alle dek- en bodektoestelle en -toebehore, met inbegrip van wenasse, kaapstanders, windasse, davits, touleiers, noodstuurgerei en toebehore wat tussen die anker en die kettingbak gebruik word.
- (b)
 - (i) Uitwerking van strome, wind, vlak water en diepgang op maneuvrering. In riviere en hawens maneuvreer. Met of sonder die gebruik van sleepbote langs kaaie en olie-eindpunte aanlê of daarvandaan vertrek.
 - (ii) Ankerings en die gebruik van ankers en kables in alle omstandighede.

- (iii) Hantering van skepe in stormweer.
- (iv) Die sleep en op sleeptou neem van 'n skip.
- (v) Die hantering van 'n ontredderde skip.
- (vi) Bykomende voorsorg wat getref moet word voordat stormweer intree.
- (vii) Die gebruik van olie.
- (c) (i) 'n Deeglike kennis van seek-en-reddingsprosedures.
 Die gebruik van rigtingbepaling vir aanpeiling op 'n ongeval.
 Hulp aan 'n skip, boot of vliegtuig in nood.
 Redding van die passasiers en bemanning van 'n ontredderde skip of boot, of van 'n vliegtuig wat 'n noodlanding op see gemaak het.
- (ii) Stappe wat gedoen moet word wanneer 'n skip ontredderd is en in nood verkeer.
 Verlating van skip; oorlewingsprosedure.
 Kommunikasie met die land.
 Beveiliging van passasiers en bemanning in geval van skipbreuk.
- (d) (i) Maatreëls wat getref moet word wanneer 'n skip per ongeluk beskadig word, met inbegrip van botsings, stranding, beskadiging tydens stormweer en lekkasies.
 'n Skip op die strand stuur.
- (ii) Metodes om brand aan boord van 'n skip te bestry. Voorkoming van brand ter see en in die hawe.
 Die organisasie van, en die uitreik van bevele aan spanne om brande te bestry en om reddingsbote en -vlotte in gereedheid te bring.
 Stappe wat gedoen moet word om die verspreiding van brand te voorkom.
- (e) (i) Voorbereiding vir inbring in droogdok en ontdokking. Die gebruik van stutte, kimblokke en kimstutte. Algemene prosedures en voorsorgmaatreëls wat nagekom moet word.
- (ii) Maatreëls wat getref moet word om die uitstort van olie te voorkom gedurende vragwerk, die inneem van bunkerolie of die oorbring van olie.
- (f) Roetine-inspeksie van woonkwartiere en voorraadkamers.
 Kennis van personeelbestuur, organisasie en opleiding aan boord skepe.
 Prosedure in verband met klagtes.
- (g) Die eksaminator kan die kandidaat vrae vra wat uit die skriftelike werk ontstaan, indien dit nodig geag word vanweë swak prestasies deur die kandidaat.

AANHANGSEL M

ENDOSSEMENT AS GESAGVOERDER (KORTSEEHANDEL) EN GESAGVOERDER (HAWEBEDRYF): LEERPLAN

Endossement as Gesagvoerder (Kortseehandel) en Gesagvoerder (Hawebedryf): Skeepsargitektuur (3 uur skriftelik)

Hierdie leerplan dek slegs daardie aspekte van skeepstabiliteit wat van 'n praktiese aard is en waaroor die Gesagvoerder beheer het.

- (a) Die gebruik van stabiliteit- en hidrostatiese gegewens wat aan skepe verskaf word, met inbegrip van stabiliteitsgegewens in vereenvoudigde vorm.
 Aanvangstabiliteit en die beperking daarvan tot klein slagsyhoëke. Begrip van die faktore wat die fatsoen van 'n statiese stabiliteitskromme beïnvloed en die betekenis van die oppervlakte onder die kromme.
- (b) Die bepaling van die swaartepunt van 'n skip vir verskillende toestande by die inlaai van vrag en ballas. Die uitwerking op die posisie van die swaartepunt wanneer gewigte bygevoeg, verwyder, verskuif of gehang word.
- (c) Dwarsmetasenter, metasenterhoogte. Die vry oppervlak van vloeistowwe (sonder bewys of berekening) en die uitwerking daarvan op stabiliteit.
- (d) Berekening van diepgang in trim weens die laai, aflaai of verskuiwing van gewigte (MCTC en CF gegee).
- (e) Veranderinge in stabiliteit gedurende 'n seereis, met inbegrip van die uitwerking van 'n verskuiwing van vrag of soliede ballas.
- (f) Laslyn; begrip van daardie aspekte van die toewysingsvoorwaardes wat die stabiliteit en seewaardigheid van 'n skip beïnvloed.

Endossement as Gesagvoerder (Kortseehandel) en Gesagvoerder (Hawebedryf)—Magnetiese Kompas en Navigasiehulpmiddels (3 uur skriftelik)

(a) Die aarde se magneetveld, pole en ekwator. Die aarde se totale magnetiese krag, inklinasiehoek, horisontale en vertikale komponente. Variasie.

(b) Deviasie. Elementêre idees oor die uitwerking van harde yster, vertikale en horisontale sagte yster op die kompas. Metodes wat gebruik word om vir hierdie uitwerkings te vergoed, met besondere aandag aan kortseehandelskepe. Die plasing van magnetiese kompasse met inagneming van die nabyheid van magnetiese materiaal en elektriese toestelle. Voorsorgmaatreëls wat getref moet word met betrekking tot elektriese bedrading in die nabyheid van die kompas.

(c) Die bepaling van die magnetiese peiling van 'n voorwerp in die verte deur middel van kompaspeilings wat geneem is op afstandgelyke koerse, en om 'n deviasietabel saam te stel.

(d) Die praktiese toepassing van elektroniese en radiohulpmiddels vir navigasie. Insig in en vertolking van data. Posisiebepaling; vaste en veranderlike foute, waarskynlikheidsgebied. Die gebruik van radar as 'n hulpmiddel om botsings te vermy.

(e) Die gebruik van navigasiepublikasies en -inligting wat gewoonlik aan skepe verskaf word of tot hulle beskikking is.

Endossement as Gesagvoerder (Kortseehandel) en Gesagvoerder (Hawebedryf)—Skeepsake en Reg (Mondeling)

In die loop van hierdie eksamen kan die eksaminator van die kandidaat verwag om sekere vrae skriftelik te beantwoord. Sulke skriftelike antwoorde word beperk tot dié wat as noodsaaklik beskou word om die kandidaat se bekwaamheid in hierdie vak te bepaal en moet nie afwyk van die wesentlike skriftelike aard van die eksamen nie.

(a) Die registrasiesertifikaat en die wetlike betekenis daarvan.

(b) Sertifikate wat aan boord van Suid-Afrikaanse skepe moet wees.

Prosedure vir die verkryging van sertifikate, met inbegrip van periodieke opnames en inspeksies en geldigheidstydperke.

(c) Indiensneming en ontslag van bemanning. Bemanningskale. Ooreenkoms met bemanning. Dissipline en optrede in die geval van dissiplinêre oortredings.

(d) Die amptelike skeepsjoernaal en die wet betreffende inskrywings. Verslag wat gedoen moet word in die geval van die besering of dood van bemanning of ander personeel aan boord van 'n skip.

(e) Doeanekantoorprosedure vir die in- en uitklaring van 'n Suid-Afrikaanse skip.

(f) Laslynmerke. Inskrywings en verslae ten opsigte van vryboord, diepgang en toelatings.

(g) Die veiligheid van die skip, bemanning en passasiers. Hulp aan skepe in nood. Pligte in die geval van stranding, botsing of 'n ander ongeval. Berging.

(h) Die wet betreffende die aanmelding van gevare vir navigasie.

(i) Besoedeling: Die Gesagvoerder se pligte, verpligtinge en aanspreeklikhede, met inbegrip van die hou van rekords.

(j) Suid-Afrikaanse gesondheidsregulasies. Mediese bystand ter beskikking van 'n skip ter see.

(k) 'n Oorsigtelike kennis van die Gesagvoerder se verpligtinge ten opsigte van seeversekering en die kontrak vir die vervoer van goedere per skip. Protes, vragopnames, seewaardigheidsertifikate.

(l) Kennis in breë trekke van die Gesagvoerder se verpligtinge ten opsigte van loodsing.

Endossement as Gesagvoerder (Kortseehandel) en Gesagvoerder (Hawebedryf)—Mondeling en prakties Deel A

(a) Volledige kennis van die inhoud en toepassing van die Botsingsregulasies.

(b) Nood- en loodsseine; strawwe vir misbruik.

(c) Behoorlike kennis van die beginsels van navigasiewaghou ter see en voor anker soos deur die IMO neergelê.

(d) Kennis van die inhoud en gebruik van die Departement van Vervoer se Handelskeepvaartkennisgewings, "Admiralty Notices to Mariners", en SAV se Kennisgewings aan Seevaarders.

(e) Die IALA-boeiestelsel: wrakmerkstelsel.

(f) 'n Oorsigtelike kennis van die regulasies betreffende lewensredding- en brandbestrydingstoestelle en die Regulasies in verband met die Veiligheid van Navigasie.

(g) Kennis van die soorte diens wat beskikbaar is in die Admiraliteitslys van Radioseine: *Port Operations and Vessels Traffic Management Information Services*.

Deel B

(a) Die gebruik en versorging van alle dek- en bodektoestelle en -toebehore, met inbegrip van wenasse, kaapstanders, windasse, davits, touleiers, noodstuurgerei en toebehore wat tussen die anker en die kettlingbak gebruik word.

(b) (i) Uitwerking van strome, wind, vlak water en diepgang op maneuvrering. In riviere en hawens maneuvreer. Met of sonder die gebruik van sleepbote langs kaaie en olie-eindpunte aanlê of daarvandaan vertrek.

(ii) Ankering en die gebruik van ankers en kables in alle omstandighede.

- (iii) Hantering van skepe in stormweer. Die hantering van 'n ontredde skip. Bykomende voorsorg wat getref moet word voordat stormweer intree. Die gebruik van olie.
 - (iv) Die sleep en op sleeptou neem van 'n skip.
 - (c) 'n Deeglike kennis van soek-en-reddingsprosedures. Die gebruik van rigtingbepaling vir aanpeiling op 'n ongeval. Hulp aan 'n skip, boot of vliegtuig in nood. Redding van die passasiers en bemanning van 'n ontredde skip of boot, of van 'n vliegtuig wat 'n noodlanding op see gemaak het.
 - (d)
 - (i) Oorsigtelike kennis van die regulasies betreffende lewensredding- en brandbestrydingstoestelle.
 - (ii) Maatreëls wat getref moet word wanneer 'n skip per ongeluk beskadig word, met inbegrip van botsings, stranding, beskadiging tydens stormweer en lekkasies.

'n Skip op die strand stuur.

 - (iii) Metodes om brand aan boord van 'n skip te bestry. Voorkoming van brand ter see en in die hawe. Die organisasie van, en die uitreik van bevele aan spanne om brande te bestry en om reddingsbote en -vlotte in gereedheid te bring.
- Stappe wat gedoen moet word om die verspreiding van brand te voorkom.
- (e)
 - (i) Voorbereiding vir inbring in droogdok en ontdokking. Die gebruik van stutte, kimblokke en kimstutte. Algemene prosedures en voorsorgmaatreëls wat nagekom moet word.
 - (ii) Maatreëls wat getref moet word om die uitstort van olie te voorkom gedurende vragwerk, die inneem van bunkerolie of die oorbring van olie.
 - (f) Roetine-inspeksie van woonkwartiere en voorraadkamers. Kennis van personeelbestuur, organisasie en opleiding aan boord skepe. Prosedure in verband met klagtes.
 - (g) Kennis van die gesagvoerder se verantwoordelikhede soos in die Maritieme Beroepsveiligheidsregulasies vervat. Algemene kennis van die "Code of Safe Working Practices for the Safety of Merchant Seamen". Reëls vir loodslere.
 - (h) Die eksaminator kan die kandidaat vrae vra wat uit die skriftelike werk ontstaan, indien dit nodig geag word vanweë swak prestasie deur die kandidaat.

AANHANGSEL N

SIMBOLE EN AFKORTINGS

1. Die simbole, afkortings en konvensies wat in die eksamens gebruik word, volg die SI.
2. Die volgende afkortings word gebruik:

(a) Navigasie en kaartwerk

- (i) CP: Die gekose posisie is die posisie naaste aan die waarnemer, só gekies dat die hoogte 'n integraalgraad is en die lengtegraad sodanig is dat die plaaslike uurhoek van die liggaam ten tyde van die waarneming ook 'n integraalgraad is.
 - DR: Die gisbestek is dié wat verkry word deur slegs voorsiening te maak vir gestuurde koerse en afgelegde afstande.
 - EP: Die berekende posisie is dié wat verkry word deur voorsiening te maak vir koerse en afstande en vir drif en seestroom, as daar is.
- Sekstanthoogte: Die sekstanthoogte is dié wat van 'n sekstant afgelees word.

- (ii) AZ: asimut
- C: kompas
- Co: koers
- Chron: chronometer
- Cpa: naaste saamlooppunt
- Tcpa: tyd na naaste saamlooppunt
- HE: ooghoogte
- IE: indeksfout
- LL: onderrand
- M: magneties
- P/L: standlyn
- T: ware
- UL: borand

(b) *Stabiliteit en algemene skepskennis*

- ap: agterstandlyn
- Bp: tussenstandlyn
- fp: voorstandlyn
- fwa: varswatertoelating
- B: hoogte van drukingspunt bo die kiel
- KN: regbringhefboom om die kiel
- MCTC: moment om trim 1 cm te verander
- GZ: regbringhefboom om swaartepunt
- GM: metasenterhoogte
- KM: metasenterhoogte bokant kiel
- KG: hoogte van swaartepunt (vaartuig) bokant die kiel.
- LCB: oorlangse drukingspunt
- LCF: oorlangse dryfpunt
- LOG: oorlangse swaartepunt
- TPC: ton per sentimeter indompeling
- DWA: dokwatertoelating
- BML: oorlangse metasentriese straal
- BMT: transversale metasentriese straal

(c) *Magnetisme en kompas*

- Hf: Horisontale komponent van die aarde se magneetveld
- Z: Vertikale komponent van die aarde se magneetveld

AANHANGSEL O**BEKWAAMHEIDSERTIFIKAAT AS GESAGVOERDER (SPESIALE GRAAD):
DOELWITTE EN LEERPLAN***Doelwitte*

Die eksamen wat lei tot die uitreiking van 'n sertifikaat as Gesagvoerder (Spesiale Graad) word vrywillig afgelê en is bedoel vir daardie offisiere wat streef na senior poste in die skeepvaartbedryf en regeringsdiens, en in skeepvaartonderrig waar 'n grondige kennis van professionele vakke op 'n hoër vlak as vir Klas 1: Bevare Seekaptein in baie gevalle 'n vereiste is. Om te verseker dat kandidate behoorlik voorberei is vir sowel die eksamen as vir die poste wat hulle uiteindelik sal beklee as houers van 'n sertifikaat as Gesagvoerder (Spesiale Graad) is bywoning van 'n goedgekeurde Gesagvoerder (Spesiale Graad)-kursus 'n vereiste. Voltooiing van veldwerk in sekere vakke en werklike of hipotetiese gevalle werk in ander is 'n kenmerk van die kursus, ter aanvulling van die finale eksamen deur insig te gee in die praktiese toepassing van die studies wat onderneem is. Vrystelling van die bywoning van 'n kursus kan algemeen en individueel in sekere gevalle toegestaan word aan diegene wat reeds 'n gedeelte van 'n Gesagvoerder (Spesiale Graad)-eksamen voltooi het of hulle daarvoor ingeskryf het voor die datum van publikasie van hierdie regulasies.

Eksamentoeelatingsvereistes

Alle kandidate moet die houers wees van 'n Gesagvoerder (Klas 1)-bekwaamheidsertifikaat wat geldig is kragtens die Suid-Afrikaanse Handelskeepvaartwet. Voor kwalifisering vir toelating tot Deel B van die Gesagvoerder (Spesiale Graad)-eksamen word van alle kandidate verwag om 'n bevredigende standaard in Wiskunde en Fisika te bereik ten einde hulle in staat te stel om die tegniese vakke wat in daardie Deel behandel word deeglik te begryp.

Die Wiskunde- en Fisikaleerplan verskyn hieronder tesame met besonderhede van die interne beoordelingsksamens in hierdie vakke, ekstern gemodereer deur die Departement van Vervoer, wat gehou word nadat hulle die goedgekeurde kursus ses maande lank bygewoon het. Kandidate wat die houers is van kwalifikasies wat aanvaarbaar is vir die Departement van Vervoer en wat bevestig dat die vereiste standaard bereik is in enige van die vakke wat deur die interne eksamen gedek word, sal oorweeg word vir vrystelling van die betrokke vraestelle.

Eksamen

Die finale eksamen, wat in elke geval deur die Departement van Vervoer afgeneem word, behels vyf skriftelike vraestelle, waarvan twee Deel A en drie Deel B vorm; kandidaat kan enigeen van die dele eerste aflê of beide dele saam aflê. Deel A van die eksamen is gerig op private studie ten einde die voornemende studente in staat te stel om voorbereidende leeswerk vir hierdie Deel ter see te onderneem voordat hulle met die kursus begin.

'n Slaagpunt in 'n deel van die eksamen bly vir 'n onbeperkte tyd geldig en word aangeteken deur middel van 'n endossement te dien effekte op die kandidaat se Klas 1-sertifikaat.

Vraestelle word so opgestel dat dit binne drie uur beantwoord kan word, maar kandidaat kan 'n bykomende uur toegestaan word voordat hulle gevra word om hul werk af te sluit.

Die gebruik van 'n elektroniese rekenaar met vier funksies en 'n enkelgeheue mag in die eksamen gebruik word.

Van kandidaat word daar verwag om minstens 50% van die punte wat vir elke vraestel toegeken word en 'n totaal van 60% van die totale punte wat aan elke Deel van die Eksamen toegeken word te behaal ten einde in daardie deel te slaag.

Kandidaat wat in een vak van Deel B gedruip het, maar wat die vereiste aggreëat om te slaag behaal het, kan in daardie vak hereksamineer word, maar dan moet hy minstens 60% van die punte wat aan daardie vraestel toegeken word, behaal ten einde te slaag.

Kandidaat wat die eksamen vir Deel B dui, kan in die afsonderlike vakke van daardie deel hereksamineer word, maar moet minstens 60% van die punte wat aan elke vraestel toegeken word, behaal ten einde te slaag. Daar word nie van kandidaat verwag om vakke te herhaal wat in Deel B van die eksamen geslaag is nie.

Kandidaat word nie mondeling getoets nie en daar word ook nie van hulle verwag om die gesigtoets te slaag nie.

Kursusse

Kursusse word aangebied by die Seevaartkolleges soos van tyd tot tyd deur die Direkteur-generaal goedgekeur.

Algemeen

Voltydse voorbereidingskursusse by 'n goedgekeurde kollege duur ongeveer 36 weke en omvat 'n studieprogram wat die gepubliseerde leerplanne dek. Vakke vir Deel A en Deel B moet saam bestudeer word ter voorbereiding vir albei dele van die eksamen aan die einde van die kursus.

Praktiese en eksperimentele werk moet ingesluit word; die presiese aard van hierdie werk hang af van die beskikbaarheid van fasiliteite en toerusting, maar daar word verwag dat die volgende gedek moet word:

Die gebruik van modelle ten einde die verskuiwing van gewigte te demonstreer, hanggewigte, inklinasie-eksperiment, die effek van 'n vry oppervlak, bepaling van die kromme van statiese stabiliteit, rol-eksperimente, vertrimmingsdemonstrasie. Demonstrasie en gebruik van toepaslike navigasie-toerusting en ontleding van observasiefoute. Oefeninge in praktiese hidrografiese opnames. Praktiese kompasstellings.

GESAGVOERDER (SPESIALE GRAAD): LEERPLAN VIR WISKUNDE EN FISIKA**Wiskunde**

Teorie van indekse en logaritmes. Breuk- en negatiewe indekse. Ongelykhede. Vergelykings waarin die onbekende as 'n indeks voorkom.

Funksie as 'n afbeelding van versamelings. Saamgestelde en inverse funksies. Grafieke van funksies in die kartesiese vlak. Grafiese oplossing van vergelykings. Perke van funksies. Lineêre en kwadratiese funksies. Teorie van kwadratiese vergelykings. Parsiële breuke. Res en faktorstellings. Vasstelling van wette deur redusering tot lineêre vorm. Binomiaalontwikkeling vir positiewe integraalindekse. Gebruik, sonder bewys, van breuk- en negatiewe indekse. Rye en reekse. Elementêre behandeling van konvergensie. Rekenkundige, meetkundige, eksponensiale en logaritmiese reekse. Gebruik van reekse om benaderings en perke te vind. Die algemene hoek. Graad- en radiaalmaat. Goniometriese funksies.

Trigonometriese identiteite. Algemene oplossing van trigonometriese vergelykings.

Probleme wat saamgestelde, veelvoud- en subveelvoudhoeke behels.

Inverse goniometriese funksies.

Boldriehoeke. Napier se analogieë. Sinus- en kosinusreëls vir boldriehoeke.

Oppervlakte van die boldriehoek. Pooldriehoeke. Afgeleide formules, met inbegrip van die Haversinus-formule en vierdele reël. Differensiasie van algebraïese, sirkel-, eksponensiale, logaritmiese en inverse goniometriese funksies.

Produk, kwosiënt en kettingreëls. Toepassing van differensiasie op klein foute, ekstrema en veranderingstempo. Herhaalde differensiasie. Integrasie as omgekeerde van differensiasie.

Integrasie deur verandering van die veranderlike, deur partiële breuke en deur dele. Die toepassing van integrasie op die evaluering van vlakoppervlaktes, volumes, eerste en tweede momente van oppervlaktes en volumes.

Middelwaardes. Numeriese integrasie; trapesium- en Simpsonreëls, en die bewys daarvan.

Oplossing van eenvoudige differensiaalvergelykings van die eerste orde met skeibare veranderlikes; homogene vergelykings. Integrasiefaktore. Numeriese oplossing van vergelykings in een onbekende; die metode van Newton-Raphson.

Meganika en statistiek

Optel en aftrek van vektore. Vermenigvuldiging van skalaar en vektor. Krag as 'n vektorgrootheid. Ontbinding van saamvakkige kragte. Resultant van 'n stelsel van saamvakkige kragte wat op 'n punt inwerk. Ewewig. Driekragprobleme, Lami se teorema.

Spanning, vervorming, die wet van Hooke, Young se elastisiteitsmodulus. Ewewydige kragte, momente, kragtepare. Herleiding van 'n stelsel van saamvakkige kragte wat op 'n stewige liggaam inwerk. Ewewigtoestande. Wrywing. Swaartepunt. Belaste raamwerke.

Verplasing, snelheid en versnelling as vektore. Reglynige beweging van 'n deeltjie met gelykmatige versnelling. Beweging van 'n deeltjie onder swaartekrag. Verbonde deeltjies. Projektiële. Massa, momentum, krag. Newton se bewegingswette. Impuls, arbeid, energie, krag. Beginsels van die behoud van lineêre momentum en energie. Direkte en skuinslag, met inbegrip van die gebruik van Newton se eksperimentele wet.

Skuifkrag- en buigmomentdiagramme vir puntlaste en eenvormige verspreide laste. Reglynige beweging van 'n deeltjie met veranderlike versnelling waar die versnelling 'n funksie is van tyd of verplasing. Eenvoudige harmoniese beweging.

Beweging in 'n sirkel (horisontaal en vertikaal). Eenvoudige slinger. Keëlslinger. Traagheidsmoment, teoremas van parallelle en loodregte asse. Hoekmomentum en kinetiese energie van draaiende liggame. Newton se wet vir draaiende liggame.

Voorstelling van numeriese data. Verspreiding van frekwensie. Gemiddelde en standaardafwyking van diskrete en gegroepeerde verspreidings.

Elementêre waarskynlikheidsteorie, met inbegrip van voorwaardelike waarskynlikheid.

Waarskynlikheidsverdeling van 'n variant. Binomiese, Poisson-, reghoekige en normale verdelings. Wiskundig; verwagting, veral gemiddeld en variansie.

Steekproefverdeling van die gemiddelde; standaardfout. Vertroubaarheidsperke. Hipotesetoetsing. Die toets van gemiddeldes en verskil tussen gemiddeldes.

Fisika

S.I.-eenhede word deurgaans gebruik, maar vrae kan ander praktiese eenhede soos die minuut, uur en graad Celsius insluit.

Warmte

Gedrag van 'n ideale gas met veranderinge in druk, volume en temperatuur. Eenvoudige kinetiese teorie van 'n ideale gas, met inbegrip van die afleiding van die formule $p = \frac{1}{3} c^2$ en van die gebruik van die Avogadro-getal.

Die verhouding tussen temperatuur en molekulêre kinetiese energie.

Interne energie van 'n gas. Eerste termodinamikawet. Bestendigevloei-energievergelyking. Entalpie.

Verskille tussen die vernaamste spesifieke warmtekapasiteit van 'n ideale gas. Bewys van $C_p - C_v = R$.

Verhouding van spesifieke warmte en die afhanklikheid daarvan van atomisiteit. Omkeerbare isotermiese en adiabatiese omskakelings. Arbeid verrig in isobariese, isotermiese en adiabatiese uitsettings.

Versadigde en onversadigde dampe. Kook by versadigde dampdruk, doupunt en relatiewe humiditeit. Spesifieke humiditeit (humiditeitmengverhouding). Gedrag van reële gasse.

Kritieke temperature. Warmtegeleivermoë, berekening van lineêre bestendige vloei-toestande.

Newton se verkoelingswet, afleiding van formules van die stelling van die wet.

Warmtestraling. Elektromagnetiese spektrum. Opsporingsmetodes. Prevost se teorie van uitwisseling. Swartstraling en verdeling van energie.

Variasie van golflengte van maksimum energie met temperatuur. Uitstraal- en absorpsievermoë. Kirchhoff se stralingswet, Stefan se wet. Sonkonstante en straling van die son ontvang.

Omskakeling van hitte in arbeid. Termodinamiese siklusse. Carnot-siklus. Termiese rendement. Omkeerbaarheid. Tweede termodinamiewet. Entropie. Omgekeerde siklusse, omgekeerde Carnot-siklus en dampkompressiesiklus. Prestasiekoëffisiënte vir vries- en hittepomp.

Golwe

Beskrywende behandeling van vrye en gedwonge vibrasies, demping en resonansie. Eenvoudige matematiese behandeling van dwars- en langsgolwe, eenvoudige harmoniese golwe, loopgolwe, die verhouding tussen snelheid, frekwensie en golflengte. Superposisie van kollineêre golwe, die vorming van staande golwe. Swewings.

Lig

Kennis van en gebruik van formules vir die vorming van beelde deur weerkaatsing op plat- en bolvlakke. Refraksie op plat- en bolvlakke. Kritieke hoek en totale interne weerkaatsing.

Kennis van en gebruik van dunlensformules. Dun lense in kontak. Eenvoudige behandeling van saamgestelde mikroskoop, refraktor en reflektor astronomiese teleskope. Landteleskoop en -verkyker. Vergrotings en uitgangspupil. (Besonderhede van oogstukke nie vereis nie.)

Breking en verstrooiing deur prisma's. Verstrooiingsvermoë. Voorwaarde vir minimum afwyking in die formule wat brekingsindeks verbind. Dun prisma's.

Beskrywende hantering van sferiese aberrasie, koma, astigmatisme, veldkromming en verwringing. Chromatiese aberrasie en achromatiese lenspaar, sonder berekenings.

Spektra en kleur. Ligintensiteit, ligvloed, verligting. Fotometers, fotovoltiese sel. Huygens-beginsel, afleiding van wette van refraksie en refleksie op 'n plat oppervlak. Interferensie. Young se dubbelgleufeksperiment. Dun films, slegs normale inval. Nie-weerkaatsende films, neerslag. Buiging, enkelgleuf. Beskrywende behandeling van buiging deur 'n sirkelvormige opening en die skeivermoë van 'n teleskoop. Natuurverskynsels, lugspieëlings, opdoemings, ligkrans, reënboog, korona. Ligspoed, Römer en Michelson se metode.

Klank

Snelheid van klank in gasse, vloeistowwe en stawe. Faktore wat die snelheid beïnvloed. Die meting van snelheid in gasse en stawe. Weerkaatsing en buiging. Die uitwerking van wind, snelheidsgradiënt op verbreiding. Die Doppler-effek. Klankintensiteit. Desibelskaal. Luidheid, die telefoon en dBA. Beskrywende behandeling van geraas, luggeraas en struktuurgeraas. Faktore wat transmissie en demping beïnvloed.

INTERNE BEOORDELINGSEKSAMEN

1. Eksamens word kort na die halfjaarlikse vakansie afgelê.

Kandidate skryf 'n vraestel van drie uur oor Wiskunde, 'n vraestel van drie uur oor Meganika en Statistiek en 'n vraestel van drie uur oor Fisika.

2. Die Wiskundevraestel bestaan uit nege vrae waaruit die kandidaat ses moet kies ten einde volpunte te behaal.

Die Meganikavraestel bestaan uit nege vrae—sewe oor Meganika en twee oor Statistiek. Kandidate moet minstens een vraag oor Statistiek beantwoord. Die Fisikavraestel bestaan uit drie afdelings:

- (i) Warmte: Vier vrae.
- (ii) Lig: Drie vrae.
- (iii) Klank: Twee vrae.

Kandidate moet een vraag uit elke afdeling doen en enige ander drie uit die oorblywende afdelings.

3. Die totale slaagpunt is 55 persent. Die minimum slaagpunt in elke vraestel is 45%.

GESAGVOERDER (SPESIALE GRAAD): EKSAMENLEERPLAN**DEEL A****VRAESTEL 1 — INTERNASIONALE MARITIEME OOREENKOMSTE EN REGSKENNIS****Afdeling A****1. IMO-konvensies.****(a) Toepassing:**

- (i) Die funksies van die IMO en die implementering van konvensies.
- (ii) Uitgesonderde en vrygestelde skepe.
- (iii) Nie-konvensieskepe.

(b) Sertifikate—die sertifikate wat op internasionale vaarte aan boord van vaartuie moet wees.**(c) Navigasieveiligheid:**

- (i) Reëlings vir die monitering van gevare en die pligte van Gesagvoerders.
- (ii) Verkeerverdeling en -beheer.
- (iii) Soek-en-redding.

(d) Vragte:

- (i) Kode vir die veilige hantering van massavragte.
- (ii) Kode vir gevaarlike goedere.
- (iii) Graan.
- (iv) Ander kodes wat betrekking het op skepe wat gespesialiseerde vragte aan boord het.
(Gedetailleerde tegniese kennis word nie vereis nie.)

(e) (i) Die aanmeld van ongevale en die bevindings van ondersoeke.**(ii) Die aanmeld van substandaardskepe.****(f) Besoedeling—ooreenkomste oor besoedeling.****2. Gesondheid.****(a) Internasionale ooreenkomste en maatreëls om die verspreiding van siektes deur skeepvaart te vermy.****(b) Internasionale organisasie vir mediese advies ter see.****(c) Internasionale ooreenkomste vir mediese bystand ter see.****3. Ander internasionale ooreenkomste en konvensies rakende skeepvaart.****4. Handelsaangeleenthede.****(a) (i) Wet op Seeversekering—begrip van die inhoud en betekenis.****(ii) York-Antwerp-reëls—kennis van die reëls.****(iii) Haagse Visby-reëls—kennis van die reëls.****(b) Haagse reëls—algemene kennis van die reëls wat op die vervoer van goedere ter see betrekking het.****(c) Bevrugting en huurkontrakte.****Afdeling B****1. Suid-Afrikaanse wetgewing wat uit die internasionale ooreenkomste in Afdeling A voortspruit.****2. Handelskeepvaartwet en verwante wetgewing soos van toepassing op:****(a) Bemanning:**

- (i) Die indiensneming en ontslag van seemanne;
- (ii) die bepalings en voorwaardes van hul indiensneming;
- (iii) oortredings en dissipline;
- (iv) toewysings en bevorderings;
- (v) klagteprosedure;
- (vi) bemanning en diplomerings.

(b) Algemeen:

- (i) Ondersoeke, navrae en howe;
- (ii) vervolging na oortredings;
- (iii) aanhouding van onseewaardige skepe;
- (iv) skipbreuk en berging.

3. Suid-Afrikaanse wetgewing betreffende:

- (a) Besoedeling van die atmosfeer;
- (b) veilige werkstoestande aan boord skepe.

VRAESTEL 2—MARIENE-OMGEWINGSTUDIES

Afdeling A

1. Weerkunde:

Die meteorologiese elemente, weerstelsels, en weervoorspelling, soos aangedui in staatspublikasies. Hierbenewens sal die volgende taamlik diepgaande geëksamineer word:

- (i) Adiabatiese prosesse, afnametempo's en stabiliteit.
- (ii) Coriolis- en middelpuntvliedende effekte; geostrofiese windvergelyking; vortisiteit; straalstrome; atmosferiese sirkulasie.
- (iii) Frontogenese en frontolise.
- (iv) Uitstralingsprosesse en warmte-oordrag.
- (v) Kondensasie- en presipitasieprosesse.

2. Oseanografie:

- (i) Algemene kenmerke van die oseane. Bodemtopografie.
Aard van die seebedding. Kuslyne en strande.
- (ii) Fisiese eienskappe van seewater. Ligbinnedringing en kleur van die see.
- (iii) Hittebalans van die oseane, verspreiding van soutgehalte, temperatuur en digtheid. Watermassas.
- (iv) Oorsake van seestrome. Oppervlak- en onderoppervlaksirkulasie.
- (v) Ysvorming, -verspreiding, -beweging en -verwering.

3. See-opname:

Die opnametegnieke betrokke by die onderwerpe wat in Afdeling 1 beskryf is.

- (i) Beheer.
- (ii) Posisiebepaling.
- (iii) Seismiese en sonarprofilering.
- (iv) Seebeddingmonsterneming.

4. Getyteorie:

Algemene kennis van—

- (a) kragte wat die gety laat styg—die ewewigsgety, moderne getyteorie;
- (b) die aarde se getye—
 - (i) hul klassifikasie en hul belangrikste harmoniese komponente; ontledings- en voorspellingsmetodes;
 - (ii) die bepaling van die gemiddelde seevlak;
 - (iii) die vasstelling van verwysingspunte langs kuslyne;
 - (iv) die keuse van plekke vir getymetings;
 - (v) die gebruik van newegetykaarte;
 - (vi) getystrome en hul meting;
- (c) seismiese en meteorologiese stuwings, wiegings, vloedgolwe en verwante verskynsels, seisoens- en langtermynveranderinge in gemiddelde seevlak.

5. Seebesoeedeling deur skepe.

Algemene kennis van die uitwerking op die omgewing en die internasionale beheermetodes met betrekking tot die volgende besoedelingsbronne:

- (a) Olie.
- (b) Skadelike stowwe.
- (c) Rioolwater.
- (d) Afval.

*Afdeling B*1. *Bronne van die see.*

(a) Visvangs:

- (i) Tipes vis, geografiese ligging van visgronde; bewaring van bronne.
- (ii) Moderne bodem- en diepseevisvangmetodes.
- (iii) Fabrieksvaartuie.
- (iv) Seevisboerdery.

(b) Minerale:

- (i) Metodes om minerale uit seewater te ekstraheer.
- (ii) Ontsoutingsprosesse.
- (iii) Sand- en gruisbaggering.
- (iv) Ekstrahering van minerale uit die seebedding, en ondersese mynbou.

(c) Olie en gas:

- (i) Tipes boortorings; boorskepe; boorplatforms; produksieplatforms; bergingsfasiliteite en tipes skeepstasies.
- (ii) Algemene idees oor boorwerk.
- (iii) Pyp lêwerk en die gebruik van duikbote.

(d) Krag:

Algemene idees oor die benutting van energie uit die see; getykragssentrales.

DEEL B**VRAESTEL 3—SKEEPSARGITEKTUUR***Afdeling A*

1. Die toepassing van Simpson se reëls by die bepaling van oppervlakte, oppervlakte middelpunt, transversale en longitudinale oppervlaktemoment, volumes en drukingspunt. Benaderde posisie van die drukingspunt, byvoorbeeld die Morrish-formule. Die Bonjean-krommes. Vloeistofdruk op plat en geboë oppervlakke.

Drukmiddelpunt

2. Transversale stabiliteit. Stabiliteit teen smal slagsyhoëke. Die afleiding $BM = I/V$. Die uitwerking van die verskuiwing van gewigte, hanggewigte, die uitwerking van vry oppervlak, met inbegrip van onderverdeling van tenks en kruisverbinde tenks. Stabiliteit teen groot slagsyhoëke. Die begrip regbringmoment. Die beperking van GM as stabiliteitsmaatstaf. Die uitwerking van die verskuiwing van gewigte en vry oppervlak op die statiese stabiliteitskromme. Die bepaling van regbringmomente, kruisstabiliteitskrommes, die gebruik van die rekenaar. Die formule vir loodregte sye en sy beperkings. Teorie van selfregbringreddingsbote. Dinamiese stabiliteit, definisie en bepalingmetode. Oorblywende dinamiese stabiliteit en die gebruik daarvan by die bepaling van die vermoë van 'n skip om gevaarlike situasies die hoof te bied, byvoorbeeld 'n swaar gewig oor die kant van die skip. Windvlae, die uitwerking van golwe en die samedromming van passasiers. Die uitwerking van vry trim op die dinamiese stabiliteit.
3. Oorlangse stabiliteit. Die afdeling $BM = I/V$. Trim. Ware gemiddelde diepgang. Verandering in diepgang weens 'n verandering in digtheid. Laaiprobleme.
4. Oorstroming van skepe. Die uitwerking van statiese en dinamiese stabiliteit. Slagsy- en trimhoëke as gevolg van onsimmetriese oorstroming. Die toepassing op kasvormige en skeepsvormige vaartuie.
5. Droogdokking van skepe. Algemene voorsorgmaatreëls en probleme betreffende blokdrukke, die uitskop van blokke, gelaai skepe, trim en verandering van stabiliteit. Stranding. Kennis in breë trekke van die vloedvereistes en berekenings met betrekking tot drywende droogdokke.

6. Tewaterlating. Probleme van tewaterlating vanaf 'n sleepelling, afloopglyspoor, slee, sleestutte, die tot stilstand bring van 'n skip, byvoorbeeld sleepkettings. Die tewaterlatingsdiagram.
7. Spanning en vervorming. Eenvoudige buigteorie, profielmodulus, toepassing op eenvoudige balke en op skepe. Spanning en vervorming op 'n skip wanneer dit in stil water en in 'n seegang is. Murray se metode. Die gebruik van las-, skuifkrag- en buigmomentkrommes. Berekenings in verband met kasvormige vaartuie. Spanningsaanwysers.
8. 'n Omvattende kennis van die gebruik van alle soorte hidrostatiese, stabiliteits- en spanningsdata wat aan alle tipes skepe, met inbegrip van behoueringskepe, verskaf word: LNG/LPG, vissersvaartuie en baggerskepe.
9. Maneuivering en skeepsbewegings. Skeepsmaneuivering- en afgemetemylproefvaarte. Evaluering van stuurkenmerke en die toepassing daarvan op die ontwerp van die romp en roer. Slagsyhoek wanneer die skip draai. Die uitwerking van vlak water op maneuvring. Interaksie. Skeepsbewegings. Algemene begrip van golwe en die begrip van die seegang. Die ses vryheidsgrade van 'n skip, die definisie en oorsaak van elke skeepsbeweging.
Die uitwerking van skeepsbewegings op die stabiliteit en veiligheid van die vaartuig, die omslaan van skepe as gevolg van 'n dwarssee, 'n meesee en 'n see vanuit die windveer. Metodes om 'n skip se bewegings te verminder.
10. Vibrering van 'n skip. Algemene kennis van 'n skip se struktuurvibrasies. Die voorkoming en vermindering van vibrasie.

Afdeling B

Ontwerpveiligheid

Algemene begrip van die ontwerpkenmerke wat bydra tot die veiligheid van die volgende tipes vaartuie:

- (a) Passasiers- en motorveerbote.
- (b) A- en B-tipe skepe.
- (c) Tenkskepe.
- (d) Chemikalieëtenkskepe.
- (e) VSG- en VPG-skepe.
- (f) Behoueringskepe.
- (g) Baggerskepe.
- (h) Skeertuie.
- (i) Kussingtuie.
- (j) Onderwatervaartuie.
- (k) Vissers- en kusvoorraadvaartuie.

(Dit wil sê ondervervdeling, brandbeskerming, vryboord, isolering, tenkbestryking, behoueringstelsels en gespesialiseerde vraghanteringstelsel, waar van toepassing.)

VRAESTEL 4—NAVIGASIEHULPMIDDELS

Kennis van elektroniese kringe word nie vereis nie.

1. Standlyne. Die teorie van standlyne. Die uitwerking van waarnemingsfoute met betrekking tot standlyne en posisiebepalings. Die statistiese behandeling van foute. Die wiskundige teorie van hiperbole en die hiperboliese kruisnet.
2. Hiperboliese stelsels. 'n Volledige begrip van die beginsels, kenmerke, akkuraatheid en foute wat met hiperboliese stelsels vir skeepvaart gepaard gaan. Decca, Loran en Omega. Kortafstandhoënoekurigheidstelsels. Karteer- en registreertoerusting.
3. Radiorigtingbepaling. Beginsels en kenmerke. KSB- en digitale presentasie. Radiobakens en bakens met draaiende patrone. Noodposisieaanduidingsradiobakens.
4. Snelheids-, afstand- en dieptemeteinstrumente. Eggoloders. Skeepsjoernale. Aanlêhulpmiddels. Toepassing van die Doppler-beginsel.
5. Skeepsradar. Basiese beginsels en die praktiese gebruik daarvan. Kenmerke van moderne radarstelsels. Sekondêre radar, met inbegrip van Racon en Ramark. Botsingsvoorkomingstelsels. Die gevolge van uitstipfoute. 'n Ontleding van ongelukke waarby radar 'n rol gespeel het.
6. Satellietnavigasie. Basiese teorie en praktiese gebruik.

7. Geïntegreerde navigasiesistels. Basiese beginsels en praktiese gebruik. Kalmanfiltreertegniese.
8. Navorsing en ontwikkeling. Kennis in breë trekke van ander sistels wat nog in 'n stadium van ontwikkeling is, byvoorbeeld:
 - (a) Laserstrale.
 - (b) Infrarooitegniese.
 - (c) Akoestiese-antwoordsenders vir duikbote.
 - (d) Splitstraalkanaalnavigasiesistels.
 - (e) Skeepsidentifikasie.
 - (f) Dinamiese standstelsels.
 - (g) Leikabels.
 - (h) Ringlasergiroskope. Nuwe ontwikkelings in giroskope.
 - (i) Navstar, G.P.S. en Geosat.
 - (j) Toekomstige wêreld maritieme nood- en veiligheidstelsels.
9. Tolkompas. 'n Volledige teoretiese en praktiese begrip van kommersiële tolkompe in algemene gebruik. Die basiese teorie en praktiese gebruik van inerte navigasiesistels.

VRAESTEL 5—NAVIGASIE

Afdeling A

1.
 - (a) Dieper insig in die beginsels van navigasie word vereis as vir die laer grade.
 - (b) Die eienskappe van boldriehoek.
 - (c) Foute in astronomiese aardwaarnemings en standlyne en posisiebepalings.
 - (d) Kepler se wette.
 - (e) Die helderheid van sterre.
 - (f) Gekoördineerde universele tyd.
 - (g) Die inhoud van die verkorte seemansalmanak.
 - (h) Die teorie van die sekstant, korreksies en foute in sekstante.
 - (i) Geosentriese en geografiese breedtegraad.
2. Die berekening en toepassing van die formules wat gebruik word vir—
 - (a) veranderingstempo's van asimut en hoogte;
 - (b) maksimum en minimum hoogtes.
3. Die teorie en 'n algemene begrip van die eienskappe van die volgende:
 - (a) Mercatorprojeksie.
 - (b) Transversale Mercatorprojeksie.
 - (c) Gnomoniese projeksie.
 - (d) Ortomorfiiese keëlprojeksie van Lamberts.
 - (e) Stereografiese projeksie.
4. Voorkoming van botsings:
 - (a) Botsingvoorkomings- en maneuvreerstelsels.
 - (b) Roetebepalingstelsels.
 - (c) Verkeersbeheerorganisasie.
5. Soek- en -reddingswerk.
 - (a) Prosedures.
 - (b) Patrone.
 - (c) Stipwerk.
6. Spesiale probleme by navigasie:
 - (a) Navigasie in die poolstreke.
 - (b) Navigasie van hoëspoed- en onderwatervaartuie.

Afdeling B

1. 'n Volledige teoretiese en praktiese begrip van die oorsake van deviasie van die magnetiese kompas, met inbegrip van toestande van geen deviasie en praktiese regstellingsmetodes.
2. Die statutêre voorskrifte en inhoud van skeepvaartkennisgewings betreffende die voorsiening, plasing en onderhoud van skeepskompass, en die plasing van ander toerusting in die omgewing.
3. Magnetiese sendkompas en magnetiese tolkompas.
4. Die teorie van degaussering in skepe.

AANHANGSEL P

(SIEN REGULASIE 30)

KURSUS IN ELEKTRONIESE NAVIGASIESTELSELS**OPLEIDING IN DIE GEBRUIK VAN RADAR- EN ANDER ELEKTRONIESE NAVIGASIE-TOERUSTING****ALGEMEEN**

Hierdie Aanhangsel dek die vereistes vir opleiding in die operasionele gebruik van radar- en elektroniese navigasietoerusting, en die vereistes vir die toekenning van sertifikate.

1. Die kursus in Elektroniese Navigasiestelsels en die gepaardgaande eksamen het die kursusse vir radar-waarnemer met ingang van 1 Junie 1984 vervang.
2. Die Navigasiebeheerkursus het die Radarsimulatorkursus met ingang van 1 Junie 1984 vervang.

KURSUS IN ELEKTRONIESE NAVIGASIESTELSELS*Doelwit*

Die mikpunt van die kursus is om die leerlingoffisier toe te rus met die basiese kennis en vaardighede wat nodig is om die elektroniese navigasiestelsels waarmee S.A. skepe gewoonlik toegerus is te bedien en om gebruik te maak van die inligting wat voorsien word om die pligte van 'n brugwagoffisier by ontvangs van 'n eerste bekwaamheidsertifikaat te onderneem.

Einddoel

Aan die einde van die opleiding moet die opleideling in staat wees om sy pligte, soos in die spesifikasie aangedui as Subaanhangsel A, doeltreffend te verrig en om die inligting wat van elektroniese navigasietoerusting verkry word aan te wend vir die veilige navigasie van die skip.

Opleidingsplan

Die hele opleidingskursus bestaan uit drie progressiewe stadstiums wat voltooi word gedurende die twee vernaamste kollege-opleidingstydperke en die tussentydperk seediens, in die opleidingskemas deur die Departement goedgekeur. Dit is die bedoeling dat die leerplan van die ENS-kursus geïntegreer moet wees met en aanvullend by die verwante navigasiestudies in die hoofopleidingskursus. Minstens 118 uur word aan die ENS-kursus gewy, met inbegrip van beoordeling, maar uitgesonderd die eindeksamen waarvoor 'n bykomstige twee uur per kandidaat toegelaat moet word gedurende die kollege-opleidingstydperk. So nie kan die kursus in die geval van persone wat bekwaamheidsertifikate buite die goedgekeurde beplande opleidingskemas wil verwerf, aangebied word as 'n voltydse blok wat 150 uur duur.

Leerplan

Die leerplan vir die kursus is aangeheg by Subaanhangsel B.

Aanbieding van die kursus

Die onderlinge verwantskap tussen die veilige gebruik van alle navigasie-metodes is die grondbeginsel van die kursus.

Praktiese opleiding is noodsaaklik omdat dit die student in sy rol as waghou-offisier bedrewe maak in die hantering van spesifieke toerustingiteme.

In die laaste stadstiums van die kursus word daar van simulاسie gebruik gemaak by oefeninge wat die studente ondervinding laat opdoen van werklike radarstipwerk en die gebruik van radar vir deurlopende posisie-monitering. Sulke oefeninge moet egter verband hou met die basiese begrippe van botsingvoorkomings- en navigasietegniese, en nie met ingewikkelde oefeninge wat meer onder die Navigasiebeheerkursus tuishoort nie.

Toerusting

Die toerustingspesifikasie vir die kursus is by Subaanhangel C aangeheg.

Eksamens en beoordeling

Die vordering van studente moet in elke stadium van die kursus beoordeel word en in aanmerking geneem word as deel van die finale eksamen. Die eksamen wat aan die einde van die kursus afgelê word, bestaan uit die konstruksie en vertolking van radarstippings, gevolg deur 'n mondelinge/praktiese toets waarin gebruik gemaak word van toerusting wat by die kollege geïnstalleer is.

Vereistes vir beoordeling en vir toelating tot en die afneem van die eksamen is by Subaanhangel D aangeheg.

Sertifikate

'n Sertifikaat in Elektroniese Navigasiesistels, uitgereik deur die Departement van Vervoer, word deur die kollege toegeken aan opleidings wat die volle kursus bevredigend gevolg het en in die eindeksamen geslaag het.

Goedkeuring

Die kursus word aangebied ooreenkomstig die bepalings van hierdie Aanhangel. Die personeel wat met onderrig gemoeid is, moet aanvaarbaar wees vir die Departement van Vervoer. Die kursus en eksamen is oop vir inspeksie deur beamptes van die Departement van Vervoer ten einde te verseker dat algemene standaarde gehandhaaf word.

SUBAANHANGSEL A VAN DIE ENS- KURSUSSPESIFIKASIE

Vaardigheid-/kennisspesifikasie vir die opleiding in elektroniese navigasietoerusting

Werkvereiste	Vaardigheid	Kennis
	Die volgende paragrawe word almal ingelui deur die woorde: "Die offisier moet in staat wees"	
1. Om rigtingpeilings en standlyne te verkry en aan te teken	1. Om geskikte radiobakens te kies en te identifiseer; om die D/F (rigtingsoeker) op te stel en in die hand- of outomatiese modus op 'n geselekteerde radiobaken of op 'n noodfrekwensie in te skakel; om 'n peiling van 'n sendstasie te verkry en om gepaste regstellings te maak; om peilings en standlyne op 'n navigasiekaart uit te stip	1. Die basiese beginsels van radiopeilers (RDF). Beskrywing van radiopeilontvangers in gebruik ter see. Die oorsake en uitwerking van ionosfeergolwe, die halfsirkelfout, kwadrantfout en kuseffek. Kalibreering. Toepassing van halfkonvergensie. Akkuraatheid, afstand en ander beperkings van RDF. Gebruik daarvan vir aanpeiling op 'n ongeval. Doel van die "Admiralty List of Radio Signals" se lys van radioseine, Volume II.
2. Om eggoloders te gebruik	2. Om tipiese eggolodingstoerusting te bedien en die inligting op die vertoon-terminaal korrek te vertolk	2. Die basiese beginsels van skeeps-eggoloders. Tipes in gebruik ter see. Die vernaamste komponente van veeldoelnavigasie-eggolodingstoerusting. Voorsorgmaatreëls wat getref moet word by die gebruik daarvan en die akkuraatheid wat verlang word.
3. Om die skip se posisie vas te stel deur van hiperboliese navigasiesistels gebruik te maak: (a) Decca-navigator	(a) Om die toepaslike Decca-navigatorketting te kies; om die toerusting te bedien; om inligting te vertolk; om regstellings en toelatings vir vaste en veranderlike foute aan te bring; om Decca-koördinate op 'n Decca-kaart uit te stip ten einde die skip se posisie te bepaal; om die verwagte akkuraatheid te bepaal	3. Die basiese beginsels van hiperboliese navigasie. Die verskil tussen sistels wat gebruik maak van die meting van tydverskil en van faseverskil. (a) Beskrywing van die Decca-navigasiesistels en -ontvangers in gebruik aan boord skepe. Dekkingsgebiede en Decca-kaarte. Vertolking van instruksies in die Decca-handboek. Oorsprong en oorsake van foute. Die gebruik van Decca-datavelle.

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| (b) Loran C..... | (b) Om die toepaslike Loran-ketting te kies; om die Loran-ontvanger te bedien; om die inligting op die vertoonterminaal korrek te vertolk; om foutregstellings aan te bring; om Loran-koördinate uit te stip ten einde posisie te bepaal; om die verwagte akkuraatheid te bepaal | (b) Beskrywing van die Loran-stelsel en tipiese ontvanger in gebruik aan boord skepe; oorsprong en oorsake van foute; regstellings en verwagte akkuraatheid. Dekkingsgebiede en Loran-kaarte. |
| (c) Omega | (c) Om die toepaslike Omega-stasies te kies; om 'n Omega-ontvanger te bedien; om die inligting op die vertoonterminaal korrek te vertolk; om foutregstellings aan te bring; om Omega-data uit te stip ten einde posisie te bepaal; om die verwagte akkuraatheid te bepaal | (c) Beskrywing van die basiese Omega-stelsel en ontvangers in gebruik aan boord skepe. Oorsprong en oorsake van foute. Die gebruik van voortplantingskorreksietafels. Posisionele akkuraatheid. Dekkingsgebied en Omega-kaarte. |
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| 4. Om die skip se posisie te bepaal deur van satelliet-navigasietoerusting gebruik te maak | 4. Om die ontvanger te bedien; om die posisie uit te stip; om die verwagte akkuraatheid te bepaal | 4. Basiese beskrywing en beginsels van die satellietnavigasiestelsels. Tipiese ontvangers in gebruik aan boord skepe. Oorsprong en oorsake van foute. Regstellings en verwagte akkuraatheid. Dekkingsgebiede. |
| 5. Om basiese radartoerusting te bedien | 5. Om kontroles aan te skakel en in te stel vir 'n optimale beeld; om die werkverrigting van toerusting na te gaan; om die kontroles te verstel ten einde 'n optimale beeld te behou; om waninstelling van die kontroles te kan raaksien; om die afstande en peilings van teikens te meet | 5. Beskrywing van basiese seeradarinstallasie. Identifikasie van kontroles en die basiese beginsels van radar. |
| 6. Om die radarstel as 'n navigasiehulpmiddel te gebruik..... | 6. Om peilings en/of afstande te verkry en die posisie van die skip te bepaal; om parallelindekstegnieke vir deurlopende posisiemoniterings te gebruik | 6. Opsporing en herkenning van teikens. Oorsprong van foute in verkreeë posisies. Die gebruik van radar vir navigasie in beperkte vaarwater of kuswaters, met inbegrip van parallelindekstegnieke. |
| 7. Om radar te gebruik om botsings te vermy..... | 7. Om 'n radarwaghouidiens in stand te hou deur inligting van die vertoonterminaal te verkry of deur van radaruitstiphulpmiddels gebruik te maak; om potensieel gevaarlike teikens te identifiseer; om 'n botsingsrisiko te takseer en om die uitwerking te beoordeel van veranderinge in eie en/of ander vaartuie se koers en spoed in voorgenome botsingsvoorkomingsmaneuvers; om inligting te rapporteer. | 7. Beginsels en konstruksie van 'n radarstipping. Die gebruik van uitstiphulpmiddels. Die gebruik van 'n stippling om inligting oor teikens te verkry. Die beoordeling van 'n botsingsrisiko. Die uitwerking van die verandering van koers en spoed met betrekking tot die voorkoming van 'n botsing. Radarrapporteringsprosedures. Die toepassing van die Botsingsregulasies in beperkte sig. |
| 8. Om outomatiese radaruitstiphulpmiddels te gebruik..... | 8. Om toerusting aan te skakel en op te stel; om die kontroles te verstel ten einde 'n optimale beeld te behou; om 'n stippling te behou deur teikens outomaties of met die hand te verkry; om inligting wat vertoon word te vertolk en reg te beoordeel; om inligting te rapporteer. | 8. Die beskrywing en beginsels van die werking van ARPA-toerusting. Die werkverrigting en akkuraatheid van die stelsel. Vertoonpersentasie. Kontroles, vermoëns van die stelsel en inligtingsfasiliteite. |

SUBAANHANGSEL B BY ENS-**KURSUSSPESIFIKASIE****KURSUS EN ELEKTRONIESE NAVIGASIESTELSELS****ALGEMENE RIGLYNE EN LEERPLAN****Opsomming***Stadium A—Kollege-opleiding*

Die doel van hierdie stadium van die opleiding is om die leerlingoffisier bewus te maak van die basiese werkbeginsels van die elektroniese navigasietoerusting en om hom te leer hoe om hierdie toerusting te bedien sodat hy noukeurige inligting aan die brugwaghouspan kan verstrek gedurende die daaropvolgende seefase van die beplande opleidingskema.

Stadium B—See-opleiding

Gedurende die tydperk seediens tussen die kollegefases behoort die leerlingoffisier hom toe te spits op die konsolidering van die vaardighede en kennis wat gedurende Stadium A verwerf is deur onder toesig gebruik te maak van al die radar- en navigasiehulptoerusting aan boord van die skip (skepe) waarop die seediens verrig word.

Stadium C—Kollege-opleiding

Die doel van hierdie stadium is om 'n wyer begrip van navigasiestelsels, sowel as insig in die akkuraatheid, beskikbaarheid, beperkings en die gebruik van navigasie-instrumente teen die agtergrond van algemene vereistes vir navigasie te ontwikkel.

Verwante-studies

In die geval van opleidelinge wat verwante opleidingskemas in fases volg, word die ENS-kursusleerplan gedek tesame met die verwante praktiese navigasie-afdeling van die hoofstroom van die opleiding.

Let ook op dat die Afdeling Toegepaste Wetenskap van die Klas 3-leerplan, wat oor WS-teorie en die beginsels van radio handel, as nuttige agtergrondmateriaal vir die studie van radiopeiling en hiperboliese stelsels dien, en dat wanneer hulle voltooi is, die twee studieverlede 'n geïntegreerde geheel behoort te vorm.

Amptelike publikasies

Van opleidelinge word verwag om kennis te dra van die huidige amptelike publikasies wat betrekking het op die gebruik van radar- en ander navigasietoerusting met inbegrip van die volgende:

- (i) Die Botsingsregulasies
- (ii) Handelskeepvaartkennisgewings van die Departement van Vervoer
- (iii) Regulasies in verband met die Veiligheid van Navigasie
- (iv) Die Seeradarprestasiespesifikasies (HMSO & IMO)
- (v) Die ARPA-prestasiespesifikasies (HMSO & IMO)
- (vi) Verslae van howe van marine-onderzoek, wat betrekking het op veilige navigasie.

Gevallestudies

Inligting oor die gebruik of misbruik van toerusting na aanleiding van werklike voorvalle verkry, dien as 'n waardevolle bron wat dwarsdeur die kursus gebruik word.

Die aandag word in hierdie verband gevestig op die *Marine Navigation Casualty Reports* wat deur die International Chamber of Shipping, 30/32 St Mary Axe, London EX 3A 8ET gepubliseer word.

Praktiese oefeninge

Praktiese oefeninge is 'n basiese kenmerk van die kursus. Hulle word so ontwerp dat die student in staat gestel word om sy vermoë te toon om die toerusting te bedien en die inligting wat verkry is korrek te gebruik soos in die spesifikasie van Subaanhangel A aangedui. In die laaste stadiums van die kursus word simulatie gebruik om studente oefening te gee in werklike radaruitstipwerk en in die gebruik van radar vir deurlopende posisiemonitering. Die leerplan wat ARPA-toerusting dek, word in hierdie stadium, sover dit waghou-offisier betref, indringend genoeg behandel en neem die student se betreklik beperkte praktiese ondervinding ter see in aanmerking.

Leerplan

Gaan van die veronderstelling uit dat al die doelwitte voorafgegaan word deur die woorde "Die verwagte resultaat van die studies is dat die student in staat moet wees tot die volgende:".

Stadium A—Kollegetydperk**Basiese beginsels van elektromagnetiese voortplanting****A1* Elektromagnetiese energie**

- (1) Verduidelik waarom die meeste navigasihulpmiddels van elektromagnetiese energie gebruik maak.
- (2) Omskryf die frekwensie van 'n elektromagnetiese golf.
- (3) Omskryf die golflengte van 'n elektromagnetiese golf.
- (4) Vermeld die gemiddelde voortplantingsnelheid van 'n elektromagnetiese golf.
- (5) Omskryf die Doppler-effek.

A2* Rig-, spoed- en afstandinstrumente**Beskryf rig-, spoed- en afstandinstrumente**

- (1) Noem dat die hooftolkompass in staat is om 'n vaste rigting aan te wys.
- (2) Beskryf die aanvanklike opstelling en verstelling onderweg van die tolkompasinstallasie.
- (3) Beskryf hoe om 'n peiling te maak om vir tolkompasfout te toets en hoe om 'n fout te benoem en toe te pas.
- (4) Beskryf hoe die magnetiese kompas gestel kan word om voortdurend 'n vaste rigting aan te wys.
- (5) Beskryf hoe om 'n peiling te maak om die magnetiese kompas te toets, en hoe om die fout te benoem en toe te pas.
- (6) Beskryf 'n magnetiese sendkompas.
- (7) Noem die instrumente wat koersinformatie ontvang.
- (8) Beskryf die gebruik en werking van 'n stuuroutomaat, met inbegrip van buitekoersalarms.
- (9) Bespreek metodes om die afstand wat gevaar is asook die snelheid deur die water te bepaal.
- (10) Beskryf die tipes sleepspoed- en onderwaterspoed- en onderwaterafstandinstrumente, met inbegrip van Doppler-tipes.

* Van leerlinge wat tydperkopleidingskemas volg waar die ENS-kursus geïntegreerd is, sal verwag word om paragrawe A1 en A2 onder verwante studies te dek.

Posisiebeginselstelsels**A3. Lewer bewys van kennis van die basiese beginsels van hiperboliese navigasie**

- (1) Gee die definisie van 'n hiperbool.
- (2) Trek 'n hiperboolpatroon rondom twee fokuspunte met die basislyn verdeel in 'n eksakte getal gelyke verdelings.
- (3) Noem die begrippe van bane.
- (4) Toon hoe dubbelsinnigheid ontstaan wanneer die twee fokuspunte radiostasies is wat gelyktydig seine uitsend.
- (5) Noem dat dubbelsinnigheid deur die toepassing van 'n tydsvertraging verwyder word.
- (6) Omskryf 'n grondlynnuitbreidingsgebied.
- (7) Verklaar waarom die hiperbool/hiperbole se akkuraatheid in die grondlynnuitbreidingsgebied verminder.
- (8) Kombineer twee hiperboolpatrone om die metode van posisievasstelling te illustreer.
- (9) Beskryf hoe 'n hiperboolpatroon (-bane) geproduseer kan word tussen twee stasies wat op dieselfde frekwensie uitsaai en 'n eksakte getal golflengtes uitmekaar is met die seine wat in fase begin.
- (10) Noem dat faseverskille gebruik kan word om hiperboliese standlyne tussen twee volle bane vas te stel.
- (11) Noem dat tydverskil gebruik kan word om intermediêre hiperboliese standlyne tussen twee volle bane vas te stel.

A.4 Lewer bewys van die vermoë om die Decca-navigasiestelsel te bedien

- (1) Beskryf die basiese Decca-navigasiestelsel.
- (2) Meld die omvang van dekkinggebiede.
- (3) Identifiseer die Decca-kaart en die bykomende inligting wat in druk daarop verskyn.
- (4) Vertolk die instruksies in die Decca-handboek.
- (5) Stel 'n Decca-ontvanger op vir 'n bekende posisie.
- (6) Stel 'n Decca-ontvanger op deur middel van baanidentifikasieseine.

- (7) Beskryf ander tipes Decca-ontvangers as dié in A4(5) in gebruik op skepe.
- (8) Verkry Decca-koördinate van die Decca-ontvanger.
- (9) Gebruik datavelle om vastefoutkorreksies en toelating vir veranderlike foute te vind en toe te pas.
- (10) Stel die posisie vas deur data wat van die Decca-ontvanger verkry is, te stip.
- (11) Demonstreer interketteringposisiebepalingstegnieke.
- (12) Gee 'n opsomming van die inhoud van die handelskeepvaartkennisgewings wat betrekking het op die gebruik van die Decca-navigator.

A.5 Lewer bewys van die vermoë om posisiebepalings te doen deur gebruik te maak van Loran-koördinate

- (1) Beskryf die tipes Loran C-ontvangers in gebruik ter see.
- (2) Identifiseer die Loran-kaart en die bykomende inligting wat daarop verskyn.
- (3) Stip die posisie deur van Loran-koördinate gebruik te maak.

A.6 Lewer bewys van die vermoë om radiorigtingsoekers te bedien

- (1) Noem dat 'n peiling van 'n radiosender verkry kan word deur 'n rigtingsoeker te gebruik.
- (2) Beskryf die metode om die koersinligting wat deur die tolkompas aan die rigtingsoeker voorsien word in te voer en te toets.
- (3) Vertolk inligting betreffende radiobakens, wat in die "Admiralty List of Radio Signals", Volume II, voorkom.
- (4) Verkry die peilings (deur rigtingidentifikasie) van spesifieke radiobakens, ekstern of nageboots.
- (5) Pas die korreksie van die ykkromme verkry toe op die relatiewe peiling.
- (6) Sit verbeterde relatiewe peiling om in grootsirkelpeiling.
- (7) Sit 'n grootsirkelpeiling om in 'n loksodroompeiling.
- (8) Beskryf hoe 'n radiorigtingsoeker gebruik word om op 'n ongeval aan te peil.
- (9) Stip loksodroompeiling op kaart.

A.7 Lewer bewys van die vermoë om 'n Omega-opvangstel te bedien

- (1) Beskryf Omega as 'n wêreldwye faseverskilstelsel wat die posisies van senders aandui.
- (2) Lewer bewys van die vermoë om korreksietabelle te gebruik.
- (3) Identifiseer die Omega-kaart en die bykomstige inligting daarop aangedui.
- (4) Lewer bewys van die vermoë om toepaslike stasiepare te kies en om die Omega-ontvanger op te stel voordat daar vertrek word.
- (5) Lewer bewys van die vermoë om Omega-lesings te korrigeer en om posisie op 'n kaart uit te stip.
- (6) Beskryf die metodes om die ontvanger onderweg op te stel.

A.8 Toon begrip van die basiese beginsels van eggoloding en lewer bewys van die vermoë om 'n eggolood te bedien

- (1) Beskryf die basiese beginsels van 'n ultrasoniese see-eggoloder.
- (2) Noem die aanvaarde waarde van die snelheid van klank in seewater en die grense waarbinne die werklike waarde mag lê.
- (3) Noem die fisiese faktore wat die snelheid van klank in seewater beïnvloed.
- (4) Teken 'n eenvoudige blokdiagram van 'n eggolood en noem die funksies van die onderskeie blokke.
- (5) Bedien 'n tipiese eggolood, en lewer bewys van die vermoë om gebruikersonderhoud uit te voer, byvoorbeeld vervang papier, verstel of vervang die stilus, ensovoorts.
- (6) Onderskei tussen "afstand" en "fase" en toon bewustheid van die gevare van die gebruik van die verkeerde fase.
- (7) Bring die gegewens waarvan die peilings gemeet word in verband met die kaartgegewens.

A.9 *Beskryf die metode waarvolgens 'n radarinstallasie inligting versamel en dit op 'n visuele skerm vertoon.*

- (1) Verduidelik die eggobeginnsel en die toepassing daarvan op radarpulse.
- (2) Identifiseer die komponente van 'n eenvoudige blokdiagram van 'n radarinstallasie.
- (3) Beskryf die baan wat deur 'n enkele radarpuls vanaf die sender na die teiken gevolg word.
- (4) Beskryf die baan van 'n terugkerende eggo deur die ontvanger tot by die toepassing daarvan in die CRT.
- (5) Beskryf die metode waarvolgens 'n CRT 'n eggo op die korrekte afstand en peiling vertoon.
- (6) Identifiseer die radarhorison en die faktore wat die afstand van die waarnemer af beïnvloed.
- (7) Noem die veiligheidsmaatreëls wat nodig is in die nabyheid van oop toerusting en die bestralingsgevaar naby antennes en oop golfleiers.

A.10 *Toon die vermoë om kontroles so te stel dat 'n optimale vertoning van teikens verkry word*

- (1) Noem die korrekte aanskakel veiligheidsmaatreëls en -prosedures.
- (2) Identifiseer 'n skip se boeg bo-, noord bo- en warebewegingvoorstelling en bring die vertoning in lyn met 'n spesifieke metode.
- (3) Toon die korrekte instelling van helderheid-, versterking- en instemkontroles. Herken waninstelling.
- (4) Onderskei tussen die funksies van die seesteuringseggo- en neerslagkontroles en toon hulle korrekte instelling.
- (5) Beskryf 'n prestasiemoniteringsprosedure in breë trekke en toon hoe dit gebruik word.
- (6) Toon die funksies van die oorblywende kontroles en die gebruik van afstand- en peilingmetingskontroles en -rapporteringsprosedures.
- (7) Herken radareggo's en toon begrip van die faktore wat die vertolking van 'n beeld affekteer, bv. skadu-sektore, radar-tot-radarsteuring en ander indruiseggo's.

A.11 *Beskryf die navigasie-inligting wat deur radar verskaf word en die praktiese toepassing daarvan*

- (1) Identifiseer die oorsprong van foute in die akkuraatheid van radarafstande.
- (2) Identifiseer die oorsprong van foute in die akkuraatheid van radarpeilings.
- (3) Toon die vermoë om die skip se posisie te bepaal deur die uitstip van afstande en/of peilings.
- (4) Vergelyk die kaart en PPI vir opvallende radarteikens.
- (5) Beskryf die voorkoms van radarbakens en radarpeilbakens op radarskerms.
- (6) Toon die praktiese gebruik van navigasieparallelindekstegnieke.

A.12 *Beskryf die gebruik van radar as 'n hulpmiddel om botsings te voorkom*

- (1) Beskryf die beginsels van relatiewe en ware radaruitstippings.
- (2) Stip 'n opeenvolging van posisiebepalings uit as 'n relatiewe stipping, lei die werklike koers en spoed van 'n teiken af en voorspel die CPA en TCPA.
- (3) Stip 'n opeenvolging van posisiebepalings uit as 'n ware stipping, verkry die werklike koers en spoed van 'n teiken en voorspel die CPA en TCPA.
- (4) Beoordeel die belangrikheid van die kennis van die voorkoms van 'n teiken.
- (5) Beskryf die voordele van die gebruik van 'n radarreflektoruitstipper.
- (6) Herken die faktore wat by doeltreffende radarwaghouding betrokke is.
- (7) Gebruik die regte verslagprosedure.

A.13 *Toon die vermoë om die kontroles van 'n ARPA-skerm te gebruik*

- (1) Beskryf die inligting wat deur ARPA-toerusting vir navigasie en vir die vermyding van botsings verskaf word.
- (2) Bevestig die korrekte insette van koers en spoed.
- (3) Bedien die kontroles om teikens te vind en te kanselleer.
- (4) Kies ware/relatiewe vektore.
- (5) Pas vektorlengtes aan om CPA en TCPA vas te stel.
- (6) Bevestig die gegewens in (5) deur gebruik te maak van alfanumeriese gegewens.

Stadium B—Tweede seefase

Gedurende die seediens tussen die kollegefases moet die leerlingoffisier praktiese ondervinding opdoen in die volgende toerusting, waar dit geïnstalleer is:

Decca-navigator.

Loran C.

Omega.

Satellietnavigator.

Rigtingsoeker.

Eggolood.

Radar.

Outomatiese radaruitstiphulpmiddels (ARPA)

Die volgende oefeninge moet onder toesig van een van die skip se navigasie-offisiere uitgevoer word:

(1) Die uitstip van radardata om die volgende te verkry:

(a) Die skip se posisie op die kaart;

(b) die koers, speed, voorkoms, CPA en TCPA van 'n skip se teikens.

(2) Die bediening van die skip se eggoloodtoerusting om lodings te verkry, en die vergelyking daarvan met die gekarteerde diepte van die water.

(3) Die uitstip van koördinate verkry van minstens een van die tipes hiperboliese navigasietoerusting wat hierbo gelys is.

(4) Die aantekene van D/F-peilings tesame met berekenings ten einde die relevante ware peilings te verkry.

(5) Bediening van die toerusting om die inligting wat in (1) tot (3) vereis word, te verkry.

Die leerling se rekordboek moet geëndosseer word in die betrokke afdeling wanneer die oefeninge tot tevredenheid van die betrokke offisier(e) voltooi is.

By die bepaling van die hoeveelheid praktiese opleiding wat vereis word, moet rekening gehou word met die beoordeling wat aan die einde van Stadium A van die kursus deur die kollege gemaak is.

Die oefeninge moet waar moontlik in samehang met verwante oefeninge in navigasieprosedures onderneem word.

Dit is met die oog op die bevordering van die leerlingoffisier se navigasievaardighede van die uiterste belang dat data wat van elektroniese navigasietoerusting verkry is waar moontlik altyd volgens ander metodes nagegaan moet word.

Die gevare van navigasie wanneer daar staatgemaak word op karige of onbevestigde inligting moet beklemtoon word. In hierdie verband moet die leerlingoffisier waar moontlik 'n junior posisie in die brugwaghouspan inneem.

Stadium C—Kollegefase**Posisiebepalingstelsels**

C.1 Hersiening en uitbreiding van stelsels waarin daar van hiperboliese navigasietegnieke gebruik gemaak word.

(1) Hersien die basiese beginsels van die verkryging van 'n posisie deur koördinate te vind van die hiperboliese kruisnet op navigasiakaarte gesuperponeer.

(2) Noem die belangrike navigasiestelsels waarin daar gebruik gemaak word van die meting van die faseverskil- en tydverskiltegniek.

C.2 Die Decca-stelsel

(1) Hersien *How the Decca System Works (Appendix 4, Decca Operating Instruction, of soortgelyk)*.

(2) Beskryf die periodieke verbreding van die patroon om baanidentifikasieseine asook die seinvolgorde vir die multipulsketting te voorsien.

(3) Beskryf die gebruik van baanidentifikasieseine om diskrimineerders op te stel wanneer die dekking binnegegaan word of by aanskakeling binne die dekkingsgebied.

(4) Beskryf die uitwerking van ionosfeergolfsteuring.

(5) Beskryf werking by toestande van 'n swak sein en/of hoë geraas.

(6) Bespreek die moontlike oorsake van foutiewe baanaanwysing.

(7) Beskryf die gevare van die gebruik van Decca-gange as bane.

(8) Hersien die akkuraatheid en foute van die stelsel en inligting deur die seedatakaarte voorsien.

- (9) Verduidelik die belangrikheid van foute en die waarskynlikheidsfaktor van die akkuraatheid van die posisie wat verkry is.
- (10) Meld die waarskuwings wat vir kettingwanfunksionering voorsien word.
- (11) Demonstreer metodes vir die opstel en bediening van Decca-ontvangers.
- (12) Verkry Decca-koördinate en bepaal posisie deur middel van data-uitstipwerk.
- (13) Verkry Decca-koördinate deur interketteringvasstelling en stip data uit om posisie te bepaal.

C.3 Die Loran-stelsel

- (1) Hersien die produksie van 'n hiperboliese patroon voortspruitend uit verspringende pulse tussen hoof-en slaafstasies.
- (2) Omskryf pulsherhaalfrekwensie, herhalingsinterval en tydsdeling.
- (3) Beskryf die koersmeting van tydsverskil en prestasie deur 'n Loran-ontvanger.
- (4) Beskryf die siklusvergelykingsomhulling deur die Loran C-ontvanger geproduseer.
- (5) Beskryf die ontvangs van grond- en ionosfeergolwe deur die Loran-ontvanger en die voordele van laefrekwensietransmissies.
- (6) Dui gebiede aan waar gemengde ionosfeer-/grondseine of beide ionosfeerseine ontvang sal word en beskryf die uitstipprosedure.
- (7) Beskryf die akkuraatheid van die stelsel en moontlike foute.
- (8) Beskryf die funksies van die kontroles van 'n halfoutomatiese Loran-ontvanger.
- (9) Beskryf 'n ten volle outomatiese Loran-ontvanger.
- (10) Verkry Loran-koördinate en stel die posisie vas op die Loran-kaart terwyl moontlike foute in aanmerking geneem word.

C.4 Radiorigtingsoekers

- (1) Hersien die werking van radiorigtingsoekers.
- (2) Verduidelik hoe die minimum sein die voortplantingsrigting aandui wanneer die oordantenne in werking is.
- (3) Beskryf die Bellini-Tosi-stelsel en die werking van die soekspoel.
- (4) Beskryf hoe foute ontstaan vanweë die interaksie tussen die voortgeplante golf en heruitstraling vanaf die skip se struktuur.
- (5) Verduidelik hoe residuele foute van (4) uitgestip word ten einde 'n ykkromme te produseer.
- (6) Beskryf foute wat ontstaan in die rigting van die voortgeplante sein as gevolg van oorsake buite die skip—ionosfeergolf- en kusrefraksie-effekte—en bespreek metodes om die uitwerking van hierdie foute te beperk.
- (7) Verkry D/F-peilings en bepaal 'n posisie op 'n kaart met inagneming van foutkorreksies.
- (8) Gee 'n opsomming van die gebruike van rigtingsoekers in soek-en-redding.

C.5 Die Omega-stelsel

- (1) Hersien die werking van die Omega-ontvangstel.
- (2) Noem die voordele van die voortplanting van baie laefrekwensieradiogolwe.
- (3) Noem die voordele van 'n lang basislyn.
- (4) Noem die faktore wat die keuse van die hiperboliese kruisnet tussen 'n stasiepaar beïnvloed.
- (5) Beskryf tydsdeling en die Omega-stasies se seinformaat.
- (6) Beskryf die uitwerking van die lae geïoniseerde laag op BLF-radiogolwe en die gevolglike daelikse en seisoensvariasies.
- (7) Bespreek die akkuraatheid van Omega-seine.
- (8) Bespreek voortplantingsanomalieë en die uitwerking van die sein-tot-geraasverhouding.
- (9) Verduidelik waarom dit nodig mag wees om die Synch-stasie onderweg te verander en meld die prosedure wat gevolg moet word.
- (10) Verduidelik waarom dit nodig mag wees om die LOP-stasie onderweg te verander en meld die prosedure wat gevolg moet word.
- (11) Beskryf die gebruik en werking van 'n LOP-opnemer.

- (12) Beskryf die opsporing van foutiewe baanaanwysing en die korreksie daarvan.
- (13) Beskryf voorsorgmaatreëls naby een sender.
- (14) Beskryf differensiaal-Omega.
- (15) Beskryf outomatiese posisie-aanduitoestelle gebaseer op die ontvangs van Omega-seine.
- (16) Toon kennis van navigasiewaarskuwings wat op Omega betrekking het.

C.6 Hersien die basiese beginsels en werking van die deursendingsatellietnavigasiestelsel

- (1) Beskryf die algemene kenmerke van 'n navigasiesatelliet.
- (2) Beskryf die bane van satelliete.
- (3) Beskryf die rol van opspoor- en invoerstasies.
- (4) Beskryf die inligting wat deur 'n deursendingsatelliet uitgesend word.
- (5) Beskryf hoe die geïntegreerde Doppler-differensiefrekwensies wat van 'n deursendingsatelliet ontvang is, tesame met kennis van twee satellietposisies, 'n hiperboloïed of revolusie kan afbaken.
- (6) Beskryf hoe twee of meer sulke hiperboloïede gekombineer kan word om 'n waarnemerposisie aan te gee.
- (7) Beskryf foute as gevolg van enkelfrekwensie-uitsending, spoed oor die land, antennehoogte, gesigshoek en geodetiese verskille.
- (8) Beskryf die Navstar-satellietstelsel.
- (9) Beskryf die inligting wat deur die Navstar-satelliet uitgesend word.
- (10) Verduidelik hoe pseudoafstand gemeet word.
- (11) Verduidelik hoe ekwivalente gebruiker-klokfout gemeet word vir die beraming van waarnemerposisie.
- (12) Verduidelik hoe onafhanklike afstandfoute bereken word om 'n ware gebruiker-klokfout en derhalwe die ware posisie van die waarnemer te verkry.
- (13) Beskryf 'n tipiese Navstar-ontvanger en aanvangswaarnemingsvolgorde.
- (14) Beskryf die roetinerewerking van Navstar-toerusting.

C.7 Eggosoekers

- (1) Hersien die basiese beginsels en werking van eggosoekers.
- (2) Verduidelik die oorsake van foute in die aangetekende diepte.
- (3) Som die inhoud van Marinekennisgewings met betrekking tot eggosoekers op.
- (4) Beskryf die voorsorgmaatreëls wat getref moet word wanneer eggosoekers gebruik word.

Radar

C.8 Beskryf die basiese beginsels van radar

- (1) Verduidelik hoe afstand bepaal word.
- (2) Verduidelik hoe peiling bepaal word.

C.9 Beskryf die toepassing van die basiese beginsels in die praktyk

- (1) Beskryf hoe inligting vertoon word.
- (2) Verduidelik waarom uitgangsendergie "gepulsêr" moet word.
- (3) Beskryf die uitwerking van die pulsduur op die beeld.
- (4) Verduidelik die uitwerking van die pulsduur op afstandonderskeidingsvermoë en minimum afstand.
- (5) Verduidelik ander faktore wat die minimum afstand beïnvloed.
- (6) Noem die spesifikasievereiste ten opsigte van afstandonderskeidingsvermoë en minimum afstand.
- (7) Verduidelik waarom en wanneer versillende pulsdure gebruik word.
- (8) Verduidelik die noodsaaklikheid van 'n smal horisontale bundelbreedte (HBW) maar 'n breë vertikale bundelbreedte (VBW).
- (9) Beskryf die uitwerking van HBW op die beeld.
- (10) Noem die spesifikasievereiste ten opsigte van HBW en VBW.
- (11) Illustreer uitgangsvermoë deur pooldiagramme.
- (12) Omskryf halfkragpunte.
- (13) Noem die spesifikasievereiste ten opsigte van peilingdiskriminering.

C.10 Toon 'n nie-tegniese kennis van 'n radarstel

- (1) Illustreer die funksionele eenhede van 'n radarstel deur 'n blokdiagram.
- (2) Beskryf die funksies van die blokdiagrameenhede en hul onderlinge verband.
- (3) Beskryf hoe die koersflits geproduseer word.
- (4) Verduidelik moontlike peilingonakkuraathede voortspruitend uit (3).
- (5) Noem die spesifikasievereistes ten opsigte van koersflitsakkuraatheid.
- (6) Beskryf en illustreer verskillende tipes antennes tans in gebruik.
- (7) Verduidelik hoe antenne-ontwerp aan die spesifikasie vir HBW en VBW voldoen.
- (8) Beskryf die metodes van afstandmeting met radartoerusting, byvoorbeeld vaste en veranderlike afstand-merkers, interaftasmerkers.
- (9) Identifiseer moontlike oorsprong van 'n fout in (8) en die relatiewe akkuraatheid van die verskillende metodes.
- (10) Meld die spesifikasievereistes ten opsigte van afstandakkuraatheid.
- (11) Besef die behoefte aan gereelde kontrolering van afstandakkuraatheid en korreksie van of toelating vir onakkuraathede.
- (12) Beskryf die metodes waarvolgens peilings op radartoerusting gemeet word, byvoorbeeld 'n draaibare looper op 'n skyf, EBI en ander metodes.
- (13) Identifiseer peilingonakkuraathede as gevolg van parallaks, koersflitsverskuiwing en wanstelling van die middelpunt.
- (14) Noem die spesifikasievereistes vir peilingakkuraatheid.
- (15) Besef die behoefte aan gereelde kontrolering van peilingakkuraatheid en korreksie van of toelating vir onakkuraathede.

C.11 Gebruik kontroles om 'n radarbeeld te verkry

- (1) Verduidelik die behoefte aan kontrolestellings voordat daar aangeskakel word.
- (2) Meld die spesifikasievereistes ten opsigte van tydsverloop tussen die aanskakeling en die aktivering.
- (3) Manipuleer kontroles in die korrekte volgorde om 'n optimale beeld op die verlangde wyse te verkry.
- (4) Beskryf die uitwerking van ontvangergeraas op die beeld.
- (5) Regverdig die kriteria vir optimale kontrolestellings.
- (6) Noem die gevare van wangestelde kontroles.
- (7) Spoor kontrolewanstellings op en doen die nodige regstellings.
- (8) Besef die uitwerking van die plasing van radareenhede en die berging van onderdele naby magnetiese kompas.
- (9) Definieer "magneties veilige afstand" en "erkende veilige afstand".

C.12 Vertolk die beeld

- (1) Identifiseer indruiseggo's, byvoorbeeld indirek, veelvuldig, bylob, sekondêre spoor en steuring.
- (2) Verduidelik die oorsprong van indruiseggo's.
- (3) Verduidelik die uitwerking van antenneplasing op die beeld, met betrekking tot die skoorsteen, maste, bobou, ensovoorts.
- (4) Omskryf blinde en skaduweesektore.
- (5) Beskryf aanbevole meetmetodes vir blinde en skaduweesektore.
- (6) Verduidelik die voorkoms van seesluiering.
- (7) Meld die gevaar van seesluiering.
- (8) Onderneem 'n soektog in seesluiering.
- (9) Verduidelik die voorkoms van neerslag op 'n beeld.
- (10) Meld die gevare van neerslagsluiering.
- (11) Onderneem 'n soektog binne en buite neerslag.
- (12) Onderskei tussen die uitwerking van see- en neerslagsluiering.
- (13) Verduidelik hoe 'n beeld beïnvloed kan word deur nabygeleë spantorings, groot strukture, kraglyne wat riviere kruis, riviermondings en vervorming van die kuslyn as gevolg van ys.
- (14) Vergelyk die uitwerking van verskille tussen afstandskale.

C.13 Identifiseer faktore wat teikenopsporing beïnvloed.

- (1) Maak gebruik van 'n totale prestasiemonitor om die prestasiestandaard te bepaal en besef die behoefte aan die gereelde nagaan van prestasie.
- (2) Meld die uitwerking van prestasieverlies.
- (3) Omskryf "radarhorison".
- (4) Bereken die maksimum opspoorafstande in standaard meteorologiese toestande.
- (5) Meld die spesifikasievereistes vir afstandprestasie.
- (6) Evalueer die uitwerking van nie-standaardtoestande op opspoorafstande.
- (7) Noem die toestande wat waarskynlik tot bo-standaardbreking en substandaardbreking sal lei.
- (8) Verduidelik die uitwerking van teikenkenmerke op eggosterkte, bv. die grootte, fatsoen, voorkoms en samestelling van teikens.
- (9) Verduidelik die vertoonde uitwerking van pulsduur en bundelbreedte op topografiese teikens.
- (10) Verduidelik watter uitwerking die beweging van 'n skip op vaart op teikenopsporing het.

C.14 Gebruik 'n radarstel vir navigasie

- (1) Bepaal posisie deur peilings en/of afstande.
- (2) Noem die oorsprong van 'n posisiefout.
- (3) Vergelyk die akkuraatheid van radarposisiebepalings volgens verskillende metodes verkry.
- (4) Vergelyk die akkuraatheid van radarposisiebepalings met dié van ander metodes.
- (5) Begryp die belangrikheid van dubbelkontrole van die akkuraatheid van radarposisiebepalings volgens ander metodes verkry.
- (6) Begryp die waarde van die gebruikmaking van alle beskikbare inligtingbronne om posisies te bepaal.
- (7) Beskryf die werkbeginsele en die verskyning van opspoorhulpmiddels in beelde, bv. hoekreflektors, radarbakens, radarpeilbakens.
- (8) Maak gebruik van radar in helder weer—
 - (i) om met visuele waarnemings te vergelyk;
 - (ii) om die relatiewe akkuraatheid van radarinligting te bepaal;
 - (iii) om die vermoëns en beperkings van radar te bepaal;
 - (iv) om gekarteerde eienskappe te vergelyk met eienskappe wat deur radar vertoon word.
- (9) Maak gebruik van parallelindekstegnieke vir deurlopende posisiemonitering.

C.15 Gebruik 'n radarstel vir botsingvoorkoming

- (1) Bepaal op 'n relatiewebewegingsbeeld—
 - (i) die uitwerking van eie skeepsbewegings;
 - (ii) die uitwerking van 'n teiken se bewegings;
 - (iii) die voordele van kompasstabilisasie.
- (2) Bepaal die uitwerking van beweging op eie en ander skepe in 'n warebewegingsbeeld.
- (3) Beskryf die uitwerking van onakkuraatheid in kompasstabilisasiedata op 'n relatiewebewegingsbeeld.
- (4) Beskryf die uitwerking van onakkuraatheid in spoed en kompasstabilisasiedata op 'n warebewegingsbeeld.
- (5) Begryp die akkuraatheidperke van inligting verkrygbaar van nagloei-spore op beelde.
- (6) Begryp die ontwikkeling van 'n situasie op handgemeenafstand.
- (7) Identifiseer gevaarlike teikens.
- (8) Gebruik uitstiptegnieke om inligting af te lei omtrent teikens, bv. CPA, TCPA, koers, spoed, voorkoms, tempo en rigting van gety.
- (9) Verkry die inligting in (8) deur—
 - (i) 'n ongestabiliseerde relatiewe uitstipping;
 - (ii) 'n gestabiliseerde relatiewe uitstipping;
 - (iii) 'n ware uitstipping.

- (10) Vergelyk die voordele van die verskillende uitstipmetodes.
- (11) Gebruik die korrekte rapporteerprosedure.
- (12) Begryp die belangrikheid daarvan dat radarobservasieverslae goed uiteengesit moet wees.
- (13) Bring 'n stippouse in verband met die teikennaderingspoed en -afstand.
- (14) Voorspel die baan van teikens op die beeld.
- (15) Bereken die uitwerking van verandering van eie skip se koers en spoed.
- (16) Identifiseer veranderings in die teiken se koers en spoed.
- (17) Bepaal die vereiste verandering van eie skip se koers en spoed om die verlangde uitwerking te verkry.
- (18) Bring eie en die teiken se verwagte aksie in verband met die botsingsregulasies.
- (19) Begryp die belangrikheid van gereelde waarnemings wat dikwels geskied.
- (20) Identifiseer die vertraging tussen 'n koersverandering en spoed van 'n teiken en die opsporing van daardie verandering.
- (21) Identifiseer die uitwerking van klein en ingrypende veranderinge van koers en spoed op die snelheid en akkuraatheid van die opsporing van verandering.
- (22) Begryp die gevare van veronderstellings wat op grond van onvoldoende inligting gemaak word.
- (23) Begryp die gevare van klein veranderings van koers of spoed.
- (24) Begryp die voordele van veilige spoed wanneer radar gebruik word om botsing te voorkom.
- (25) Bring spoed in verband met CPA en TCPA en met die maneuvreerkenmerke van vaartuie.
- (26) Begryp die behoefte aan die vroeë gebruik van radar in helder weer in die nag wanneer daar aanduidings is dat sigbaarheid mag verswak.
- (27) Beskryf meganiese hulpmiddels om inligting te verkry, bv. RAS-uitstipper.
- (28) Verduidelik die beginsel van en beskryf die voordele van die refleksiestipper.

Outomatiese radaruitstiphulpmiddels (ARPA)

C.16 Begryp die beginsel van outomatiese radaruitstiphulpmiddels

- (1) Verduidelik in breë trekke watter inligting deur ARPA-toerusting vir navigasie en botsingvoorkoming voorsien word.
- (2) Bespreek die onderskeie metodes waarvolgens teikendata vertoon word.
- (3) Bespreek die moontlike gevare daaraan verbonde om te veel op ARPA te steun.

C.17 Ondersoek die faktore wat 'n uitwerking het op die ARPA-stelsel se werkverrigting en akkuraatheid

- (1) Beskryf die inset van die onverwerkte radarbeeld.
- (2) Meld die uitwerking van beperkings op—
 - (a) radarafstand en radarpeilingsakkuraatheid; en
 - (b) radarafstand- en radarpeilingsdiskriminasie.
- (3) Beskryf die insette van koers- en spoedinstrumente.
- (4) Meld die uitwerking van waninstellings of onakkuraatheid in die koers- en spoed insette op die ARPA-data wat vertoon word.
- (5) Meld die beperkinge op hand- sowel as outomatiese verkrygingsfasiliteite deur multi-teikensituasies, teikenervaging en teikenruiling meegebring.

C.18 Begryp die vol vermoëns en beperkings van ARPA

- (1) Beskryf die metodes wat gebruik word om teikens vir volging te verkry.
- (2) Bespreek die kriteria wat gebruik word vir—
 - (a) outomatiese; en
 - (b) handverkryging.
- (3) Beskryf die uitwerking wat verlore teikens, teikenervaging en teikenruiling op die volger het.
- (4) Beskryf die vertraging wat veroorsaak word deur die verwerking van ARPA-data.
- (5) Beskryf die roetine wat gebruik word vir die toets van wanfunksionering van die ARPA-beeld en die nodige voorsorgmaatreëls (nadat wanfunksionering voorgekom het).
- (6) Begryp die gebruike en beperkings van ARPA-alarms, skütringe en sektorwaarskuwingstelsels en beskryf die korrekte instelling van hierdie alarms.

- (7) Interpreteer ARPA-data wat vertoon word en vergelyk dit met handuitstipmetodes veral ten opsigte van bedreigingbepaling en die gebruik van grafiese voorstelling van gevaargebiede.
- (8) Beskryf die proefmanoeuvreerfasiliteit en verduidelik sy verband met die handuitstipvoorspellingsmetode.
- (9) Weet wanneer en hoe om die *uitstipgeheuefasiliteit te gebruik*.

C.19 *Gebruik 'n ARPA vir botsingvoorkoming*

- (1) Beskryf die gebruik van die werkkontroles en die datavertoonmetodes.
- (2) Demonstreer die korrekte opstelling van 'n ARPA-beeld.
- (3) Beskryf die operasionele waarskuwings en bykomende alarms wat geïnstalleer kan word.
- (4) Beskryf die gebruik van selfdiagnostiese roetines by die nagaan van wanfunksionering.
- (5) Vergelyk inligting van ARPA verkry met dié wat van 'n basiese radarstipping verkry word.
- (6) Identifiseer kritieke eggo's.
- (7) Gebruik inligting wat deur ARPA voorsien is om 'n botsingrisiko te bepaal.
- (8) Ontleed die risiko van botsing.
- (9) Bedien die uitstipmanoeuvreerfasiliteit.
- (10) Hanteer die uitstipgeheuefasiliteit.
- (11) Bepaal watter optrede nodig is om handgemeenaafstandsituasies te voorkom, terwyl daar verseker word dat sodanige aksie nie interaksie met enige ander teiken veroorsaak nie.

Gebruik van elektroniese navigasietoerusting

C.20 *Kategoriseer en bepaal die akkuraatheid van elektroniese navigasie-instrumente en -tegnieke volgens spesifieke gebiedsvereistes*

- (1) Gee 'n lys van instrumente en tegnieke in algemene gebruik.
- (2) Noem die akkuraatheid, beskikbaarheid en beperkings van instrumente en tegnieke in algemene gebruik.
- (3) Kategoriseer die bruikbaarheid van die stelsels volgens die volgende gebiede- oseaan-, landnaderings-, kus- en riviermondingsgebiede.
- (4) Begryp die behoefte daaraan om te alle tyd aan die basiese beginsels en operasionele leiding vir offisiere wat in bevel van 'n navigasiewag is, te voldoen, veral met betrekking tot die gebruik van radar en ARPAs.

SUBAANHANGSEL C van ENS-kursusspesifikasie

Elektronies navigasiestelsel (ENS)-kursus

Toerustingsspesifikasie

- A. Die volgende is die minimum toerusting wat vereis word vir die ENS-kursus (data-uitsette hoef nie gekoördineer te word nie):

'n Decca-navigatorontvanger gekontroleer deur 'n statiese simulator;

'n goedgekeurde tipe D/F-ontvanger-lewendig, tesame met 'n rug-teen-rug-goniometer en seingenerator;

'n goedgekeurde tipe eggoloder gekontroleer deur 'n simulator, of gebruik in lug;

'n volledige stel basiese radaruitrusting van 'n soort waaraan 'n Tipe-toetsertifikaat volgens die Prestasiespesifikasie van 1968 (of later) deur die Departement van Vervoer toegeken is;

toegang tot 'n radarsimulator van 'n soort wat goedgekeur is deur die Departement van Vervoer, of die gebruik van VCR-toerusting wat basiese uitstip oefeninge voorsien soos goedgekeur deur die Departement van Vervoer;

toegang tot toerusting wat goedgekeur is deur die Departement van Vervoer en wat in staat is om ARPA-kenmerke te vertoon;

'n satellietnavigasie-ontvanger lewendig.

- B. Die volgende toerusting word as wenslik beskou en moet, indien reeds geïnstalleer, gebruik word; 'n besluit om nuwe toerusting te installeer of bestaande stelle te vervang moet egter eers geneem word na oorlegpleging met die Departement van Vervoer, met inagneming van die mate waarin die toerusting te alle tye ter see in algemene gebruik is. Doeltreffende visuele hulpmiddels, modelle en ander fasiliteite, wat die werkprosedure van die toerusting duidelik toon, kan dan as alternatief aanvaar word;

'n Loran C-ontvanger wat deur 'n statiese simulator gekontroleer word;

'n Omega-ontvanger lewendig;

Algemene vereistes

- C. Ten einde voorsiening te maak vir 'n omgewing wat in hoë mate ooreenstem met dié aan boord van handelskepe, moet die praktiese werk van die kursus uitgevoer word deur gebruik te maak van toerusting van 'n tipe wat algemeen op Suid-Afrikaanse handelskepe gebruik word.

Radaropleiding moet geskied op 'n ten volle werkende siviele seeradartipe wat deur die Departement van Vervoer goedgekeur is. Die vertoning van eggo's moet net so realisties soos 'n situasie aan boord van 'n skip wees en demonstrasietoerusting moet derhalwe geïnstalleer word ooreenkomstig een van die volgende vereistes:

1. Dit moet naby 'n skeepskanaal by die kus geleë wees. Die volgende faktore moet in aanmerking geneem word by die bepaling van 'n geskikte terrein:
 - (a) Met die oog op die demonstrering van, en die eksaminering van studente in waarnemingstegnieke van bewegende teikens in die omgewing van die eie skip, veral wanneer sulke teikens moontlik deur seesluiering verdof mag word, is dit noodsaaklik dat die terrein naby aan skeepvaart in 'n hoofskeepskanaal en/of die ingang van 'n hawe moet wees en 'n onbelemmerde uitsig daarop moet bied. Die maksimum afstand vanaf die kus is 200 meter, maar hierdie afstand is slegs toelaatbaar wanneer daar ten volle aan die ander vereistes van hierdie Subaanhangel voldoen kan word;
 - (b) die onbelemmerde gesigsveld oor die see moet nie minder as 160° wees nie;
 - (c) die hoogte van die antenne moet sodanig wees dat 'n duidelike uitsig seewaarts verkry word;
 - (d) die radaruitsig seewaarts moet sodanig wees dat langafstandteikens, d.w.s. minstens vyf myl, vertoon kan word;
 - (e) die radaruitsig moet skadusektore kan toon, bv. van nabygeleë geboue;
 - (f) visuele observasie van die radaruitsiggebied moet gereedlik beskikbaar wees sodat die radar- en visuele observasie van teikens maklik vergelyk kan word.
2. Dit moet aan boord van 'n opleidingsvaartuig geïnstalleer wees, mits sodanige vaartuig nie tot 'n dok of smal rivier beperk is nie.
3. Dit moet op 'n kollegeterrein geïnstalleer wees waar daar dan van 'n videokassetopnemerstelsel gebruik gemaak word, mits—
 - (i) een van die radarterminale wat tydens hierdie kursus gebruik word, toegerus is met 'n videokassetopnemerstelsel wat deur die Departement van Vervoer goedgekeur is;
 - (ii) 'n bandbiblioteek, goedgekeur deur die Departement van Vervoer, beskikbaar is vir gebruik met die videokassetopnemerstelsel;
 - (iii) minstens een ten volle werkende marineradarstel geïnstalleer word op 'n plek wat deur die Departement van Vervoer goedgekeur is.

SUBAANHANGSEL D van ENS-kursusspesifikasie

Sertifikaat in Elektroniese-Navigasiesistelsels

Beoordelings- en eksamenreëlings

1. Inleiding

- (1) Die Sertifikaat in Elektroniese Navigasiesistelsels word uitgereik aan studente wat die eksamen soos voorgeskryf in Afdeling 3 na voltooiing van die kursus slaag en wat die beoordelings tydens die kursus, waarna in Afdeling 2 verwys word, bevredigend voltooi. Die resultate van hierdie beoordelings word in aanmerking geneem gedurende die finale eksamen.
- (2) Die eksamen- en beoordelingsreëlings moet deur die Direkteur-generaal goedgekeur word. Beoordelings moet uitgevoer word deur die lektor wat betrokke is by die onderrig van elke individuele instrument.

2. *Beoordeling van vordering*(1) *Stadium A en Stadium C (kollegefasies)*

- (i) Die kollege beoordeel 'n student se praktiese vermoë om die individuele instrumente te bedien nadat die studie van elke besondere instrument voltooi is.
- (ii) 'n Soortgelyke beoordeling word gemaak van die standaard van die kaartwerk wat uitgevoer is terwyl posisies verkry is van koördinate wat van die onderskeie instrumente afgelei is.
- (iii) Die beoordeling van praktiese werk word in elke stadium op die volgende wyse aange-teken:

Kursus in Elektroniese Navigasiesistels				*Stadium A/C			
Praktiese hantering				Stipwerk			
Instrument	A	B	C	A	B	C	OPMERKINGS

SLEUTEL

A—Goed in staat om werk op hierdie vlak te hanteer.

B—In staat om werk op hierdie vlak te hanteer.

C—Nie in staat om die werk in hierdie stadium te hanteer nie.

* Skrap soos toepaslik om 'n aanduiding te gee van die stadium van opleiding waarna die beoordeling verwys.

- (iv) Die prosedures vir praktiese beoordeling moet ter aanvulling dien van die inkursus-beoordeling van die teoretiese kennis wat vir 'n BTEC- of SCOTVEC-toekenning vereis word. Vir studente wat onder goedgekeurde faseopleidingskemas volg, word as vereiste gestel 'n ekwivalente beoordeling van teoretiese kennis, wat gedurende die loop van die kursus volgehou word op 'n wyse wat vir die Departement van Vervoer aanvaarbaar is.
 - (v) Studente behoort te poog om enige ongunstige beoordelings gedurende Stadium A reg te stel. Aan die einde van Stadium A behoort studente 'n afskrif te ontvang van die beoordelingstaat(-state), wat aan die kollege teruggestuur moet word by die aanvang van Stadium C. Gedurende Stadium B behoort studente te poog om, terwyl hulle ter see is, hul praktiese prestasie en begrip van die gebruik van die toerusting te verbeter. 'n Aantekening oor hul vordering moet deur die skip se offisiere op die beoordelingsvel gemaak word. As daar nie bevredigende vordering is nie, moet 'n verdere poging gedurende Stadium C aangewend word om beter te vaar.
- (2) *Stadium B (tweede seefase van die opleidingskema)*
- (i) Toepaslike inskrywings moet in die rekordboek vir praktiese opleiding gemaak word as bewys dat die opleiding oefeninge voltooi het in die gebruik van elektroniese navigasietoerusting, met inbegrip van posisiebepaling, radar, eggoloding en rigtingpeiling, tesame met verwante praktyk en navigasieprosedures. (Sien ook (5) hierbo.)
 - (ii) Hierdie inskrywings moet deur die betrokke lektor nagegaan word wanneer die student terugkeer vir Stadium C.
- (3) *By voltooiing van Stadium C*

By voltooiing van Stadium C moet daar 'n formule eksamen afgelê word in radar, die rigtingpeiler en minstens een ander elektroniese navigasie-instrument. (Sien par. 3.) In sommige gevalle mag dit egter nodig wees om die eksamen af te neem oor die volle reeks toerusting waarop die kursus gebaseer is; wanneer besluit word oor die toerusting waarvoor eksamen afgeneem moet word, moet die eksaminator elke kandidaat se beoordelingsvelle nagaan om vas te stel of daar enige swakhede bestaan met betrekking tot die bediening van toerusting, of ten opsigte van die basiese kennis wat vereis word om die toerusting aan boord van 'n skip doeltreffend te gebruik.

(4) *Modulêre kursusse*

- (i) Progressiewe beoordeling van die praktiese en teoretiese kennis moet gedurende die loop van modulêre kursusse volgehou word op 'n wyse wat aanvaarbaar is vir die Departement van Vervoer.
- (ii) By voltooiing van 'n modulêre kursus moet die eksamenprosedure dieselfde wees as dié wat aan die einde van Stadium C vereis word vir studente wat gefaseerde opleiding-skemas volg.

3. *Finale eksamen en beoordeling*(1) *Toelating*

- (i) Daar word van alle kandidate vereis om die ENS-kursus en minstens 15 maande kwalifiserende diens ter see bevredigend te voltooi het.
- (ii) Opleidingsplan wat 'n gefaseerde skema van opleiding deurloop, word geag die kursus te voltooi het waar dit geïntegreer is met verwante studies, mits minstens 118 uur gewy is aan die ENS-materiaal en die beoordeling in Afdeling 2 beskryf bevredigend voltooi is. In die geval van ander kandidate sal bevredigende bywoning van die kursus deur die kollege beoordeel word maar dit moet minstens 150 uur wees en die beoordelings in Afdeling 2 beskryf, moet dan bevredigend voltooi wees.
- (iii) Kandidate wat nie aan die vereiste voldoen nie, mag in buitengewone omstandighede tot die eksamen toegelaat word, mits toestemming van die Departement van Vervoer in elke geval verkry is.

*Sien Opleidingsplanbladsy 1.

(2) *Samestelling*

- (i) Die Eksamen bestaan uit twee dele:

Deel 1: 'n Eksamen van een uur in die konstruksie en vertolking van radaruitstippings.

Deel 2: 'n Praktiese/mondelinge eksamen.

Deel 1 — Konstruksie en vertolking van radaruitstippings.

Deel 1 bestaan uit oefeninge in die konstruksie en vertolking van radaruitstippings van gegewe inligting en hoogstens een uur word toegelaat vir die voltooiing daarvan. Die inligting wat die kandidaat uit die stippings moet verkry, word gekies uit die volgende:

- (1) 'n Aanduiding van vaste en bewegende teikens, asook die naaste naderingspunt van teikens;
- (2) koers en spoed van bewegende teikens;
- (3) voorkoms van teikens;
- (4) snelheid en rigting van getystroom;
- (5) koersverandering wat nodig is om te vergoed vir getyrgting; en
- (6) uitwerking van koersverandering en/of waarnemingspoed van skip en/of teikens op CPA en TCPA.

Kandidate moet toegelaat word om die tipe stipwerk van hulle keuse te konstrueer. Vrae moet nie op so 'n wyse gestel word dat dit kandidate beperk tot 'n bepaalde tipe of tipes stipwerk nie.

Deel 2 — *Prakties mondeling*

In Deel 2 moet kandidate individueel getoets word oor tegnieke met betrekking tot die praktiese instelling en gebruik van radar, die D/F en minstens een ander elektroniese navigasie-instrument. Die eksaminator behoort egter gelei te word deur die inkursusbeoordelings (uiteengesit in Afdeling 2) wanneer daar besluit word of ander toerusting in die praktiese eksamen en in die mondelinge toets ingesluit moet word.

Mondelinge/praktiese toetse kan na die goeddunke van die kolleges óf as 'n enkele saamgestelde toets vir elke kandidaat, óf by verskillende geleenthede vir elke toerustingem afgeneem word.

Praktiese eksamen

Die praktiese toets moet 'n kandidaat se bekwaamheid in die gebruik van toerusting ooreenkomstig die volgende riglyne bepaal:

Radar

Die aanskakel en afskakel van toerusting volgens die korrekte prosedure; die instel van die vertoonkontroles van die radarstel in die korrekte volgorde met verwysing na die aanduidings van punte van optimale stelling; herkenning van waninstelling van stelknoppe:

Helderheids-/versterkings-/videoprosesseerkontroles;

fokuskontroles;

seesluier kontroles;

middelkontroles;

reënwerende of korttydkonstantekontroles;

handinstemkontrole;

optimale keuse van afstandskale met inagneming van die wisselende toestande of omstandighede van verkeer, weer of nabyheid van die land;

gebruik van vaste en veranderlike afstandsmerkers;

akkuraatheid en nagaan vir onnoukeurighede;

gebruik van elektroniese peilingaanduiders;

meting van afstande en peilings vir posisiebepaling;

perke van akkuraatheid van vasstellings;

waarnemings om inligting te verkry om botsings te help voorkom;

die aanstuur van inligting in 'n verstaanbare vorm;

radarrapporteringsprosedures;

nagaan van die prestasie van radartoerusting;

gebruik van 'n prestasiemonitor en die behoefte aan gereelde kontrolering;

beeldinstellingskontrole;

mondelinge vrae oor die gebruik van warebewegingsradar;

mondelinge vrae oor die beginsels, vermoëns en beperkings van ARPA.

Rigtingsoekers

Verkry 'n rigtingsoekerpeiling en pas enige nodige korreksies toe ten einde dit moontlik te maak om die peiling op 'n navigasiekaart aan te bring; sodanige peiling moet van 'n eksterne bron van radiotransmissie wees, bv. 'n nabygeleë radiobaken.

Elektroniese posisiebepalingstelsels

Neem lesings van die verskillende toerustingitems nadat seker gemaak is dat die toerusting opgestel is in ooreenstemming met die instruksies wat in die toepaslike bedieningshandleidings aangegee word; stip sodanige lesings uit op 'n navigasiekaart, terwyl die nodige voorsiening gemaak word vir enige regstellings wat deur die eksaminator aangedui mag word (die eksaminator kan die regstellings in hipotetiese vorm gee).

Eggoloders

Bedien die toerusting volgens die instruksies aangedui in die bedieningshandleiding.

Mondelinge eksamen

Die kandidaat moet vrae mondeling beantwoord oor die gebruik van enige van bogenoemde toerusting, die uitwerking van foute en waninstellings en oor enige ander onderwerpe in die leerplan, wat die eksaminator kan help om 'n oordeel te vel oor die kandidaat se vermoë om data op 'n bekwame wyse uit navigasietoerusting te verkry, te vertolk en te gebruik.

4. Uitreiking van sertifikaat

- (1) 'n Kandidaat moet in albei dele van die finale eksamen slaag en die standaard bereik wat deur die Departement van Vervoer vereis word in die inkursusbeoordelings van teoretiese kennis om vir die uitreiking van 'n Sertifikaat in Elektroniese Navigasiestelsels te kwalifiseer.
- (2) Sewentig persent van die beskikbare punte moet behaal word ten einde in Deel 1 te slaag. Ten einde in Deel 2 te slaag, moet 'n kandidaat die eksaminator oortuig van sy bekwaamheid om die toerusting met inagneming van die doelwitte van die kursus te gebruik. 'n Kandidaat wat druipt, moet die hele kursus herhaal voordat hy die eksamen weer kan aflê, tensy die hereksamen aangepak word binne 12 maande na die eerste poging.

- (3) Met betrekking tot vakke wat gedeeltelik geslaag word, kan eksaminators na goeë dunke uitstel verleen ten opsigte van Deel 1 of Deel 2. Die uitgestelde deel moet egter binne ses maande na die eerste poging aangepak word. Uitstel kan slegs vir een deel toegelaat word en indien die kandidaat hierin drup, moet hy albei dele herhaal wanneer hy die eksamen weer aflê.

5. Departement van Vervoer se goedkeuring en moderering

- (1) Progressiewe beoordeling van teoretiese kennis. In alle gevalle, d.i. vir studente wat die technikonskemas, ander goedgekeurde skemas van gefaseerde opleiding of modulêre kursusse volg, moet kolleges hul beoordelingsplan vir elke onderwerp in die leerplan gelys aan die Departement van Vervoer voorlê vir goedkeuring. Die plan kan dié volg wat kragtens die technikonbeoordelingskemas aanvaar word, of in die geval van modulêre kursusse kan 'n metode gevolg word waarvolgens kort skriftelike eksamens van tyd tot tyd gedurende die kursus afgeneem word. Elke eksamen dek die onderwerpmateriaal wat gedurende die kursus tot met die aanbreek van die eksamen behandel is.

- (2) Beoordeling van uitstipvaardighede.

Kolleges moet aan die Departement van Vervoer vir goedkeuring afskrifte voorlê van vraestelle wat in Deel 1 van die finale eksamen gestel gaan word (hierdie vraestelle moet wat inhoud en standaard betref, ooreenstem met dié wat goedgekeur is vir die Radarwaarnemereksamen).

- (3) Afneem van eksamen

Die eksamen word namens die Departement van Vervoer afgeneem deur 'n eksaminator wat deur die kollege aangewys is en wat vir die Departement aanvaarbaar is. Die Departement behou hom egter die reg van sy beamptes voor om te eniger tyd 'n eksamen, hetsy in sy geheel of gedeeltelik, te laat afneem.

AANHANGSEL Q

KURSUS IN NAVIGASIEBEHEER

Doel

Om bevelsbesluitneming gebaseer op data deur navigasie-instrumente verskaf, volledig begrip van stelsel-foute, deeglike begrip van die operasionele aspekte van moderne navigasiestelsels en effektiewe brugspanwerk-prosedures te bevorder.

Bedoel vir Offisiere met minstens 18 maande diens as gediplomeerde waghoud-offisiere. Besit van 'n NB-sertifikaat is 'n voorvereiste vir die uitreiking van die Klas 2-bekwaamheidsertifikaat en Bevelvoeringsendossementsertifikate.

Mikpunt

Aan die einde van die opleiding moet die offisier in staat wees om navigasie-inligting wat van alle bronne verkry is te evalueer ten einde bevelsbesluite te neem en te implementeer met die oog op botsingvoorkoming en die veilige navigasie van die skip.

Om hierdie mikpunt te bereik, brei hierdie kursus die aanwending van navigasie- en botsingvoorkomings-tegnieke wat alreeds bestudeer en in die praktyk beoefen is uit, en die kursus toon die belangrikheid van hul onderlinge verband en die optimale gebruik van die navigasiedata wat normaalweg beskikbaar is vir die veilige navigasie van die skip.

Opleidingsplan

By die opstel van die opleidingsplan is van die veronderstelling uitgegaan dat studente bekwaam is in basiese parallelindeksing, radarstipwerk en deurvaartbeplanningsprosedures.

Wanneer die NB-kursus gevolg word as deel van die kollegegebaseerde kursus ter voorbereiding van die Departementele Klas 2-bekwaamheidsertifikaat moet dit waar moontlik aanvullend wees tot en die kulminering wees van verwante studies in die Klas 2-leerplan wat betrekking het op praktiese navigasie en deurvaartbeplanningsprosedures.

Daar word derhalwe nie vereis dat die kursus as 'n diskrete module buite die hoofstroom van studie behandel moet word nie, maar minstens 36 uur moet gewy word aan die simulatoroefeninge wat deel van die kursus vorm.

Studente wat nie die NB-kursus as deel van die studiekursus vir 'n volle Klas 2-sertifikaat volg nie, mag voordat met die oefeninge begin word bykomende tyd nodig hê vir die hersiening van die basiese prosedures hierbo genoem, en vir sodanige studente kan die kursus aangebied word as 'n volydse blok wat 60 uur duur.

Kursusprogram

Die kursusprogram en oefeninge wat aangebied word, word in Subaanhangsel A getoon.

Toerusting

Die lys van toerusting wat vir die kursus vereis word, word in Subaanhangsel B gegee. Kolleges mag waar moontlik oorweging skenk aan die gebruik van ander geskikte toerusting, byvoorbeeld skeepsimulators en opleidingsvaartuie, vir die aanbied van oefeninge bykomend by die voorgeskrewe simulatoroefeninge. Sulke bykomende oefeninge kan sekere aspekte van die opleiding en die bereiking van die doelstellings van die kursus verder bevorder, veral met betrekking tot instrumentlooding- en brugspanwerkprosedures.

Toelating tot die kursus

'n Student moet vir toelating tot hierdie kursus minstens 18 maande diens gelewer het as 'n gediplomeerde waghou-offisier en moet die houer wees van 'n Sertifikaat in Elektroniese Navigasiesistels [of van sowel 'n Radarwaarnemersertifikaat as 'n Sertifikaat in Elektroniese Navigasiesistels (Operasie)].

Ander kategorieë van seevaarders wat nie die vereiste seediens vir toelating tot hierdie kursus verrig het nie, maar na die oordeel van die kollege voordeel sal trek uit die opleiding, mag tot die kursus toegelaat word. Na suksesvolle voltooiing van die kursus kan 'n kollege bekwaamheidsertifikaat aan hulle uitgereik word.

Aanbieding van kursus

Opleidingsinrigtings kan oor hulle eie gedetailleerde beplanning van kursusse en tydtafelreëlins besluit. By die implementering van die oefeninge om gemelde mikpunte te bereik moet die volgende riglyne egter in aanmerking geneem word:

- (i) Die oefeninge moet intensief wees en dit moet pas by die gevorderdheid en graad van die studente;
- (ii) die omgewing waarin die oefeninge aangebied word, moet bevorderlik wees vir die opdoen van kennis deur deelname eerder as deur formele klaskameronderrig of lesings;
- (iii) die rol wat die studente speel, moet verteenwoordigend wees van die werklike situasie ten einde dit moontlik te maak om brugspanwerkprosedures te volg;
- (iv) na elke oefening moet al die offisiere 'n algemene samespreking voer waartydens die oefening ontleed en die aksies gekritiseer word.

Beoordeling

Daar sal geen formele eksamen aan die einde van die kursus wees nie, maar studente se prestasie en begrip van die basiese beginsels sal gedurende die kursus streng beoordeel word ooreenkomstig die riglyne in Subaanhangsel C.

Sertifikaat

'n Navigasiebeheerkursusertifikaat sal uitgereik word aan offisiere wat die kursus bevredigend voltooi ooreenkomstig die riglyne in Subaanhangsel C. Indien 'n student wat 'n geïntegreerde kursus volg 'n bepaalde sessie misloop, moet hy die tekort aanvul voordat 'n sertifikaat uitgereik word.

Goedkeuring

Die program van elke kursus moet deur die Departement van Vervoer goedgekeur word.

SUBAANHANGSEL A van die Navigasiebeheerkursusspesifikasie
KURSUSPROGRAM EN OEFENINGE WAT AANGEBIED MOET WORD

1. Inleiding

- 1.1 Die kursus sluit die program van simulatoroefeninge wat in hierdie Subaanhangsel beskryf is in, maar opleidingsinrigtings kan, ooreenkomstig die volgende riglyne, die besonderhede van hulle eie oefeninge ontwerp ten einde die doelstellings wat vir elke stadium gelys is te bereik, en oor die geskikte "afspeelgebiede" en die duur van elke oefening besluit.

2. Ontwerp van oefeninge

- (1) By die ontwerp en aanbieding van oefeninge moet die volgende in gedagte gehou word:
- (i) Die gebruik en werking van die volledige reeks navigasietoerusting, met inbegrip van radar en ARPA, is reeds gedurende die ENS-kursus bestudeer en sommige simulatoroefeninge is reeds in daardie stadium onderneem.
 - (ii) Die beginsels van die hou van 'n veilige navigasiewag, kaartwerk, deurvaartbeplanning en brugspanwerkprosedures is reeds bestudeer as deel van die verwante werk vir die bekwaamheidsertifikaatleerplanne. Waar 'n student die navigasiebeheerkursus volg as deel van 'n studiekursus wat tot die Klas 2-eksamen lei, moet opleiding in basiese tegnieke van, byvoorbeeld, deurvaartbeplanning en hersiening van radarstipwerk, deel vorm van daardie studiekursus. Weens die uiters praktiese en realistiese aard van die oefeninge bevorder die navigasiebeheerkursus die toepassing van die betrokke beginsels.

- (iii) Offisiere wat die navigasiebeheerkursus volg, maar nie as 'n deel van 'n studiekursus vir 'n Klas 2-sertifikaat nie, mag bykomende tyd nodig hê vir hersiening van die basiese tegnieke voordat daar met die navigasiebeheeroefeninge begin word.
- (iv) Offisiere wat nie 'n kursus in Elektroniese Navigasiestelsels (ENS) gevolg het nie, maar wat die Radarwaarnemerkursus en die kursus in Elektroniese Navigasiehulpmiddels (Operasie) gevolg het, mag dit voor hul toetrede nodig vind om Stadium 1 van die Navigasiebeheerkursus te verleng met die oog op volle dekking van paragrawe C16-19 van die ENS-kursusleerplan, wat opleiding in die gebruik van ARPAs insluit.
- (v) Studente moet minstens 18 maande ondervinding as gediplomeerde waghou-offisiere ter see opgedoen het voordat met die kursus begin word.

(2) Ten einde genoemde doelwit van die kursus te bereik, behoort die nodige aandag geskenk te word aan—

- (i) die beplanning en uitvoering van vaarte in beperkte en oop waters;
- (ii) die gebruik van radar en ARPA vir botsingvoorkoming, navigasie en instrumentloodsing;
- (iii) die keuring en gebruik van ander navigasietoerusting en data ooreenkomstig die heersende toestande;
- (iv) ander dienste en inligting soos weerverslae en die gebruik van radiotelefoonkommunikasie.

(3) Doeltreffende brugspanwerkprosedures moet deurgaans in die kursus beklemtoon word.

3. Organisasie

Die kursus kan nie in sy doel slaag met minder as vier studente in twee spanne van twee elk, of meer as drie studente by elke skip nie.

4. Spanrolle

- (1) Die rolle moet verteenwoordigend wees van die werklike situasie ten einde dit moontlik te maak om brugspanwerkprosedures te volg. Die Gesagvoerder moet byvoorbeeld as die ontvanger/koördineerder van inligting optree en moet met die oog op die veilige bestuur van die eie skip oorhoofse besluite neem, terwyl die offisier van die wag 'n primêre rol speel in die verloop van die oefening ooreenkomstig die pligte van 'n offisier in bevel van 'n navigasiewag, waar moontlik bygestaan deur die derde spanlid. Die spanne moet hulle eie plan vir die deurvaart wat gevolg moet word in ooreenstemming met erkende prosedures opstel.

Geskikte publikasies, bv. "Admiralty Pilot Books and Tide Tables" is vir hierdie doel beskikbaar.

- (2) Gedurende die kursus moet rolle soos toepaslik omgeruil word om elke student voldoende geleentheid te bied om as bevelvoerder van die skip op te tree en om die toerusting by elke posisie van die skip te bedien.

5. Oefeninge

- 5.1 By voltooiing van die eerste stadium van die kursus moet die offisier-in-bevel van die skip toegelaat word om die tegnieke wat hy verkies te gebruik by die beplanning van die voorgenome deurvaart, by die verkryging van radar- en navigasie-inligting en by die manewrering van sy skip.

- 5.2 Na afloop van elke oefening moet al die studente samesprekings voer om die handelinge wat plaasgevind het te analiseer en te kritiseer, en rekords van die oefening moet vir hierdie doel beskikbaar wees.

Besprekings kan gevolg word deur demonstrasies van die uitwerking van enige moontlike alternatiewe optrede, of optrede wat in die bespreking voorgestel is. Dit kan by geleentheid ook voordelig wees om alternatiewe tipes beeldvoorstellings te demonstreer en te vergelyk.

6. Oefeninge

Stadium 1—Botsingvoorkomingsoefeninge

Tema: Oopwateroefeninge wat ontmoetings met een of twee teikenskepe behels en later op veelskipontmoetings uitloop.

Die aanvanklike oefening(e) moet die student bekendstel met die toerusting en hom weereens vertrou maak met die gebruik van 'n radarstel vir botsingvoorkoming deur radar- en ARPA-tegnieke.

Doelstellings:

- (i) Om die opleiding se uitstip- en vertolkingsvermoëns te verfris, en om sy begrip van uitstip-beperkings en -foute te verbeter (met inbegrip van dié wat met die gebruik van ARPA-stelsels in verband staan).
- (ii) Om, waar optrede nodig is, die nodigheid van groot koers- en/of spoedveranderinge in 'n vroeë stadium van die ontmoeting in te sien.
- (iii) Om die moontlikheid in te sien dat stappe wat reeds gedoen word, gekanselleer moet word, veral as peilings aanvanklik stadig verander.

Omvang van oefeninge

Die oefeninge moet voorbeelde insluit van alle kategorieë van realistiese ontmoetings wat veranderings in die skip se koers en/of spoed mag vereis. Dit is in hierdie stadium belangrik dat oefeninge en demonstrasies gerig moet wees op daardie situasies wat in gevalle van werklike botsings voorgekom het.

*Stadium 2—Navigasie en botsingvoorkoming**Tema:*

Oefeninge wat veelskipontmoetings insluit wanneer 'n kuslyn of ander navigasiegevaar uit oop waters genader word.

Doelstellings:

Om voort te gaan met die oefen van botsingvoorkomingsmanoeuvres waarby enkel- en veelskipontmoetings betrokke is, en terselfdertyd—

- (i) die student se vermoë te verbeter om as deel van 'n span te werk wanneer die land genader word en in kuswaters genavigeer word;
- (ii) die nodigheid te illustreer om die eie skip se posisie vas te stel en sy voortgang in kuswaters te monitor;
- (iii) elke span se vermoë te toets om die skip se baan in kuswaters te monitor en 'n doeltreffende radarwag in stand te hou.

Omvang van oefeninge:

Die oefeninge moet die volgende aspekte dek:

Posisiebepaling deur gebruik te maak van elektroniese hulpmiddels vir navigasie.

Die opstel en uitvoering van 'n navigasieplan vir die nadering van die land.

Monitering van die skip se baan in kuswaters, met inbegrip van die gebruik van parallelindekstegnieke.

Die uitwerking van getystrome, seestrome en wind op die behoud van baan.

Die probleme om grondgestabiliseerde warebewegingsradarbeelde te vertolk.

Botsingvoorkomingsmanoeuvres.

Die toevallige wanfunksionering van toerusting wat in navigasie en botsingvoorkoming gebruik word.

Beperkings van ARPA in die navigasierol.

*Stadium 3—Soek-en-reddingswerk**Tema:*

Oefening(e), hetsy in oopwaters of kuswaters, met besondere aandag aan die noodsaaklikheid daarvan om 'n soek-en-reddingsoperasie uit te voer, terwyl voortgegaan word met die oefen van botsingvoorkoming en navigasietegnieke en -prosedures.

Doelwitte:

- (i) Die oefen, sowel in die skip as tussenskeeps, van soek-en-reddingsprosedures en -tegnieke, met besondere klem op die koördinerende en beplanning van die soektog ten einde die redding in die kortste moontlike tyd af te handel terwyl die beskikbare hulpmiddels met die grootste mate van doeltreffendheid gebruik word.
- (ii) Om die beginsel van effektiewe brugspanwerkprosedures in te skerp.

Omvang van oefening(e):

Die ongeval moet realisties beheer word deur die instrukteur en kan byvoorbeeld sink voordat reddingskepe opdaag. Elke skip, tesame met instrukteursbeheerde teikens [met inbegrip van helikopter(s)], moet betrokke wees by die reaksie op die noodgeval. Oefening(e) moet die volgende insluit:

Navigasie- en botsingsvoorkomingsoorwegings.

Die noodsaaklikheid daarvan dat die ongeval dit vir ander maklik moet maak om hom op te spoor.

Gebruik van die D/F vir aanpeiling op 'n ongeval (wanneer dit in 'n simulator voorsien word, moet hierdie fasiliteit gebruik word om die realisme van die oefeninge te verhoog).

Koördinerings en beplanning van die soek-en-reddingsoperasie.

Stadium 4—Navigasie en botsingvoorkoming

Tema:

Intensiewe oefeninge wat die nadering van en deurvaart deur gebiede met swaar verkeer en navigasiebeperkings behels.

Doelstellings:

Om korrekte deurvaartbeplanning en waghouprosedures wat vir doeltreffende navigasiebeheer in beperkte waters met swaar verkeer vereis word, te konsolideer.

Omvang van oefeninge:

Die oefeninge moet die vermoë van individue en spanne tot die realistiese maksimum verhoog. Hulle moet soveel aspekte moontlik van navigasie en botsingvoorkoming insluit. Die punte in Stadiums 1 en 2 genoem, moet waar toepaslik gebruik word en die oefening(e) moet ook die volgende insluit:

Die opstel en uitvoer van 'n deurvaartplan deur 'n gebied wat fokuspunte vir verkeer- en verkeersverdelingsones bevat.

Landbasisverkeersinligting moet ingesluit word. Nadering van loodsstasie en die aan boord neem van 'n loods.

Minstens een oefening moet lank genoeg wees om realistiese oorhandigings tussen lede van die span soos toepaslik op heersende omstandighede moontlik te maak, bv. die aanvang van beperkte sigbaarheid.

SUBAANHANGSEL B VAN NAVIGASIEBEHEERKURSUSSPESIFIKASIE TOERUSTINGVEREISTES

Die volgende minimum toerusting word vir die kursus vereis:

1. 'n Seenavigasietoerustingsimulator waaraan 'n Tipetoetsertifikaat deur die Departement van Vervoer toegeken is en wat geïnstalleer is in akkommodasie deur die Direkteur-generaal goedgekeur.
2. Die simulator moet minstens drie skeepsposisies in werklike tyd aandryf. Elke skeepsposisie word voorsien van die volgende:
 - (i) 'n Basiese radarterminal met opleidingbeheer van skeepsmanewrering.
 - (ii) Data van (a) 'n Decca-navigator (b) 'n MF/DF en (c) 'n eggoloder wat deur werklike, verteenwoordigende of grafiese beelde, of in alfanumeriese vorme, voorsien word.
 - (iii) Toepaslike kaarte, handstiphulpmiddels, 'n stiptafel, 'n konvooitydhouer, en kompas- en skeepsnelheidsaflesings. Daarby moet 'n gesimuleerde radiotelefoonkommunikasiesistelsel van skip-tot-skip en skip-tot-land (instrukteur se posisie) voorsien word.
3. Benewens die vereistes van paragrafe 1 en 2 moet minstens een skeepsposisie voorsien word van 'n ARPA-beeld wat óf 'n integrerende deel van die radarbeeld wat in paragraaf 2 (i) vereis word, óf 'n alleenstaande fasiliteit kan wees. In albei gevalle moet die beeld met ARPA-kenmerke in verband gebring word met die simulering van die skip se posisie.
4. Die navigasiebeelde en data-uitsette in paragrafe 2 en 3 hierbo vereis, moet deur die simulatorrekenaar beheer word en in verband gebring word met die betrokke skeepsposisie, terwyl tipiese foute van hierdie beelde deur die instrukteur nagegaan moet word. Die toepaslike bedieningsaanwysings en foutkorreksiedata moet waar nodig aan die opleidingse beskikbaar gestel word.
5. Elke skeepsposisie moet geakkommodeer word in 'n hokkie of kamer geskei van die ander skepe, en die hoofsimulatorrekenaar en die instrukteur se posisie moet voldoende klankdig wees.
6. Plek moet beskikbaar wees vir voorligting en ondervraging.
7. Tot tyd en wyl bestaande simulators wat nie aan bogenoemde vereistes voldoen nie verbeter of vervang kan word, mag bestaande toerusting steeds gebruik word, mits die goedkeuring van die Direkteur-generaal in elke geval verkry is.

Opmerkings:

Simulators wat na 1 September 1981 vervaardig is, moet aan die werkverrigtingspesifikasie (1980) vir sodanige simulators, soos gepubliseer deur die Departement van Vervoer, voldoen.

Daar kan moontlik vereis word dat minstens twee skeepsposisies met ARPA toegerus moet wees, maar 'n besluit oor hierdie aangeleentheid kan nie geneem word voordat ondervinding in die aanbieding van die kursus opgedoen is nie. Hierdie bykomende vereiste moet in gedagte gehou word wanneer nuwe toerusting bestel word.

SUBAANHANGSEL C VAN NAVIGASIEBEHEER**KURSUSSPESIFIKASIE****NAVIGASIE BEHEERKURSUS—BEOORDELING**

Opmerkings as riglyne

Algemeen

Die hoofdoel van die beoordeling is om vas te stel of die student gemelde doelstellings van die kursus bereik het op 'n vlak wat na die mening van die beoordelaar bevredigend is. Die beoordelaar moet die optrede van elke student progressief oor die volle duur van die kursus evalueer, met inagneming in die latere stadiums van enige prestasieverbetering deur die student as gevolg van die opdoen van kennis deur deelneming met sy medestudente. Dit is van selfsprekend dat sodanige beoordeling grotendeels subjektief sal wees en dat geen poging aangewend moet word om soos in 'n eksamen punte "objektief toe te ken" nie. In die meeste gevalle sal swakhede gedurende die vooropdragsessies na vore kom en enige latere verbetering in prestasie moet behoorlik in ag geneem word.

Aan die ander kant is dit belangrik dat 'n druipaanslag oorweeg moet word indien 'n student geen beduidende verbetering in prestasie toon nadat hy aanvanklik onbevredigend op moontlike gevaarsituasies gereageer het nie. Die sertifikaat moet teruggehou word totdat bevredigende heropleiding ondergaan is. Die tersaaklike swakhede moet deur die beoordelaar en die betrokke student bespreek word.

Maatstawwe

Aan die einde van die kursus behoort die student—

1. korrekte (en redelike) besluite ooreenkomstig die Botsingsregulasies te neem;
2. data van die navigasie-instrumente tot sy beskikking te verkry en reg toe te pas;
3. navigasie- en botsingvoorkomingsgewens op 'n gekoördineerde en samehangende wyse vir die veilige navigasie van sy skip te gebruik;
4. doeltreffend beheer van sy skip oor te neem wanneer hy in bevel geplaas word;
5. gedurende noodsituasies doeltreffend op te tree;
6. die implikasies te besef van die ontstaan van 'n gevaarlike toestand weens versuim om vroeë en positiewe teenmaatreëls te tref;
7. stappe wat gedoen is te kan regverdig en te leer uit vorige handelinge van homself en andere; en
8. 'n begrip te hê van die omgewings- en operasionele faktore wat die beweeglikheid van sy skip en dié van ander skepe kan beperk.

Opmerking Onvermoë om op bepaalde tye gedurende die kursus aan hierdie maatstawwe te voldoen behoort nie 'n druipaanslag te impliseer nie indien die student agterna sy fout insien en positiewe aanduidings gee dat sy optrede daarna tot 'n aanvaarbare vlak verbeter het. Werklike grensgevalle behoort die voordeel van die twyfel te kry en behoort dus te slaag.

AANHANGSEL R**KURSUS IN OUTOMATIESE RADARUITSTIPHULPMIDDELS****Doelstelling:**

Om opleiding te verskaf in die grondbeginsels en bediening van ARPA-toerusting en in die vertolking en ontleding van inligting met behulp van hierdie toerusting verkry.

Bedoel vir:

Gesagvoerders en Offisiere in bevel van 'n navigasiewaghoudiens, wat op skepe wat met ARPA-toerusting toegerus is, dien, of voornemens is om daarop te dien. [Opmerking: Hierdie opleidingsprogram vorm 'n essensiële deel van die kursus in Elektroniese Navigasiestelsels (ENS-kursus); die besit van 'n ENS-Sertifikaat van die Departement van Vervoer moet derhalwe voldoen aan die vereistes vir offisiere wat in bevel is van 'n wag van enige skip wat oor ARPA-toerusting beskik].

Mikpunt:

Aan die einde van die kursus moet die offisier in staat wees om ARPA-toerusting doeltreffend te gebruik as 'n veilige hulpmiddel vir navigasie en botsingvoorkoming deur die vermoë om—

- (1) prosedures vir die bediening van die toerusting te volg en die beeld te behou;
- (2) die data wat voorsien word te verkry en te ontleed;
- (3) op te tree soos vereis vir veilige navigasie gebaseer op die korrekte vertolking en ontleding van ARPA-data.

Leerplan:

Die leerplan vir hierdie kursus is by Subaanhangsel A aangeheg.

Toerusting:

Die minimum toerusting vir hierdie kursus moet uit 'n goedgekeurde ARPA-stel bestaan wat aan die IMO-spesifikasie vir sodanige toerusting voldoen [IMO-Resolusie A422 (XI) het betrekking]. Die ARPA-inset moet voorsien word deur 'n simulator met 'n wisselwerkingsvermoë soos goedgekeur deur die Departement van Vervoer.

Toelating tot die kursus:

Studente wat tot hierdie kursus toegelaat word, moet in besit wees van 'n Radarwaarnemerssertifikaat. Hulle moet verkieslik ook in besit wees van 'n Bywoningssertifikaat van 'n Departement van Vervoer-goedgekeurde radar-simulatorkursus en moet minstens 18 maande seediens verrig het.

Van offisiere wat hierdie kursus moet volg en wat nie voorheen 'n radarsimulatorkursus bygewoon het nie, sal verwag word om 'n preliminêre intensiewe tydperk van hersiening van basiese radarstipwerk op 'n radarsimulator te volg. Die opleidingsinrigting kan besluit oor die mate waarin enige sodanige preliminêre opleiding nodig is vir die bereiking van die doelstellings van die APRA-opleiding, en of groepe studente met uiteenlopende radar-ondervinding tot dieselfde ARPA-kursus toegelaat moet word.

Duur en aanbieding van kursus:

Die tyd wat nodig is om die doelstellings te bereik, hang in hoë mate af van vorige ondervinding en opleiding en van die toerusting wat beskikbaar is vir die aanbieding van die kursus. In die reël moet die kursus gebaseer wees op die vereiste dat daar nie meer as vier studente, verdeel in pare, per ARPA-terminaal moet wees nie; dat elke paar minstens nege uur moet bestee aan die gebruik van ARPA-toerusting, en dat al die studente ewe veel geleentheid moet kry om die beskikbare toerusting te bedien.

Die leerplanonderwerpe moet, waar toepaslik, gedek word deur onderrig en demonstrasies en deur intensiewe simulatoroefeninge in verband met die gebruik van ARPA. Aandag word gevestig op die noodigheid daarvan dat die opleidings 'n reeks werklikheidsoefeninge moet voltooi, gevolg deur 'n ondervraging en bespreking van die handeling wat gedurende die oefening plaasgevind het. Aandag moet geskenk word aan—

- (1) die noodsaaklikheid daarvan om te alle tye in ooreenstemming met die bepalings van die Botsingsregulasies en die Basiese Beginsels en Operasionele Gids vir die Hou van 'n Veilige Navigasieweg op te tree;
- (2) die gevare daaraan verbonde om te veel op ARPA-data te vertrou;
- (3) die vermoëns en beperkings van die stelsel, en daardie faktore wat die stelsel se prestasie en akkuraatheid kan beïnvloed.

Sertifikaat:

'n Sertifikaat vir die kursus in Outomatiese Radaruitstiphulpmiddels sal uitgereik word aan offisiere wat die kursus bygewoon en bevredigend daaraan deelgeneem het.

Goedkeuring van kursus:

Die fasiliteite en kursusprogram moet deur die Departement van Vervoer goedgekeur word.

SUBAANHANGSEL A van ARPA-kursusspesifikasie**OPLEIDING IN DIE OPERASIONELE GEBRUIK VAN
OUTOMATIESE RADARUITSTIPHULPMIDDELS (ARPA)****1. Algemeen**

- 1.1 Die kursus handel oor die grondbeginsels en bediening van ARPA-toerusting en die vertolking en ontleding van inligting wat verkry is.

- 1.2 Benewens die formele opleiding en demonstrasies moet studente 'n reeks werklikheidsoefeninge voltooi waarin die vertoonde radarinligting óf in ARPA-formaat, óf in basiese radarformaat is. Sodanige buigsaamheid van aanbieding maak dit moontlik om realistiese oefeninge te onderneem wat aan elke groep studente die wydste verskeidenheid van beeldinligting moontlik beskikbaar stel en sodoende hulle vermoë verbeter om óf basiese radarstelsels, óf APRA-stelsels effektief te gebruik.
- 1.3 Die aandag word gevestig op die vereistes soos in die afdeling *Duur en aanbieding van die kursus* in die kursusspesifikasie uiteengesit, en daar word verder gewys op die behoefte aan preliminêre bykomende opleiding vir studente wat nie voorheen 'n radarsimulatorkursus gevolg het nie.
- 1.4 Die besonderhede van die doelwitte wat gedurende hierdie kursus bereik moet word, word in paragraaf 2 hieronder beskryf, terwyl 'n meer omvattende leerplan van vakke wat deur opleiding/demonstrasie en praktiese oefeninge gedek moet word onderskeidelik in paragrawe 3 en 4 gegee word.

2. Doelwitte

By voltooiing van hierdie kursus moet studente oor die volgende beskik:

2.1 Kennis van—

- 2.1.1 die moontlike gevare daaraan verbonde om te veel op ARPA te vertrou;
- 2.1.2 die vernaamste tipes ARPA-stelsels en hulle beeldkenmerke;
- 2.1.3 die IMO-prestasiestandaarde vir ARPA;
- 2.1.4 faktore wat die prestasie en akkuraatheid van die stelsel beïnvloed;
- 2.1.5 volgvermoëns en beperkings van ARPA;
- 2.1.6 prosesseervertragings.

2.2 Die kennis en vermoë om met behulp van goedgekeurde toerusting te demonstreer—

- 2.2.1 die opstel en behoud van ARPA-beelde;
- 2.2.2 wanneer en hoe om die operasionele waarskuwings te gebruik; hul voordele en beperkings;
- 2.2.3 operasionele toetse van die stelsel;
- 2.2.4 wanneer en hoe om inligting te verkry in sowel relatiewe- as warebewegingsbeeldmodusse, met inbegrip van—
 - (a) die identifikasie van kritieke eggo's;
 - (b) die gebruik van uitsluitingsgebiede in outomatiese modus;
 - (c) die spoed en rigting van 'n teiken se relatiewe beweging;
 - (d) die tyd na en voorspelde afstand tot by die teiken se naaste naderingspunt;
 - (e) die koers en spoed van teikens;
 - (f) die opspoor van koers- en spoedveranderinge van teikens, en die beperkings van sodanige inligting;
 - (g) die uitwerking van veranderinge in skip se koers of spoed of albei;
 - (h) die werking van die toetsmaneuver;
- 2.2.5 hand- en outomatiese verkryging van teikens, en hulle onderskeie beperkings;
- 2.2.6 wanneer en hoe om ware en relatiewe vektore en tipiese grafiese voorstelling van teikeninligting en gevaargebiede te gebruik;
- 2.2.7 wanneer en hoe om inligting oor verbygegane posisies van teikens wat gevolg word, te gebruik;

2.2.8 toepassing van die Internasionale Regulasies vir die Voorkoming van Botsings ter See.

3. *Leerplan—Teorie en demonstrasie*

3.1 Die moontlike gevare daaraan verbonde om te veel op ARPA te vertrou.

3.1.1 Die besef dat ARPA slegs 'n navigasihulpmiddel is en dat sy beperkings, met inbegrip van dié van sy sensors, dit gevaarlik maak om, veral wat die hou van 'n uitkykpos betref, te veel op ARPA te vertrou. Die noodsaaklikheid daarvan om te alle tye te voldoen aan die basiese beginsels en die operasionele leiding vir offisiere in bevel van 'n navigasiewag.

3.2 Die belangrikste tipes ARPA-stelsels en hulle beeldkenmerke.

3.2.1 Kennis van die belangrikste tipes ARPA-stelsels in gebruik; hul onderskeie beeldkenmerke en 'n begrip van wanneer om gebruik te maak van grond- of seegestabiliseerde modusse en nood bo-, koers bo- of boeg bovoorstellings.

3.3 IMO-prestasiestandaarde vir ARPA.

3.3.1 Begrip van die IMO-prestasiestandaarde vir ARPA, in die besonder die standaarde wat op akkuraatheid betrekking het.

3.4 Faktore wat die stelsel se prestasie en akkuraatheid beïnvloed.

3.4.1 Kennis van ARPA-sensorinsetprestasielparameters; radar-, kompas- en spoedinsette; die uitwerking van sensorwanfunksionering op die akkuraatheid van ARPA-data.

3.4.2 Uitwerking van die beperkings van radarafstand en peilingdiskriminasie en -akkuraatheid; die beperkings van kompas- en spoedinset op die akkuraatheid van ARPA-data.

3.4.3 Kennis van faktore wat vektorakkuraatheid beïnvloed.

3.5 Volgvermoëns en -beperkings.

3.5.1 Kennis van die kriteria vir die seleksie van teikens deur outomatiese verkryging.

3.5.2 Faktore wat tot die korrekte keuse van teikens vir handverkryging aanleiding gee.

3.5.3 Uitwerking van verlore teikens en teikenervaging op volging.

3.5.4 Omstandighede wat aanleiding gee tot teikenruiling en die uitwerking daarvan op die data wat vertoon word.

3.6 Oponthoud met prosessering.

3.6.1. Die vertraging wat inherent is aan die vertoning van geprosesseerde ARPA-inligting, veral by verkryging en herverkryging of wanneer 'n opgespoorde teiken maneuvreer.

3.7 Wanneer en hoe om die operasionele waarskuwings te gebruik, hul voordele en beperkings.

3.7.1 Begrip van die gebruike, voordele en beperkings van operasionele waarskuwings deur ARPA; korrekte instelling om waar moontlik oorbodige sturings te vermy.

3.8 Operasionele toetse vir die stelsel.

3.8.1 Toetsmetodes vir die wanfunksionering van ARPA-stelsels, met inbegrip van funksionele selftoetsing.

3.8.2 Voorsorgmaatreëls wat getref moet word nadat wanfunksionering voorgekom het.

3.9 Hand- en outomatiese verkryging van teikens, en hulle onderskeie beperkings.

3.9.1 Kennis van die beperkings op beide tipes verkryging in meerteikensscenario's; uitwerking van teikenervaging en teikenruiling op die verkryging.

3.10 Wanneer en hoe om gebruik te maak van ware en relatiewe vektore; en tipiese grafiese voorstelling van teikeninligting en gevaargebiede.

3.10.1 Deeglike kennis van ware en relatiewe vektore; afleiding van die ware koers en spoed van teikens.

- 3.10.2 Beoordeling van 'n bedreiging; afleiding van voorspelde naaste naderingspunt en voorspelde tyd tot by die naaste naderingspunt vanaf die voorwaartse ekstrapolering van vektore; die gebruik van die grafiese voorstelling van gevaargebiede.
- 3.10.3 Die uitwerking van veranderings in koers en/of spoed van die skip en/of teikens op voorspelde naaste naderingspunt en voorspelde tyd tot by die naaste naderingspunt en gevaargebiede.
- 3.10.4 Die uitwerking van onjuiste vektore en gevaargebiede.
- 3.10.5 Die voordeel van die oorskakeling van ware na relatiewe vektore.
- 3.11 Wanneer en hoe om die inligting oor die vorige posisie van teikens wat gevolg word, te gebruik.
 - 3.11.1 Kennis van die afleiding van vorige posisies van teikens wat gevolg word, die herkenning van historiese data as 'n wyse om onlangse maneuvring van teikens aan te dui en as 'n metode om die geldigheid van die ARPA se volgstelsel na te gaan.

4. Leerplan—Praktiese oefeninge

4.1 Die opstel en behoud van beelde.

- 4.1.1 Die korrekte aanvangsprosedure om die optimale beeld uit ARPA-inligting te verkry.
- 4.1.2 Keuse van beeldaanbieding; gestabiliseerde relatiewebewegingsbeelde en warebewegingsbeelde.
- 4.1.3 Korrekte instelling van alle veranderlikeradarbeeldkontroles vir optimale databeelde.
- 4.1.4 Selektoring, soos toepaslik, van vereiste spoedinset vir ARPA.
- 4.1.5 Selektoring van ARPA-uitstipkontroles, hand-/outomatiese verkryging, vektor-/grafiese beeld van data.
- 4.1.6 Selektoring van die tydskaal van vektore/grafiese voorstellings.
- 4.1.7 Die gebruik van uitsluitingsgebiede wanneer outomatiese verkryging deur ARPA gebruik word.
- 4.1.8 Prestasiekontrolering van radar, kompas, spoedinsetsensors en ARPA.

4.2 Operasionele toetse vir die stelsel.

- 4.2.1 Kontrolering van stelsel en die bepaling van die data-akkuraatheid van ARPA, met inbegrip van die toetsmaneuverfasiliteit, deur dit met basiese radaruitstippings te vergelyk.

4.3 Wanneer en hoe om inligting uit 'n ARPA-beeld te verkry.

- 4.3.1 Toon die vermoë om inligting te verkry in sowel relatiewe- as warebewegingsbeeldmodus, met inbegrip van—
 - (a) die identifikasie van kritieke eggo's;
 - (b) spoed en rigting van 'n teiken se relatiewe beweging;
 - (c) die tyd na 'n teiken en die voorspelde afstand tot by 'n teiken se naaste naderingspunt;
 - (d) die rigting en spoed van teikens;
 - (e) die opspoor van koers- en spoedveranderings van teikens, en die beperkings van sodanige inligting;
 - (f) die uitwerking van verandering van 'n skip se koers of spoed of albei;
 - (g) die werking van die toetsmaneuver.

4.4 Die toepassing van die Internasionale Regulasies vir die Voorkoming van Botsings ter See.

- 4.4.1 Die ontleding van 'n potensiële botsingsituasie aan die hand van vertone inligting en die bepaling en uitvoer van handelinge om situasies op handgemeenafstand te vermy ooreenkomstig die Internasionale Regulasies vir die Voorkoming van Botsings ter See.

ANNEXURE A

COMPARISON OF CERTIFICATES OF COMPETENCY

Class of Merchant Shipping Act 1951, certificate of competency	Equivalent class of certificate of competency issued under these regulations
Master Foreign Going	Class 1 (Master Mariner)
Chief Navigating Officer	Class 2 plus Master (Short Sea Trade) Command Endorsement
Second Navigating Officer	Class 3
Master Coasting	Class 4 plus Master (Short Sea Trade) Command Endorsement
Navigating Officer Coasting	Class 5

ANNEXURE B

SPECIMEN CERTIFICATE OF WATCH-KEEPING SERVICE FOR A CLASS 1 OR CLASS 2 CERTIFICATE AND FOR A COMMAND ENDORSEMENT

PART 1

This is to certify that M..... has served on M.V./S.S..... from..... to..... in the capacity of (1st) (2nd) (3rd) (4th) watch-keeping officer under my command. During this period the above-named officer was in full charge of a watch for not less than hours out of every 24 hours while the vessel was at sea on *unlimited/*limited/*short sea voyages.

In addition he regularly carried out other duties in connection with the routine and maintenance of the ship. Bridge watches were doubled during the following periods and at no other times:.....

During those periods the above-named officer served as the *Senior/Junior of two bridge-keeping officers. During the period of engagement stated above the above-named officer—

- *(a) was granted no leave of absence;
- (b) was granted leave of absence as follows:

..... which period(s)* was/were deducted from his total leave entitlement.

.....
Signature of Master

.....
Date

PART 2

During the period the vessel was in the final stages of construction and the above-named officer served on board.
Signature of *Company Marine Superintendent

.....
Master

.....
Date

Delete if not applicable.

*Delete as appropriate.

(Reverse of Certificate of Watch-keeping Service)

M..... served as on MV/SS under my command for the periods stated.

His conduct during the period stated overleaf was

His ability was

His sobriety was

.....
Master

.....
Date

ANNEXURE C**SIGHT TESTS**

Examination days and places shall be by appointment as arranged with the examiner at the nearest port.

The conduct of the tests

The purpose of these tests shall be to ensure that the candidate's eyesight is sufficiently good to enable him to pick up and identify correctly the lights of distant ships at sea. For this purpose a person shall be required to reach certain minimum standards both of form and colour vision.

A sight test shall comprise a letter and a lantern test taken in that order. The tests shall be conducted under the strict personal supervision of a Sight Test Examiner, who shall keep a record of all mistakes made by the candidate both in the letter test and the lantern test.

Every candidate seeking admission to an examination for a first certificate of competency as a deck officer or fisherman shall hold a sight test certificate showing that he has passed in both letter and lantern tests within the six-month period preceding the date of the examination. For certificates of competency subsequent to the first, a sight test certificate meeting the conditions in respect to the letter test only shall be required.

When taking the lantern test, candidates are required not to hurry. They are required to satisfy themselves as to the colours of the lights shown before reporting them to the examiner. The result of the test shall be judged by what the candidate reports; carelessness may cause failure and thus prevent the candidate from taking up a career at sea.

Candidates are required to take a test when in good health, or their vision may be impaired. Candidates may take the sight test with or without aid (conventional spectacles or contact lenses) at their option but candidates who opt to use aids for the letter or lantern test or both shall additionally reach a minimum standard in each eye without aids.

A. LETTER TEST

1. (a) The letter test shall be conducted on Snellen's principle by means of sheets of letters viewed indirectly through a polished mirror so as to place the letters at a virtual distance of 6 metres from the eye. Each sheet contains 7 lines, the 3rd, 4th, 5th, 6th and 7th lines corresponding to standards 6/24, 6/18, 6/12, 6/9 and 6/6, respectively.
(b) Candidates shall be tested in each eye separately.
2. **Standard of vision required**
 - (a) A candidate who elects to take the test without aids shall be required to read correctly down to and including line 7 with the better eye and down to and including line 6 with the other eye.
 - (b) A candidate who elects to take the test using aids shall first take the test without aids when he shall be required to read correctly down to and including line 5 with the better eye and line 3 with the other eye. The candidate shall then be tested with aids and shall be required to read correctly down to and including line 7 with the better eye and down to and including line 6 with the other eye.

3. Method of testing

The test sheets and means of illumination shall be in accordance with BS 4274-1960 and shall be contained in a cabinet placed so that the centre of each sheet as viewed shall be at the height of eye of the average person in a sitting position. When the candidate is sitting in the correct position one of the sheets shall be exposed and he shall be asked to read the letters from left to right beginning at the top and going downwards.

If with aids or without aids or in both cases the candidate fails to reach the required standard an additional sheet shall be given for each eye in that part or parts of the test in which he has failed.

If at the conclusion of the letter test the candidate is considered to have reached the required standard he shall then proceed to the lantern test unless he holds a certificate of competency for which a lantern test recognised by the Director-General would have been a condition for its issue.

If at the conclusion of the letter test the candidate is considered not to have reached the required standard, the following alternatives shall be explained:

- (a) The examination may be stopped, a certificate of failure issued, and the examination may be repeated on payment of a further fee after a period of not less than one month.
- (b) The candidate may proceed to the lantern test. In this case a record of all mistakes made in the letter test and all mistakes, if any, made in the lantern test shall be forwarded to the Director-General for his decision on the test. Failure to pass the letter test may sometimes be due to a defect in vision which may be curable. Whenever, therefore, a candidate fails to pass this test he shall be advised to consult an ophthalmologist with a view to ascertaining the nature of the defect and whether it is curable.

B. LANTERN TEST

4. The test shall be conducted in a room so darkened as to exclude all daylight.
5. **Darkness adaptation.** A candidate who needs darkness adaptation shall be kept in a completely or partially darkened room for at least 10 minutes.

6. Apparatus. The lantern used for the test shall be designed to show three colours: Red, white and green, singly through a large aperture or two at a time, side by side, through small apertures. When the small apertures are used any combination of the three colours may be shown or they may be of the same colour. The lantern shall be positioned directly in front of a mirror so that the front part of the lantern is exactly 3,05 m from the mirror and the lights reflected in the mirror show clearly when viewed by the candidate seated close to the lantern.
7. Method of testing. The test shall commence with a series of lights shown through the large aperture followed by four complete circuits and one broken circuit of lights shown through the small apertures. The candidate shall be required to name the colours of the lights as they appear.

C. TEST RESULTS

8. (a) A candidate who makes no mistakes in the test conducted by means of the lantern or who, when reading the small aperture lights confuses green-white or red-white not more than six times in four complete circuits, shall be deemed to have passed the colour vision test.
- (b) If at any stage of the test conducted by means of the lantern the candidate mistakes red for green or vice versa, he shall be deemed to have failed the colour vision test.
- (c) Candidates shall be notified on an appropriate form of their success or failure, or that their case has been referred for consideration.
- (d) A candidate who fails the lantern test locally shall not be retested except at the discretion of the Director-General, to whom direct application shall be made in writing.

ANNEXURE D

EXPLANATORY NOTE TO SYLLABUSES

The examinations shall use the SI system of units.

The syllabuses shall be progressive from grade to grade. The syllabus for a higher grade in both written and oral examinations shall always be regarded as including the syllabus for the corresponding subject, if any, for certificates of a lower grade. Questions in the examination may be set combining more than one of the paragraphs in the syllabus.

The depth of knowledge required of the candidate shall, where it is not clear from the prescribed syllabus, be established by a working committee consisting of a representative of each appropriate training institution, the Department of Transport and the Industry.

Although English or Afrikaans is not included in these syllabuses as a separate subject, candidates are required to show a good standard of English or Afrikaans in their descriptive answers, and the marks obtained shall to some extent be a reflection of their skill in the use of English or Afrikaans.

Marks shall be lost for poor composition, bad grammar and incorrect spelling, up to a maximum of 20% of the total marks awarded for each subject.

Note: Reference is made in the syllabuses to a knowledge of the Collision Regulations. These are the Substitution for the International Regulations for Preventing Collisions at Sea, 1977.

These regulations shall be subject to amendment in accordance with the requirements of the international conventions ratified by the Government of the Republic of South Africa.

ANNEXURE E

PRESCRIBED MARKING AND COMPARISON OF TECHNIKON AND DEPARTMENTAL SUBJECTS

(Technikon subject titles in bold print in square brackets)

CLASS 6—Certificate of Competency (Part C)

	<i>Time</i>	<i>Total marks</i>	<i>Pass mark</i>
1. Practical Navigation, Chartwork and Pilotage	3 hours	200	120
2. General Ship Knowledge	2 hours	150	90

Orals: As arranged by examiner.

CLASS 5—Certificate of Competency

	<i>Time</i>	<i>Total marks</i>	<i>Pass mark</i>
1. Chartwork and Practical Navigation	3 hours	200	120
2. General Ship Knowledge	3 hours	200	120

Orals: As arranged by examiner.

CLASS 4—Certificate of Competency

	<i>Time</i>	<i>Total marks</i>	<i>Pass mark</i>
1. Naval Architecture [Naval Architecture II]	3 hours	200	120
2. Cargo Work and Shipping Practice [Sea Transport II]	3 hours	200	100
3. Chartwork [Navigation II]	3 hours	200	120
4. Practical Navigation [Navigation II]	3 hours	200	120
5. Marine Environmental Studies [Marine Environmental Studies II]	3 hours	200	100

Orals: As arranged with the examiner.

CLASS 3—Certificate of competency

	<i>Time</i>	<i>Total marks</i>	<i>Pass mark</i>
1. Naval Architecture [Naval Architecture II]	3 hrs	200	120
2. Cargo Work and Shipping Practice [Sea transport II]	3 hrs	200	100
3. Chartwork [Navigation II]	3 hrs	200	120
4. Practical Navigation [Navigation II]	3 hrs	200	120
5. Marine Environmental Studies [Marine Environmental Studies II]	3 hrs	200	100
6. Applied Science [Marine Science I]	3 hrs	200	100
7. Principles of Navigation [Navigation]	3 hrs	200	100
8. Mathematics [Marine Mathematics I]	2 hrs	200	100

Orals: As arranged by examiner.

CLASS 2—Certificate of competency

	<i>Time</i>	<i>Total marks</i>	<i>Pass mark</i>
1. Navigation [Navigation III]	3 hrs	200	120
2. Navigation Information Systems [Nav. Info Systems III]	3 hrs	200	120
3. Marine Environmental Studies [Marine Environmental Studies III]	3 hrs	200	100
4. Cargo Work and Shipping Practice [Sea Transport III]	3 hrs	200	120
5. Naval Architecture [Naval Architecture III]	3 hrs	200	120
6. Business and Law [Mar. Law and Shipping Practice III]	3 hrs	200	100

Orals: As arranged by examiner.

CLASS 1 – Certificate of competency

	<i>Time</i>	<i>Total marks</i>	<i>Pass mark</i>
1. Business and Law..... [Mar. Law and Shipping Practice IV]	3 hrs	200	100
2. Navigation (Paper A)	4 hrs	200	120
Navigation (Paper B)	3 hrs	200	120
[Navigation IV]			
3. Naval Architecture	3 hrs	200	120
[Naval Architecture IV]			
4. Engineering and Control Systems	3 hrs	200	100
[Ship Technology II]			
5. Navigation Instrumentation.....	3 hrs	200	120
[Nav. Info Systems IV]			

Orals: As arranged by examiner.

MASTER (LIMITED TRADE) ENDORSEMENT

	<i>Time</i>	<i>Total marks</i>	<i>Pass mark</i>
1. Naval Architecture	3 hrs	200	120
2. Business and Law.....	3 hrs	200	120
3. Magnetic and Gyro Compass and Navigational Aids	2 hrs	150	90
4. Ship-board Operations	3 hrs	200	120

Orals: As arranged by examiner.

MASTER (SHORT SEA TRADE) ENDORSEMENT

	<i>Time</i>	<i>Total marks</i>	<i>Pass mark</i>
1. Naval Architecture	3 hrs	200	120
2. Magnetic Compass and Navigation Aids	2 hrs	150	90

Orals: As arranged by examiner.

ANNEXURE F**DECK OFFICER CLASS 6 CERTIFICATE OF COMPETENCY: SYLLABUS****PART A—RESTRICTED TRADE****ORAL SYLLABUS****General**

- (a) The syllabus shall be designed to allow candidates to be examined by means of a practical test on board the vessel in which the applicant serves, although any such examination shall as a rule be conducted at the Department's examination centres.
- (b) A candidate shall be required to show—
 - (i) proficiency in the use of the navigational aids installed in the class of vessel in which he serves;
 - (ii) proof that he has satisfactorily completed a practical shipboard fire-fighting course, a practical first aid at sea course and a practical survival at sea course, which shall include the use of inflatable life-rafts.
- (c) A candidate shall be required to show that he has a reasonable knowledge of the navigation by-laws which are applicable to the area of operation to be endorsed on the certificate of competency.

SECTION 1**Practical navigation, chartwork and pilotage**

- (a) A working knowledge of tides, currents, and operational and seasonal weather patterns in the area.
- (b) A practical demonstration of chartwork within the context of the equipment on board the vessel, as follows:
Given variation and the deviation of the magnetic compass, to convert true courses into compass courses and vice versa.

- To find the compass course between two positions.
- The effect of current on speed.
- Allowance for leeway.
- Given compass course steered, the speed of the ship and direction and rate of the current, to find the true course made good.
- To fix a position on a chart by bearing and range.
- To find the course to steer allowing for a current.
- Given the course steered and distance run, to determine the set and rate of the current experienced between two positions.
- To fix a position on a chart by simultaneous cross bearings.
- (c) An examination on information given on a chart.
- Reference:*
 - Buoys.
 - Lights.
 - Radio beacons.
 - Navigational aids.
 - Depths and nature of bottom and use of soundings.
 - Depth and height contours.
 - Tidal streams, traffic lanes and separation zones.
 - Recognition of the coast.
 - Chart correction.
- (d) Candidates shall be examined on the selection of suitable anchorages, approaching anchorage and entering narrow waters; landfalls in thick and clear weather.
- (e) The practical use of electronic aids to navigation fitted in the vessel.

SECTION 2

Practical Seamanship and Signals

- (a) Ability to take a compass bearing or bearings.
 - Ability to check compass bearings by transit.
 - To read and understand a barometer and thermometer.
 - The care and maintenance of liquid compasses.
 - The avoidance of electrical and magnetic interference.
- (b) Rope work and rigging. Knots, hitches and bends in common use.
 - Seizing, rackings, rope and chain stoppers.
 - Short and eye splicing of three-strand rope.
- (c) Preparations for getting under way. Duties prior to proceeding to sea and making harbour; entering a dock. Berthing alongside quay, jetties, or other ships and securing to buoys. Helm orders. Conning the ship. Effects of propellers on the steering of a ship. The effect of current, wind, shallows, and draught on manoeuvring. Stopping, going astern, manoeuvring. Turning a ship short-round. Emergency manoeuvres. Bringing a ship to single anchor in an emergency. Use of two anchors. Man overboard. Dragging anchor. Markings on and use of ordinary leadline.
- (d) Anchors, cables, their use and stowage. Knowledge of the use of all deck appliances including emergency steering gear.
- (e) A full knowledge of the content and application of the Collision Regulations and those annexures concerned with safe navigation, as applicable to the trade or operations in which the candidate is employed.

Distress signals; penalties for misuse

A knowledge of the contents and use of the South African Merchant Shipping Notices and South African Navy Notices to Mariners. Local systems of buoyage; wreck marking.

- (f)
 - (i) Management of ships in heavy weather.
 - Handling a disabled ship.
 - Extra precautions to be taken before the onset of heavy weather.
 - (iii) Towing and being towed.

- (g) Rigging of a pilot ladder.
- (h) Duties of the person in charge of the ship at sea, at anchor and in port.
- (i) Search and rescue.
 - Assisting a ship or aircraft in distress.
 - Rescuing the passengers and crew of a disabled ship or ditched aircraft.
 - Recovering boats at sea.
 - Action to be taken when disabled and in distress.
 - Abandoning ship; survival procedures.
 - Communications with shore. Beaching or landing.
 - The use of rockets and rocket apparatus, as applicable to the vessel.
 - Preservation of crew and passengers in the event of wreck.
 - Survival in lifeboats and life-rafts.
 - An outline knowledge of the regulations concerning lifesaving and fire-fighting appliances, their care and use.
 - Measures to be taken following accidental damage, including collision, grounding, heavy weather damage and leaks, and the importance of the correct use of watertight doors.
 - Beaching a ship.
 - Methods of dealing with fire on board ship.
 - Prevention of fire at sea and in port.
- (j) Measures to be taken to prevent the spillage of oil during bunkering or oil cargo work.
- (k) Ability to recognise the single letter signals of the International Code of Signals either by flags or by Morse code by sound or flashing light.
- (l) Ability to transmit and receive signals by Morse code by sound or flashing light up to six words per minute.

SECTION 3

General ship knowledge

- (a) The names and functions of the principal parts of a ship. General definitions of main dimensions. A practical understanding of general pumping arrangements and ballasting, as applicable to the vessel concerned.
- (b) The meaning of the terms "buoyancy" and "deadweight".
- (c) A practical knowledge of the principles of stability and trim and factors affecting these. The danger of slack tanks.
- (d) General principles of cargo stowage and handling. A general knowledge of the carriage of dangerous goods, where applicable in the trade or operation. Use of displacement and tonne per centimetre scales. Correction to apply for fresh water allowance.
- (e) Entries to be made in the deck log book including reports to be made in the event of injury to or death of crew or other personnel on board ship.
- (f) Legal duties in the case of strandings, collisions and other accidents.
- (g) Load line marks. Entries and reports in respect of freeboard, draught and allowances.
- (h) Certificates required to be carried by coastal ships, including Certificates of Registry.
- (i) The law relating to the reporting of dangers to navigation.
- (j) Avoidance of pollution of the sea by ships. The keeping of records under the Oil Pollution Act, Act No. 6 of 1981, where applicable to the vessel.
- (k) The Beaufort wind scale.

A knowledge of basic meteorology so as to be able to forecast the probable changes in the weather owing to the passage of a depression and to know the conditions that might give rise to fog.

The knowledge required shall not be more than is necessary to make intelligent use of SABC television and radio forecasts and of forecasts with weather maps given in newspapers and maps issued by the Weather Bureau for coastal waters.

PART B—SHORT SEA TRADE

General

- (a) The syllabus shall be designed to allow candidates to be examined by means of an oral examination at the Department's examination centres, although any such examination may be conducted by means of a practical test on board the vessel in which the applicant serves.
- (b) A candidate shall be required to show proficiency in the use of navigational aids, fire-fighting equipment and life-saving equipment installed in the class of vessel in which he serves, and in practical first aid.
- (c) The syllabus for this Part shall be same as that for Part A, but the candidate will be expected to have a greater depth of knowledge than if he had been taking the examination pertaining to Part A.

PART C—UNLIMITED TRADE**SECTION 1****Written paper in Practical Navigation, Chartwork and Pilotage (3 hours)**

- (a) In addition to the syllabus Practical Navigation, Chartwork and Pilotage contained in Part A, Section 1, the candidate will have to demonstrate his ability to determine the following:
- (i) The compass error and deviation using a bearing of the Sun and Venus.
 - (ii) The ship's latitude by meridian altitude of the Sun and Venus.
 - (iii) The direction of the position line on which the ship is situated and a position through which it passes, from an observation of the Sun or Venus near or out of the meridian.
 - (iv) The ship's position using position lines obtained from two or more celestial observations, with or without a run. The celestial observations can be those of the Sun, selected stars as listed in the nautical almanac and Venus.

NOTE: For the computations required in this examination the candidate may use sight reduction tables, Norries or Burtons tables or a scientific calculator without a pre-programming capability.

SECTION 2**Written paper in General Ship Knowledge (3 hours)**

- (a) In addition to the syllabus General Ship Knowledge contained in Part A, Section 3:
- (i) Customs house procedure for entering or clearing a South African ship.
 - (ii) South African and international health regulations. Medical assistance available to a ship at sea.

SECTION 3**Oral examination in Practical Seamanship and Signals**

- (a) In addition to the syllabus Practical Seamanship and Signals contained in Part A, Section 2:
- (i) Ability to use a compass for taking bearings.
 - (ii) Ability to correct a micrometer sextant into which has been introduced one or more of perpendicularity, side or index errors.
 - (iii) Ability to find the index error of a sextant.
 - (iv) Ability to use a micrometer sextant for taking vertical and horizontal angles; to read the sextant both on and off the arc.
 - (v) Ability to read and understand an aneroid barometer.
 - (vi) Ability to transmit and receive signals by Morse code by sound or flashing light up to six words per minute.
 - (vii) The use of the international code of signals and the ability to recognise the single letter signals of the code.

ANNEXURE G**DECK OFFICER CLASS 5 CERTIFICATE OF COMPETENCY: SYLLABUS****CLASS 5—Chartwork and Practical Navigation**

(3 hours written)

Part A—Chartwork

- (a) Given variation and the deviation of the magnetic compass, or gyro error, converting true courses into compass courses and vice versa. Given a sample table of deviations, extracting the deviation, thence converting true courses into magnetic and compass courses. Finding the compass course between two positions.
- The effect of current on speed.
- Allowance for leeway.
- Given compass course steered, the speed of the ship and direction and rate of the current, to find the true course made good.
- Finding the course to steer allowing for a current. Given the course steered and distance run, determining the set and rate of the current experienced between two positions.
- (b) Fixing a position on a chart by simultaneous cross bearings, by bearing and range, by positional information from radio aids to navigation or by any combination, applying the necessary corrections. The use of lattice charts.
- (c) Fixing a position by bearings of one or more objects with a run between, allowing for a current, and finding the distance at which the ship will pass off a given point. The use of position lines obtained by any method, including terrestrial position lines and position circles. The use of transit bearings.

- (d) Elementary knowledge of passage planning and execution. Landfalls in thick and clear weather. The selection of suitable anchorages, approaching anchorage and entering narrow waters. The use of clearing marks and horizontal and vertical danger angles. Distance of sighting lights.
- (e) Finding the time and height of high and low water at Standard ports and at Secondary ports by tidal differences using Admiralty Tide Tables, Vol. 2; the use of tide curves as published in the Admiralty Tide Tables.
- (f) The interpretation of a chart or plan; particularly the information given about lights, buoys, radio beacons and other navigational aids; depths and height contours; tidal streams; traffic lanes and separation zones. Recognition of the coast and radar-responsive targets.

Chart correction.

Depths and nature of bottom. Use of soundings.

Note: Questions may be set in this paper requiring descriptive answers as well as work on the chart provided.

Part B—Practical navigation

- (a) Practical questions on plane and Mercator sailing.
- (b) The use of the traverse method to obtain the position of the ship at any time, given compass courses, variation, deviation and the run recorded by log or calculated by time and estimated speed, allowing for the effects of wind and current.
- (c) Finding compass error by observation of heavenly bodies and, for a magnetic compass, the deviation for the direction of the ship's head.
- (d) Finding the latitude by meridian altitude of the sun, moon or a star.

CLASS 5—General Ship Knowledge (3 hours written)

- (a) General ideas on ship construction and on plans and data available on board ship.
 - General pumping arrangements.
 - General definition of main dimensions.
 - The names of the principal parts of a ship.
- (b) General understanding of:
 - Displacement.
 - Deadweight.
 - Buoyancy; reserve buoyancy; understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy.
- (c) Use of displacement and tonne per centimetre immersion scales to determine mass of cargo or ballast from draughts or freeboard.
 - Load line marks.
 - Effects of relative density of water on draught and freeboard.
 - Fresh water allowance.
- (d) General understanding of—
 - centre of gravity;
 - centre of buoyancy;
 - metacentric height;
 - righting lever;
 - righting moment.
- (e) A knowledge of the IMO recommendations concerning ship stability and the use of stability and hydrostatic data supplied to ships, including stability data in simplified form. The effect of adding and removing weights. The danger of slack tanks, with reference to the subdivision thereof.
- (f) Rigging a ship for loading and discharging cargo, the use of derricks, winches and cranes.
- (g) "Lining up" pipelines on oil products carriers.
- (h) The stowage and securing of cargoes including bulk cargoes.
- (i) A knowledge of the safety precautions to be taken during the loading and discharging of bulk oil, chemicals and other dangerous commodities. Ventilation systems of holds and tanks.

CLASS 5—Marine Environmental Studies (Oral)

- (a) Reading and understanding an aneroid barometer, thermometer, hydrometer and hygrometer. The instruments supplied by the Weather Bureau shall be taken as standard.
- (b) Barometric pressure; use of barometric observations in conjunction with weather signs.
- (c) The Beaufort wind scale. Methods of estimating direction and force of wind at sea.

- (d) The characteristics of, and weather associated with, the principal pressure systems, e.g. anti-cyclones and depressions.

Relationship between pressure distribution and wind. Buys Ballot's Law.

- (e) A knowledge of the weather information available to shipping in the coastal area between the Kunene River mouth and Punta da Ouro.
- (f) A knowledge of procedures for the reporting of weather by ships.
- (g) A knowledge of local—
- (i) currents;
 - (ii) seasonal weather patterns;
 - (iii) occurrence of abnormal waves.

CLASS 5—Oral and practical

Part A

- (a) A full knowledge of the content and application of the Collision Regulations.
- (b) Distress and pilot signals; penalties for misuse.
- (c) A proper knowledge of the principles of navigational watch-keeping at sea and anchor as laid down by IMO. Duties of the deck officer in port.
- (d) A knowledge of the contents and use of Department of Transport Merchant Shipping Notices, Admiralty Notices to Mariners and SAN Notices to Mariners.
- (e) International Association of Lighthouse Authorities (IALA) system of buoyage; wreck marking system.
- (f) Code of Safe Working Practices for the Safety of Merchant Seamen.
- (g) Responsibilities under local legislation for the prevention of pollution from ships.

Part B

- (a) Using an azimuth mirror, pelorus or other instrument for taking bearings.
- (b) Using a micrometer sextant for taking vertical and horizontal angles; reading a sextant both on and off the arc.
- (c) Use, care and limitations of the magnetic and gyro compass and associated equipment, including automatic pilot.
- (d) The rigging of a ship, methods of ascertaining the proof and safe working loads of ropes, including synthetic fibre and wire ropes.
- (e) Stowage and securing of cargoes. Regulations and recommendations affecting their carriage.
- (f) Preparations for getting under way. Duties prior to proceeding to sea, making harbour, entering a dock. Berthing alongside quays, jetties or other ships and securing to buoys.
- (g) Helm orders. Conning the ship. Effects of propellers on the steering of a ship. Stopping, going astern and manoeuvring in the vicinity of pilot vessels and other craft. Picking up the pilot. Turning short round. Emergency manoeuvres. Bringing a ship to single anchor in an emergency. Man overboard.
- (h) Anchors, cables; their use and stowage.
- (i) Elementary knowledge of ships' machinery. Knowledge of the use of all deck appliances including emergency steering gear.
- (j) The use and care of life-saving equipment. Management of boats and survival craft; recovering boats at sea. Beaching or landing. Survival procedure in boats and survival craft. Search and rescue procedures.
- (k) The use and care of fire appliances including the smoke helmet and self-contained breathing apparatus.
- (l) Drills and musters. Organisation of emergency parties.
- (m) Recognition of types of ships.
- (n) The examiner may ask the candidate questions arising out of the written work if this is deemed necessary on account of lack of knowledge shown by the candidate.

CLASS 5—Communications (Oral and practical)

- (a) Sending and receive signals—
 - (i) in Morse code by flash lamp up to six words per minute; and
 - (ii) using the International Code of Signals.
- (b) A working knowledge of the GMDSS (Global Maritime Distress and Safety System) and the equipment associated with search and rescue communications.

ANNEXURE H**DECK OFFICER CLASS 4 CERTIFICATE OF COMPETENCY: SYLLABUS****CLASS 4—Naval Architecture (3 hours written)****PART A—Ship construction**

- (a) General ideas on types of ships and their construction and on plans available on board ship.

General definitions of main dimensions.

Identify and name the principal parts of a ship.

- (b) The candidate will be expected to show practical acquaintance with:

Framing systems.

Beams and beam knees.

Watertight bulkheads.

Hatchways and closing appliances.

Rudders.

Steering gear.

Shell and deck plating.

Double bottoms and peak tanks.

Bilges.

Side and wing tanks.

Stern frames.

Propellers and propeller shafts.

Stern tubes.

Sounding pipes.

Air pipes.

General pumping arrangements.

Stiffening and strengthening to resist panting, pounding and longitudinal stresses.

Cause and prevention of corrosion in a ship's structure.

- (c) General ideas on welding, riveting and burning.

PART B—Ship stability

- (a) (i) The meaning of the terms block co-efficient, displacement, deadweight, density, relative density, principle of Archimedes, flotation.

- (ii) The effect of density of water on draught and freeboard. Fresh water allowance. The marine hydrometer and its uses.

- (b) The use of Simpson's rules in the computation of areas.

- (c) Use of displacement and tonnes per centimetre immersion scales to determine mass of cargo or ballast from draughts or freeboard. Load-line marks.

Buoyancy; reserve buoyancy; understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy.

- (d) (i) General understanding, with definitions, of:

Centre of gravity, stable, unstable and neutral equilibrium.

Centre of buoyancy.

Metacentric height.

Righting lever.

Righting moment.

- (ii) Knowledge of the IMO recommendations concerning ship stability and the use of stability and hydrostatic data supplied to ships.

The effects of adding and removing weights.

The danger of slack tanks.

- (e) A knowledge of the information found on board ships in respect of shear forces and bending moments.

CLASS 4—Cargo Work and Shipping Practice (3 hours written)

- (a) Rigging a ship for loading and discharging cargo, the use of derricks, winches and cranes.
- (b) The stowage, separation and dunnaging of cargoes, including bulk cargoes.
Causes of sweating, and precautions to be taken before, during and after stowing to prevent damage by sweat.
- (c) A knowledge of the safety precautions to be taken during the loading and discharge of bulk oil, chemicals and other dangerous commodities. 'Lining up' pipelines on oil products carriers.
- (d) Calculations of mass capacities taken up by part cargoes and of space remaining. Conversion of mass measurement of cargo into space measurement and vice versa. The making and use of cargo plans.
- (e) Ventilation systems of holds and tanks.
- (f) Precautions to be taken before entering cargo and ballast tanks and void spaces.
- (g) An outline knowledge of documentation of cargo, including mate's receipts, bills of lading, dangerous goods list, waybills, manifests and charger parties.
- (h) The precautions to be taken when welding and burning processes are carried out on board ship.

CLASS 4—Chartwork (3 hours written)

- (a) Given variation and the deviation of the magnetic compass or gyro error, converting true courses into compass courses and vice versa.
Given a sample table of deviations, extracting the deviation and thence converting true courses into magnetic and compass courses.
Finding the compass course between two positions.
The effect of current on speed.
Allowance for leeway. Given compass course steered, the speed of the ship and direction and rate of the current, finding the true course made good.
To find the course to steer allowing for a current.
Given the course steered and distance run, determining the set and rate of the current experienced between two positions.
- (b) Fixing a position on a chart by simultaneous cross bearings,
by multiple ranges,
by bearing and range,
by positional information from radio aids to navigation or
by any combination,
applying the necessary corrections.
The use of lattice charts.
- (c) Fixing the position by bearings of one or more objects with the run between, allowing for a current, and finding the distance at which the ship will pass off a given point.
The use of position lines obtained by any method, including terrestrial position lines and position circles.
Use of transit bearings.
- (d) Elementary knowledge of passage planning and execution.
Landfalls in thick and clear weather.
The selection of suitable anchorages, approaching anchorage and entering narrow waters.
The use of clearing marks, also horizontal and vertical danger angles.
Distance of sighting lights.
- (e) Finding the time and height of high and low water at Standard ports and at Secondary ports by tidal differences, using the Admiralty Tide Tables, Volumes I and II.
The use of tables and tide curves to find the time at which the tide reaches a specified height or the height of the tide at a given time and thence the approximate correction to be applied to soundings or to charted heights of shore objects.
The interpretation of a chart or plan; particularly the information given about buoys, lights, radio beacons and other navigational aids, depth and height contours, tidal streams and traffic lanes and separation zones.
Recognition of the coast and radar-responsive targets.
Chart corrections.
Depths and nature of the bottom. Use of soundings.

Class 4—Practical Navigation (3 hours written)

- (a) Practical problems on plane, Mercator, great circle and composite sailing.
- (b) The use of the traverse method to obtain the position of the ship at any time, given compass course, variation, deviation and the run recorded by log or calculated by time and estimated speed, allowing for the effects of wind and current, if any.
- (c) Finding the latitude by meridian altitude of a heavenly body, above or below the pole. The latitude by observation of Polaris.
- (d) From an observation of any heavenly body near or out of the meridian, finding the direction of the position line and a position through which it passes.
- (e) The use of star charts and tables for pre-computing the azimuth and altitude of heavenly bodies.
- (f) Obtaining a position by the use of position lines obtained from two or more observations with or without run.
- (g) Finding the true bearing of a heavenly body, the compass error and thence the deviation of the magnetic compass for the direction of the ship's head.
- (h) Determining the approximate time (to the nearest minute) of the meridian passage of a heavenly body and the rising and setting times of the sun and the moon.
- (i) Calculating an approximate altitude for setting on the sextant to obtain the meridian altitude of a heavenly body.

Class 4—Marine Environmental studies (3 hours written)

- (a) The principles of pressure measurement.
 - The use of standard datum.
 - Knowledge of the aneroid barometer and the barograph.
- (b) The principles of the thermometer, maximum and minimum thermometers.
 - Sea and air temperature observations and precautions to be taken.
 - The principle of the hygrometer, observation to obtain relative humidity.
 - Care and attention given to instruments.
- (c) The Beaufort wind scale. Methods of estimating direction and force of wind at sea.
- (d) Knowledge of the mean pressure distribution.
 - Daily and seasonal changes in atmospheric pressure.
 - Prevailing winds.
 - Local and regional effects of heating and cooling, land and sea breezes, monsoons.
 - Katabatic winds.
- (e) The characteristics of, and weather associated with, the principal pressure systems, e.g. anti-cyclones, depressions, permanent and semi-permanent high and low pressure areas.
 - Relationship between pressure distribution and wind.
 - Air masses and properties.
 - Buys Ballot's law.
- (f) Use of barometric observations at a single station in conjunction with weather signs.
- (g) Water vapour in the atmosphere, evaporation, condensation, precipitation, meaning of saturation, relative humidity, dewpoint, elementary knowledge of atmospheric stability and lapse rate, formation and classification of clouds, fog, mist and dew. Haze.
- (h) Knowledge of the area, volume and distribution of the oceans and their importance to meteorology.
 - Outline knowledge of bottom topography and the characteristics of sea water.
 - Outline knowledge of the effects of pollution on the marine environment.
- (i) Knowledge of types of weather messages promulgated by meteorological organisations for shipping.
 - Coding and de-coding messages by the use of the handbook *Weather Code for Ships* as published by the Weather Bureau.
 - Knowledge of the general structure of weather reporting, e.g. selected ships, weather ships, ship stations.

Class 4—Oral and practical**Part A**

- (a) A full knowledge of the content and application of the Collision Regulations.
- (b) Distress and pilot signals; penalties for misuse.
- (c) A proper knowledge of the principles of navigational watch-keeping at sea and anchor as laid down by IMO. Duties of the deck officer in port.

- (d) Knowledge of the contents and use of Department of Transport Merchant Shipping Notices, Admiralty Notices to Mariners and South African Navy Notices to Mariners.
- (e) IALA system of buoyage; wreck marking system.
- (f) Code of Safe Working Practices for the Safety of Merchant Seamen.
- (g) Responsibilities under international conventions for the prevention of pollution from ships.

PART B

- (a) Reading and understand a barometer,
thermometer,
hydrometer and hygrometer.
Instruments supplied by the Weather Bureau shall be taken as standard.
- (b) Using an azimuth mirror, pelorus or other instrument for taking bearings.
- (c) Using a sextant for taking vertical and horizontal angles; reading a sextant both on and off the arc.
- (d) Correcting a sextant into which has been introduced one or more of perpendicularity, side or index errors.
- (e) Finding the index error of a sextant.
- (f) Ascertaining the chronometer error.
- (g) Use, care and limitations of the magnetic and gyrocompass and associated equipment, including automatic pilot.
- (h) The rigging of ships, methods of ascertaining the proof and safe working loads of ropes, including synthetic fibre and wire ropes.

Candidates may also be questioned on the qualifying examination syllabus for the issue of an Efficient Deck Rating Certificate.

- (i) Stowage and securing of cargoes. Regulations and recommendations affecting their carriage.
- (j) Preparations for getting under way.
Duties prior to proceeding to sea, making harbour, entering a dock.
Berthing alongside quays,
jetties or other ships
and securing to buoys.
- (k) Helm orders.
Conning the ship.
Effects of propellers on the steering of a ship.
Stopping,
going astern,
manoeuvring in the vicinity of pilot vessels and other craft.
Picking up a pilot.
Turning short round.
Emergency manoeuvres.
Bringing a ship to single anchor in an emergency.
Man overboard.
- (l) Drills and musters.
Organisation of emergency parties.
- (m) Anchors, cables;
their use and stowage.
- (n) Elementary knowledge of ships' machinery.
Knowledge of the use of all deck appliances including emergency steering gear.
- (o) The use, care and maintenance of all life-saving and fire-fighting appliances, lights and sound-signalling apparatus.
- (p) Search and rescue procedures.
Candidates may also be questioned on the qualifying examination syllabus for the issue of a Proficiency in Survival Craft Certificate.
- (q) The examiner may ask the candidate questions arising out of the written work if this is deemed necessary on account of lack of knowledge shown by the candidate.

Class 4 – Communications (Oral and practical)

- (a) Sending and receiving signals—
 - (i) in Morse code by flash lamp up to six words per minute; and
 - (ii) using the International Code of Signals.
- (b) A working knowledge of the GMDSS (Global Maritime Distress and Safety System) and the equipment associated with search and rescue communications.

ANNEXURE I**DECK OFFICER CLASS 3 CERTIFICATE OF COMPETENCY: SYLLABUS****Class 3—Naval Architecture**

(Syllabus as for Class 4—Naval Architecture)

Class 3—Cargo Work and Shipping Practice

(Syllabus as for Class 4—Cargo Work and Shipping Practice)

Class 3—Chartwork

(Syllabus as for Class 4—Chartwork)

Class 3—Practical Navigation

(Syllabus as for Class 4—Practical Navigation)

Class 3—Marine Environmental Studies

(Syllabus as for Class 4—Marine Environmental Studies)

Class 3—Applied Science (3 hours written)

Candidates may be asked to demonstrate their understanding of physical principles by questions involving calculation without proof and by questions on the practical application of those principles, particularly in instruments or systems in use at sea.

Candidates shall be expected to show understanding and appreciation of physical principles rather than to produce formal, memorised descriptions or statements of laws and rules.

(a) HEAT

Measurement of temperature, thermometers, thermocouples. Transference of heat; conduction, convection, radiation.

Expansion of solids and liquids, co-efficients of expansion, specific heat, latent heat.

Properties of gases; Boyle's law, Charles's law. A simple treatment of isothermal and adiabatic expansion and compression of gases; principles of refrigeration.

(b) LIGHT

Laws of reflection; plane mirror.

Laws of refraction; index of refraction, total internal reflection.

Prisms, thin lenses, a graphical treatment of the formation of images by lenses.

(c) WAVE THEORY

Simple harmonic motion; wave motion, rolling of ships, superposition. Resonance.

Tides.

Damped and forced oscillation.

Sound:

Wave motion; frequency, velocity, wave length and their relationship.

Production and propagation of sound.

Effect of wind and temperature on the velocity of sound.

Factors influencing the velocity of sound in gases and liquids.

Reflection, echoes. Doppler effect.

(d) MAGNETISM

Theory of magnetism. Laws of magnetism.

Retentivity, hysteresis curves for ferromagnetic material.

Pole strength, field strength, magnetic moment and couple, deflection of magnetised needle.

Terrestrial magnetism and magnetic elements. Variation.

(e) ELECTRICITY

The nature of electric current; e.m.f., current, resistance, their effects and relationships, electrical potential.

Insulators and insulation, electric and magnetic fields associated with electric potential and currents.

Capacitance.

Heating effect of a current; power and its relationship to current and resistance.

The magnetic field caused by a current and the resulting effects.

The effect on a current-carrying conductor in a magnetic field.

Chemical effects; passage of current through a conducting solution.

Primary and secondary cells; batteries.

Alternating voltages and currents in outline; frequency phase relationship, peak instantaneous and r.m.s. values.

Simple a.c. and d.c. circuits.

Fuses and circuit-breaker devices.

The effect of open circuits, short circuits and leakage; the effects of dirt and moisture.

Principles of electric generators and motors.

Outline of shipboard power supplies. Emergency sources.

Safety precautions to be observed when handling electrical equipment, including spares carried on board.

(f) **PRINCIPLES OF RADIO**

Typical aerial systems, including their vertical and horizontal radiation patterns.

(g) **APPLIED CHEMISTRY**

Corrosion; action between dissimilar metals.

Combustion, induced and spontaneous. Flash and ignition temperatures. Explosive mixtures, chemical change due to overheating.

Fire-extinguishing; powder, foam, gas-powered water, inert gases.

(h) **STATICS**

Composition and resolution of forces.

Principle of moments. Stress, strain, shear forces and bending moments of simple supported beams with and without load.

Simple machines; wheel and axle systems, lever, screw-jack, pulley systems, mechanical advantage, velocity ratio, efficiency.

Pressure in liquids, pressure at a depth, thrust.

(i) **DYNAMICS**

Composition and resolution of velocities and acceleration. An understanding of Newton's laws of motion, motion under gravity, work, power, kinetic and potential energy, momentum, friction and coefficient of friction including simple illustrative calculations. Rotation.

Class 3—Principles of Navigation (3 hours written)

(a) The shape of the earth. Poles, equator, meridians, parallels of latitude.

Position by latitude and longitude.

Direction, bearing, distance, units of measurement.

Difference of latitude, difference of longitude, departure, mean latitude, difference of meridional parts and the relationship between them.

Great circles, great circle course and distance, small circles on a sphere.

(b) The celestial sphere; definitions of celestial sphere, apparent motion on the celestial sphere.

Declination. Azimuth. Sidereal hour angle.

The position of a body on the celestial sphere; azimuth with altitude or declination with sidereal or local hour angle.

The rising, culmination and setting of heavenly bodies.

(c) Solar system, earth-moon system, planetary motion.

Earth's rotation and movement in orbit, mean sun, ecliptic, first point of Aries.

Equinox and solstice, sunrise, sunset, twilight.

(d) Time; Greenwich and other standard time, zone time, mean time, apparent time, sidereal time, equation of time, relationship between longitude and time.

- (e) Local hour angle of a heavenly body in time and arc. Greenwich hour angle of sun, moon, planets and Aries.
- (f) Correction of sextant altitudes; dip, refraction, horizontal parallax, parallax in altitude, semi-diameter and augmentation.
- (g) Geographical position of a heavenly body. A circle of position and its application, i.e. position line. Intercept.
- (h) The uses and simple properties of Mercator and Gnomonic charts. Latitude and longitude scales; measurements of distance. Rhumb lines. Great circles and composite tracks.
- (i) The relationship between tides and the phases of the moon.

Class 3—Mathematics (3 hours written)

(a) ALGEBRA

Definitions and processes. Theory of indices. Simple equations, problems leading to simple equations. Development of formulae, transposition and evaluation. Fractions. Factors.

Simultaneous equations of the first order involving two or three unknowns, problems leading to simultaneous equations.

The solution of quadratic equations, problems leading to quadratic equations. Graphs. Axes of reference. Rectangular and polar co-ordinates. Construction and reading of statistical graphs and diagrams. Graphs of functions, linear, algebraic and trigonometric 0° – 360° , gradient, rate of change, maximum and minimum points. Ratio, proportion and variation, simple problems.

(b) COMMON LOGARITHMS

The use of logarithms to any base. Calculations involving multiplication and division by logarithms, powers and roots. Exponential equations.

(c) MENSURATION

Areas and perimeters of rectangle, triangle and circle, volume and surface area of wedge, pyramid, cylinder, sphere, cone and prismatic block and problems thereon.

(d) GEOMETRY

The construction of plane triangles. Congruence of triangles; similarity of triangles. The right-angled triangle. Angle-sum properties of triangles and polygons. Exterior angle property. Parallel lines and transversal. Properties of circles, chords and tangents. Angle in a semi-circle; angles subtended by any chord in a circle. Forces, resultant forces and their components. The use of vectors to indicate magnitude and direction; vector addition, use of vector triangle. Properties of the ellipse and hyperbola of navigational importance.

(e) TRIGONOMETRY

Measurement of angles. Circular measure. Trigonometrical ratios up to one revolution. Haversine. Relationship between ratios. Complementary and supplementary angles and their ratios. Simple identities and trigonometrical equations. Solution of right-angled and oblique plane triangles including practical problems of navigational significance.

(f) SPHERICAL TRIGONOMETRY

Properties of spherical triangles. Solution of oblique, right-angled and quadrantal spherical triangles.

Class 3—Oral and practical

(Syllabus as for Class 4—Oral and practical)

Class 3—Communications

(Syllabus as for Class 4—Communications)

ANNEXURE J

DECK OFFICER CLASS 2 CERTIFICATE OF COMPETENCY: SYLLABUS

Class 2—Navigation (3 hours written)

- (a) Approaching the coast under any circumstances.
- (b) Planning a coastal passage or entry into harbour. Verification of position. Selection of suitable anchorages.
- (c) Execution of a passage. Monitoring progress. Effect of constraints such as weather and tide, traffic and state of ship's equipment.

- (d) The use of sailing directions and other publications relevant to coastal navigation which are required to be carried by South African merchant ships, including Admiralty Tide Tables, Volumes 1 and 2.
- (e) Astronomical navigation as in paragraphs (c) to (i) of Practical Navigation—Class 4.
- (f) Problems on great circle and composite sailing.

Note: Questions shall be set in this paper requiring descriptive answers as well as work on the chart provided.

Class 2—Navigation Information Systems (3 hours written)

- (a) The use of aids to navigation, including radar, echo sounder and visual aids, in coastal navigation and pilotage, including the use of radar in collision avoidance.
- (b) Position fixing, fixed and variable errors; area of probability. Obtaining a position from two or more observations of any type, with or without run.
- (c) The use and understanding of aids to navigation, including radio and electronic aids which are installed in the majority of merchant ships. Questions shall be directed towards ensuring that candidates have a proper understanding of the essential principles and operation of these aids and can make full use of their capabilities while appreciating their limitations.

Note: A radar plot may be set in this paper.

Class 2—Marine Environmental Studies (3 hours written)

- (a) Air masses; general ideas on source regions, classification and properties. Structure of depressions, general distribution of weather in a depression. Fronts; the frontal theory of the formation of depressions, occlusions, occluded depressions, secondary depressions, families of depressions.
- (b) Adiabatic changes in the atmosphere. Dry, saturated and environmental lapse rates. Stability, instability and conditional instability. The development of thunderstorms.
- (c) Full knowledge of the development and decay of tropical revolving storms; their localities, names, seasons, tracks and associated weather; forecasting their probable movement. Navigation in the vicinity of and the rules for avoiding tropical storms. Reports to be made under international conventions.
- (d) Knowledge of the information available in the *Weather Codes for Ships* published by the Weather Bureau.
Use of a synoptic chart to deduce the weather at specified points and to forecast the probable changes over sea areas. Facsimile weather charts and their uses.
- (e) Principal ocean currents; their names and characteristics. Causes of ocean currents, general surface circulation of the oceans, direct and indirect effect of prevailing winds, gradient currents, seasonal changes in the general circulation. Up-welling and the consequences thereof.
- (f) The causes and characteristics of ocean waves, tsunamis, breakers and surf.
- (g) The main types of floating ice and their origins. General limits of ice in both hemispheres, seasonal development and recessions, movement of icebergs. Navigation in the vicinity of ice. Reports to be made under international conventions.
- (h) An outline knowledge of the major marine resources and the exploitation thereof.
An outline knowledge of the common fishing areas and common fishing methods.

Class 2—Cargo Work and Shipping Practice (3 hours written)

- (a) Organisation and training of crew both for routine and emergency duties. Damage control and fire-fighting plans; emergency station lists. Safety of personnel during normal operational duties.
A knowledge of the Maritime Occupational Safety Regulations and their associated codes of practice.
- (b) Preparation for safety equipment, safety construction, load line and classification surveys; knowledge of the significance of the certificates issued.
- (c) Inspection and maintenance of the ship and her equipment, including the purpose, use and operation of a planned maintenance system. General repairs, preparation of repair lists. Dry-docking routine. Properties and uses of paints, resins and other protective coverings.
- (d) General principles of the stowage and handling of all types of cargo, in greater depth than is required at the lower grades, including preparations for their carriage and care in transit. Calculations relating to stowage (both of dry and liquid cargoes) and to the use of cargo gear.
- (e) Knowledge of the regulations relating to the carriage and handling of cargo, including a general knowledge of dangerous cargoes. International codes of practice. Medical first-aid guide for use in accidents involving dangerous goods.

- (f) Ballasting. Tank cleaning and gas-freeing. Bilge and ballast line systems. Piping arrangements in bulk liquid carriers. Working knowledge of the contents and application of current relevant tanker safety guides. Terms and definitions used to describe properties of common oil cargoes, such as crude oil, middle distillates and naphtha. Load-on-top procedures. Pollution Prevention Regulations.
- (g) Methods of loading and stowing items of cargo requiring special handling arrangements. The use of yo-yo gear. Rigging swinging derricks.
- (h) Lashing and securing of cargo including deck cargo. Provision of safe access. Gangways across deck cargo. Knowledge of the Merchant Shipping Loading, Unloading and Coaling Regulations, including the periodic testing of cargo handling equipment. Machinery register.
- (i) The handling of heavy weights with special reference to type and strength of gear used.
- (j) Knowledge of the requirements of the Load Line Rules as they affect the working of the ship; the significance of the various zones and seasonal areas; preparation for annual survey.
- (k) The ability to calculate the maximum amount of cargo to be loaded, either by mass or volume.

Class 2—Naval Architecture (3 hours written)

- (a) A more extensive knowledge of the fundamentals of ship construction than is required in Naval Architecture—Class 4. Midship sections of single deck and 'tween deck ships, including bulk carriers, container ships and specialised carriers. Functions, constructions and stiffening of watertight bulkheads, including collision bulkheads. Structure at the stern. Construction, stiffening and closing arrangements of hatchways and superstructures, tank openings, watertight and hull doors. Stern tubes.
- (b) General ideas of welding processes in construction and repair work, types of weld, common faults, visual examination of welded work. Testing of tanks and other watertight work. Methods of corrosion control.
- (c) Modern methods of determining the effect of different conditions of loading and ballasting on the ship's structure. Methods of compensating for discontinuity of strength, local and special stiffening.
- (d) Shear forces and bending moments. Stresses produced by shear and bending. Producing simple curves of load, shear force and bending moments.
- (e) Determination of the position of the centre of gravity of a ship for different conditions of loading and ballasting. The effect on the position of the centre of gravity of adding, removing, shifting or suspending weights. Determining the virtual rise in the position of the centre of gravity due to slack tanks. Transverse and longitudinal metacentres, metacentric height. Initial stability and its limitation to small angles of inclination. Changes in stability during a voyage. Effect of a shift of cargo or solid ballast. Stiff and tender ships.
- (f) Calculation of trim and draught due to loading, discharging and shifting weights. Effect of list and trim on stability. Stability and trim when dry-docking.
- (g) Use of stability, hydrostatic and stress data supplied to ships. An understanding of the factors affecting the shape of a curve of statical stability and the significance of the area under the curve, including its calculation. Use of stability data. Grain shift moments.
- (h) The use of Simpson's rules in the computation of areas, volumes and centroids.
- (i) Resistance and propulsion: Comparison of skin frictional resistance of hull with model at different speeds, $R_f = f.s.v.^n$ and residual resistance.

Admiralty and fuel coefficients. Relation between speed of vessel and fuel consumption with constant displacement and assuming that resistance varies as (speed)ⁿ. Elementary treatment of propeller and simple problems on pitch, pitch ratio, apparent slip, real slip, wake, thrust and power.

Class 2—Business and Law (3 hours written)

This paper covers aspects of a Chief Officer's commercial duties not examined elsewhere, and includes sufficient introduction to Shipmaster's Business and Maritime Law to enable the Chief Officer to take temporary command of the vessel in the event of the Master's incapacity or death.

(a) A knowledge of:

- (i) The action to be taken on assuming command;
- (ii) the certificate of registry and its legal significance;
- (iii) certificates and other documents required to be carried on board by South African legislation or by international conventions;
- (iv) arrival and departure procedures;
- (v) the official log book and entries to be made therein; and
- (vi) current legislation as it affects the day-to-day operation of merchant ships, with specific reference to Chapter 4 of the Merchant Shipping Act.

- (b) Documentation of cargo, including mate's receipts, bills of lading, dangerous goods list, waybills, cargo plans, manifests and charter parties.
- (c) The Master's duties and obligations with respect to—
 - (i) stranding, collision or other casualty;
 - (ii) the reporting of dangers to navigation;
 - (iii) traffic separation schemes; and
 - (iv) navigation in port areas.
- (d) Crew accommodation. Hygiene of the ship and welfare of the crew. Inspection and reports. Procedures in cases of illness or accident. The nature and source of medical assistance available to a ship at sea. Fumigation and pest control. South African and International Health Regulations.
- (e) The prevention of pollution and the keeping of records.
- (f) A knowledge of personnel management, organisation and training aboard ships.
- (g) An introduction to international maritime law as embodied in international agreements and conventions as they affect the specific obligations and responsibilities of the master, particularly those concerning safety and the protection of the marine environment.

Class 2—Oral and practical

Part A

- (a) Full knowledge of the content and application of the Collision Regulations.
- (b) Proper knowledge of the principles of navigational watch-keeping at sea and anchor as laid down by IMO.
- (c) Knowledge of the contents and use of British "M" notices.
- (d) IALA system of buoyage; wreck-marking system.
- (e) Knowledge of the regulations concerning life-saving and fire-fighting appliances.
- (f) A thorough knowledge of search and rescue procedures.

Part B

- (a) The use and care of all deck and above-deck appliances and fittings, including winches, capstans, windlasses, davits, fairleads, emergency steering gear and fittings used between anchor and cable locker.
- (b) Anchors; different types of anchors and their advantages and disadvantages.
 - Cables and their care.
 - Preparation for anchoring.
 - Operation of anchoring with a single anchor and use of a second anchor. Clearing a foul anchor and hawse.
 - Anchoring in a tideway and in confined water. Mooring.
 - Hanging off an anchor.
 - Breaking and slipping cables.
 - Getting under way. Carrying out an anchor with boats.
- (c) Effect of current, wind, shallows and draughts on manoeuvring.
 - Manoeuvring in rivers and harbours. Berthing alongside and leaving quays and oil terminals with or without the use of tugs.
- (d) Management of ships in heavy weather. Means to employ to keep a disabled or unmanageable ship out of the trough of the sea and to lessen the lee drift. Handling a disabled ship. Extra precautions to be taken before the onset of heavy weather.
- (e) Precautions when beaching a ship. Action to be taken prior to and after grounding. Floating a grounded ship, with and without assistance.
 - Action to be taken following a collision.
 - Temporary plugging of leaks.
 - Measures for the protection and safety of passengers and crew in emergencies.
 - Limiting damage and salvaging the ship following a fire or explosion.
 - Abandoning ship.

Emergency steering, rigging and use of jury steering and the means of rigging a jury rudder, where practicable.

Rescuing persons from a ship in distress or from a wreck.

Man-overboard procedures.

Methods of dealing with fire on board ship. The organisation and direction of fire-fighting, lifeboat and life-raft preparation parties.

- (f) Preparation for drydocking and undocking. Use of shores, bilge blocks and bilge shores.
- (g) Measures to be taken to prevent the spillage of oil during cargo work, bunkering or oil transfer.
- (h) The practical use of the plans, drawings and data supplied to a ship, e.g. rigging plan, general arrangement, displacement plan, safety plan, hydrostatic and manoeuvring data.
- (i) The examiner may ask the candidate questions arising out of the written work if this is deemed necessary on account of lack of knowledge shown by the candidate.

Class 2—Communications (Oral and practical)

- (a) Sending and receive signals—
 - (i) in Morse code by flash lamp up to six words per minute; and
 - (ii) using the International Code of Signals.
- (b) A greater depth of knowledge than is required for Class 4—Communications in respect of equipment associated with GMDSS (Global Maritime Distress and Safety System) and the equipment associated with search and rescue communications.

ANNEXURE K

DECK OFFICER CLASS 1 (MASTER MARINER) CERTIFICATE OF COMPETENCY: SYLLABUS

Class 1—Business and Law (3 hours written)

The legal knowledge required shall not go beyond an understanding of the international conventions, Acts, Government regulations and codes of practice applicable to shipping and the mercantile law which a shipmaster must know in order to conduct the business of a ship.

- (a) Registration of ships. The certificate of registry and its legal significance.
- (b) Certificates and other documents or publications required to be carried aboard ship; their use, how they are obtained, and (if appropriate) the period of their validity.
- (c) A comprehensive knowledge of Chapter 4 of the Merchant Shipping Act.
- (d) The official log book and the law relating to entries. Entries and reports in respect of freeboard, draught and allowances. Offences relating to misconduct, to endangering the ship and against persons on board. Discipline and treatment of disciplinary offences. Civil liability for certain offences.
- (e) Customs house procedure for entering and clearing ship. Function of ships' agents.
- (f) The safety of the ship, crew and passengers. Assistance of vessels in distress. Duties in the case of stranding, collision or other casualty. Towage and salvage.
- (g) The law relating to navigation, including the prevention of collisions.
The reporting of dangers to navigation, and marine casualties. Compulsory and non-compulsory pilotage. Constitution and powers of courts of marine enquiry, and of courts of survey.
- (h) An understanding of the general principles of the law of contract.
 - (i) General knowledge of shipping practice and documents with particular reference to charter parties, bills of lading and waybills. An understanding of the clauses in a contract of affreightment. Lay-days, demurrage and despatch (including calculations). The law relating to the carriage of cargo, and the shipowner's liabilities and responsibilities. Protests, cargo surveys, certificates of seaworthiness.
 - (j) Outline knowledge of the expressed and implied conditions and statutory terms contained in a contract of marine insurance. Particular average, general average. Procedure at a port of refuge. Lloyd's agents. Protection and indemnity clubs.
- (k) Background knowledge of South African and international organisations concerned with shipping. Safety conventions and national legislation.

Class 1 – Navigation

The examination will take the form of two papers, Paper A and Paper B.

Paper A, which is a practical passage planning exercise, will be of 4 hours' duration. It is expected that the candidate will use the first hour to appraise the project from the information supplied.

Paper B, which is a written paper of 3 hours' duration, will cover several questions on navigation and related subjects.

Questions may be asked on any aspect of navigation covered in the lower grades, including matters pertinent to navigation covered in other subjects.

Candidates shall be required to show a full understanding of the techniques involved and must be fully able to relate the various aspects one to another, and to show their ability to make full use of all the navigational and meteorological information which is available to a ship's Master, including his own observations.

Paper A

- (a) Voyage planning; the selection of ocean routes. Principles of weather routing, use of prognostic surface weather and wave charts. Use of current atlases and other charts and navigational publications relevant to ocean navigation.
- (b) Planning and executing a coastal passage. Approaching the coast. Approaching and entering harbour.
- (c) Navigation in pilotage waters, whether with or without a pilot on board.
- (d) Approaching and passing through traffic separation schemes and adjacent areas.

Paper B

- (a) The optimum course and speed for two ships wishing to rendezvous for any purpose.
- (b) Search and rescue procedures.
- (c) Navigational procedures when approaching off-shore installations, and when working with helicopters or small craft.
- (d) Navigation in extreme weather conditions.
- (e) The interpretation and use of navigational and meteorological information.
- (f) The interpretation and use of information from navigational aids, including the use of radar in collision avoidance.
- (g) Advantages and disadvantages of various navigation systems and methods; considerations underlying the choice of navigational systems for differing trades and geographical regions.

Class 1 – Naval Architecture (3 hours written)

- (a) Types of ships. General ideas on strength and construction in relation to particular trades, including specialised carriers. The use of special steels, aluminium and fire-resistant materials in ship construction. Principles of damage control. Arrangements for restricting the spread of fire in superstructures.
- (b) A working knowledge of:
 - Classification of ships;
 - periodic surveys for retention of class;
 - tonnage certificates and their purpose;
 - requirements of the Load Line Rules, period and conditions of validity of certificate, an understanding of those aspects of the conditions of assignment which affect the stability and seaworthiness of a ship. Construction regulations contained in SOLAS 74 and the surveys required thereunder.
- (c) Permeability of a compartment. The effect of bilging and flooding (end or midships compartment, on or off the centre-line).
- (d) A more comprehensive knowledge of stability than is required for Naval Architecture—Class 2 and, in addition: Stability to moderate and large angles of heel; assessment of dynamic stability from GZ curve; angle of loll; shifting or adding weights with zero GM; effect of wind and wave excitation.
- (e) Ship stability at sea.
 - Dangers to a ship with a heavy list. Precautions when righting. Deck cargoes, homogeneous cargo and cargo liable to shift. Ballasting for stability consideration. The effect of beam and free board on stability.
- (f) The inclining experiment. A comprehensive knowledge of the hydrostatic, stability and stress data supplied to ships.
- (g) Shallow water effect. Ship-to-ship and ship-to-shore interaction. The turning circle. Angle of heel when turning; effect on stability.
- (h) A more detailed knowledge than is required for Class 2 of bending stresses in the ballast and loaded conditions at sea. Torsional stress.

Class 1—Engineering and Control Systems (3 hours written)

- (a) The meaning of marine engineering terms in common use.
- (b) A general knowledge of diesel and turbine machinery, marine boilers, generators, pumps, condensers and evaporators. Transmission of main engine power. Steering systems, Manoeuvring procedures.
- (c) An understanding of marine applications of the properties of gases. Systems for the carriage of refrigerated cargoes and of liquefied gases.
- (d) General principles of remote control systems. Types of controller and the methods used in connection with pneumatic, electrical and hydraulic control systems for main engine, pumps and valves. Information systems and displays; data logging, associated alarm and fail-safe systems. Bridge control of main engines. Bow thrust units and other manoeuvring aids not covered in the syllabus for Class 1—Navigation Instrumentation. Tank and draught gauges. Stabilisers.
- (e) Fire-detection and extinction systems and procedures; general principles and practical application; capabilities and limitations of the various systems.
- (f) Pollution: The provision and operation of equipment to comply with the MARPOL Convention.

Class 1—Navigation Instrumentation (3 hours written)

- (a) The use and understanding of aids to navigation, including all those radio and electronic aids which are installed in a high proportion of merchant ships. Questions will be directed towards ensuring that candidates have a proper understanding of the essential principles and operation of these aids and can make full use of their capabilities while appreciating their limitations.
- (b) The effects of systematic and random errors in position fixing by any method.
- (c) The construction, siting, care and maintenance of the magnetic compass and associated equipment. Causes of deviation, the production of a table of deviations. Co-efficients A, B, C, D and E. The evaluation of the approximate co-efficients from given data and their relationship with the deviation. An appreciation, without calculations, of the effects of permanent magnetism and induced magnetism. Principles of compass adjustment and methods of adjustment. Heeling error, Gaussin error and retentive error. The effect of change of latitude on the deviation.
- (d) Principles of the gyro compass. Errors associated with the gyro compass, including latitude, course and speed error and correction; ballistic deflection and its relation to change of speed error; rolling error and how it is minimised. The principal parts of a gyro compass; fundamental differences in the construction and operation of the better-known gyro compasses.
- (e) Principles of operation and use of gyro and transmitting magnetic compasses, repeater systems, automatic pilot, projector compasses, rate of turn indicators.
- (f) Principle and practical application of echo sounding devices, logs and speed indicators.
- (g) An outline knowledge of the theory applicable to satellite orbits, types of orbits and satellites in maritime applications.
- (h) An outline knowledge of recent developments in navigation aids.

Class 1—Oral and practical

- (a) Exceptional circumstances.
 - (i) Loss of rudder and/or propeller. Jury steering arrangement.
 - Action to be taken following collision sustaining damage of any kind.
 - Action to be taken on grounding—methods of refloating, surveys subsequent to refloating. Beaching a ship.
 - (ii) Steps to be taken when disabled and in distress.
 - Preservation of passengers and crew in the event of wreck.
 - Abandoning ship; survival procedure.
 - Abandoning a wrecked ship.
 - Communications with the shore.
 - (iii) Assisting a ship, boat or aircraft in distress.
 - The use of direction finding for homing on to a casualty.
 - Rescuing the passengers and crew of a disabled ship, boat or ditched aircraft. The launching of rescue boats.

- (iv) Bad weather manoeuvres. Use of oil.
 - Precautions at anchor and at sea.
 - Anchoring and working anchors and cables in all circumstances.
 - Approaching rivers and harbours and manoeuvring therein.
 - Approaching off-shore loading points under open sea conditions.
- (v) Towing and being towed.
- (vi) Navigation in the vicinity of ice.
- (vii) Drydocking. Bilge blocks.
 - General procedure and precautions to be observed.
 - Distribution of mass.
 - Drydocking with full cargo for inspection of propellers and shafting.
 - Leaving a ship waterborne.
- (viii) Putting into port with damage to ship and/or cargo both from business and technical points of view.
- (ix) Safeguarding of cargo.
- (x) Prevention of fire at sea and in port.
 - Methods used to prevent the spread of fire.
 - Action to be taken to prevent the spread of fire.
 - Full knowledge of the use of fire appliances and the precautions to be taken in their use.
- (b) Methods of pest control; fumigation of holds and living spaces; safeguards in applying various methods.
- (c) Compensation and adjustment of compasses; candidates may be questioned on the practical adjustment of the magnetic compass using a ship's binnacle and compass.
- (d) Bridge procedures at sea, in harbour, and while berthing or anchoring.
- (e) Collision Regulations and other items specified in Part A of the syllabus for Class 2—Oral and Practical.
- (f) Port radio information services. Knowledge of the types of service available to aid vessels entering ports and berthing as indicated in Admiralty List of Radio Signals, *Port Operations and Vessel Traffic Management and Information Services*.
- (g) The examiner may ask the candidate questions arising out of the written work if this is deemed necessary on account of lack of knowledge shown by the candidate.

ANNEXURE L

MASTER (LIMITED TRADE) ENDORSEMENT: SYLLABUS

Master (Limited Trade) endorsement—Naval Architecture (3 hours written)

- (a) A more comprehensive knowledge of the fundamentals of ship construction than is required in Naval Architecture—Class 4.
- (b) Stresses and strains in a seaway or due to loading and ballasting. A knowledge of the parts of a ship that are specially strengthened to withstand such stresses. Methods of compensating for discontinuity of strength. Testing of tanks and other watertight work. Methods of corrosion control.
- (c) Use of stability and hydrostatic data supplied to ships. Initial stability and its limitation to small angles of heel.
 - An understanding of the factors affecting the shape of a curve of statical stability and the significance of the area under the curve.
 - Computation of areas and volumes by Simpson's first and second rules.
- (d) Determination of the centre of gravity of a ship for different conditions of loading and ballasting.
 - The effect on the position of the centre of gravity of adding, removing, shifting or suspending weights.
- (e) Transverse metacentre, metacentric height. Free surface of liquids and its effect on stability with particular reference to the subdivision of tanks.
- (f) Calculation of draught and trim due to loading, discharging or shifting weights (MCTC and CF given).
- (g) Changes in stability during a voyage, including the effect of a shift of cargo or solid ballast.
- (h) Load line; an understanding of those aspects of the conditions of assignment which affect the stability and seaworthiness of a ship.

Master (Limited Trade) endorsement—Business and Law (3 hours written)

- (a) A knowledge of:
 - (i) The action to be taken on assuming command.
 - (ii) The certificate of registry and its legal significance.
 - (iii) Certificates required to be carried by South African ships.
Procedure for obtaining certificates, including periodical surveys and inspections and periods of validity.
 - (iv) The official log book and entries to be made therein.
- (b) Engagement and discharge of crews. Manning scales. Agreement with crew. Discipline and the treatment of disciplinary offences.
- (c) Customs house procedure for entering or clearing a South African ship.
- (d) Documentation of cargo, including mate's receipt, bills of lading, dangerous cargo lists, waybills, manifests, charter parties and cargo plans.
- (e) The safety of the ship, crew and passengers. Assistance to vessels in distress. Duties in the case of stranding, collision or other casualty. Salvage.
- (f) The law relating to the reporting of dangers to navigation.
- (g) Pollution; the Master's duties, obligations and liabilities, including the keeping of records.
- (h) An outline knowledge of the Master's obligations with respect to marine insurance and the contract of carriage of goods by sea. Protest, cargo surveys, certificates of seaworthiness. General average.
- (i) An outline knowledge of the Master's obligations with respect to pilotage.
- (j) South African and international health regulations. Medical assistance available to a ship at sea.
- (k) A knowledge of the Maritime Occupational Safety Regulations and their associated codes of practice.
- (l) Constitution and powers of courts of marine enquiry and courts of survey.

Master (Limited Trade) endorsement—Magnetic and Gyro Compasses and Navigational Aids (3 hours written)

- (a) The earth's magnetic field, poles and equator. The earth's total magnetic force, angle of dip, horizontal and vertical components. Variation.
- (b) Deviation, its cause and effect. An understanding of the effect of semi-permanent and induced magnetic fields on the deviation of the compass. The means used to compensate for these effects.
- (c) Siting of magnetic compasses with reference to proximity of magnetic material and electrical appliances. Precautions to be taken with electric wiring in vicinity of the compass.
- (d) Finding the magnetic bearing of a distant object from compass bearings taken on equidistant headings and constructing a table of deviations.
- (e) The principle of the free gyroscope.
Tilt and drift.
Precession. Control and damping. Correction for latitude, course and speed error.
Care and maintenance of different types of compasses.
- (f) The practical application of electronic and radio aids to navigation.
Appreciation and interpretation of data.
Position fixing; fixed and variable errors, area of probability. The use of radar as an aid to collision avoidance.
- (g) The use of navigational publications and information commonly supplied or available to ships.

Master (Limited Trade) endorsement—Ship-board Operations (3 hours written)

- (a) Organisation and training of crew both for routine and emergency duties. Damage control and fire-fighting plans; emergency station lists. Safety of personnel during normal operational duties. The Code of Safe Working Practices for the Safety of Merchant Seamen.
- (b) Inspection and maintenance of the ship and her equipment, including the purpose, use and operation of a planned maintenance system. General repairs, preparation of repair lists. Dry-docking routine. Properties and uses of paints, resins and other protective coverings.

- (c) General principles of the stowage and handling of all types of cargo, including preparations for their carriage and care in transit. Calculations relating to stowage (both of dry and liquid cargoes) and to the use of cargo gear.
- (d) Ballasting. Tank cleaning and gas-freeing. Bilge and ballast line systems. Piping arrangements in bulk liquid carriers.
- (e) Knowledge of the regulations relating to the carriage and handling of cargo, including a general knowledge of dangerous cargoes. The international codes of practice. Medical first-aid guide for use in accidents involving dangerous goods.
- (f) A knowledge of the requirements of the Load Line Rules as they affect the working of the ship; the significance of the various zones and seasonal areas. The ability to calculate the maximum amount of cargo to be loaded, either by mass or volume.
- (g) Methods of loading and stowing items of cargo requiring special handling arrangements. The use of yo-yo gear. Rigging swinging derricks. Lashing and securing of cargo including deck cargo. Provision of safe access. Gangways across deck cargo. A knowledge of the Merchant Shipping Loading, Unloading and Coaling Regulations including the periodic testing of cargo handling equipment. Machinery register.
- (h) Preparation for safety equipment, safety construction, load line and classification surveys; a knowledge of the significance of the certificates issued.

Master (Limited Trade) endorsement—Oral and practical

Part A

- (a) A full knowledge of the content and application of the Collision Regulations.
- (b) Distress and pilot signals; penalties for misuse.
- (c) A proper knowledge of the principles of navigational watch-keeping at sea and anchor as laid down by IMO.
- (d) A knowledge of the contents and use of Department of Transport Merchant Shipping Notices, Admiralty Notices to Mariners and SAN Notices to Mariners.
- (e) IALA system of buoyage; wreck-marking system.
- (f) Knowledge of the regulations concerning life-saving and fire-fighting appliances.
- (g) Knowledge of the Safety of Navigation Regulations.
- (h) Knowledge of the types of service available in the Admiralty List of Radio Signals *Port Operations and Vessel Traffic Management Information Services*.

Part B

- (a) The use and care of deck and above-deck appliances and fittings including winches, capstans, windlasses, davits, fairleads, emergency steering gear and fittings used between anchor and cable locker.
- (b)
 - (i) Effect of current, wind, shallows and draught on manoeuvring. Manoeuvring in rivers and harbours. Berthing alongside and leaving quays and oil terminals with or without the use of tugs.
 - (ii) Anchoring and working anchors and cables in all circumstances.
 - (iii) Management of ships in heavy weather.
 - (iv) Towing and being towed.
 - (v) Handling a disabled ship.
 - (vi) Extra precautions to be taken before the onset of heavy weather.
 - (vii) Use of oil.
- (c)
 - (i) Thorough knowledge of search and rescue procedures.
 - The use of direction finding for homing on to a casualty.
 - Assisting a ship, boat or aircraft in distress.
 - Rescuing the passengers and crew of a disabled ship, boat or ditched aircraft.
 - (ii) Action to be taken when disabled and in distress.
 - Abandoning ship; survival procedures.
 - Communications with the shore.
 - Preservation of passengers and crew in the event of wreck.

- (d) (i) Measures to be taken following accidental damage, including collision, grounding, heavy weather damage and leaks.
Beaching a ship.
- (ii) Methods of dealing with fire on board ship. Prevention of fire at sea and in port.
The organisation and direction of fire-fighting and lifeboat and life-raft preparation parties.
Action to be taken to prevent the spread of fire.
- (e) (i) Preparation for drydocking and undocking. Use of shores, bilge blocks and bilge shores. General procedure and precautions to be observed.
- (ii) Measures to be taken to prevent the spillage of oil during cargo work, bunkering or oil transfer.
- (f) Routine inspection of living quarters and store-rooms.
Knowledge of personnel management, organisation and training aboard ships.
Complaints procedure.
- (g) The examiner may ask the candidate questions arising out of the written work if this is deemed necessary on account of lack of knowledge shown by the candidate.

ANNEXURE M

MASTER (SHORT SEA TRADE) AND MASTER (PORT OPERATION) ENDORSEMENTS: SYLLABUS

Master (Short Sea Trade) and Master (Port Operation) endorsement—Naval Architecture (3 hours written)

This syllabus is designed to cover only those aspects of ship stability which are of a practical nature and within the control of the Master.

- (a) Use of stability and hydrostatic data supplied to ships, including stability data in simplified form. Initial stability and its limitation to small angles of heel. An understanding of the factors affecting the shape of a curve of statical stability and the significance of the area under the curve.
- (b) Determination of the centre of gravity of a ship for different conditions of loading and ballasting. The effect on the position of the centre of gravity of adding, removing, shifting or suspending weights.
- (c) Transverse metacentre, metacentric height. Free surface of liquids (without proof or calculation) and their effect on stability.
- (d) Calculation of draught and trim due to loading, discharging or shifting weights (MCTC and CF given).
- (e) Changes in stability during a voyage, including the effect of a shift of cargo or solid ballast.
- (f) Load line; an understanding of those aspects of the conditions of assignment which affect the stability and seaworthiness of a ship.

Master (Short Sea Trade) and Master (Port Operation) endorsement—Magnetic Compass and Navigational Aids (3 hours written)

- (a) The earth's magnetic field, poles and equator. The earth's total magnetic force, angle of dip, horizontal and vertical components. Variation.
- (b) Deviation. Elementary ideas of the effect of hard iron, vertical and horizontal soft iron on the compass. The means used to compensate for these effects with special reference to short sea trade ships. Siting of magnetic compasses with reference to proximity of magnetic material and electrical appliances. Precautions to be taken with electric wiring in vicinity of the compass.
- (c) Finding the magnetic bearing of a distant object from compass bearings taken on equidistant headings and constructing a table of deviations.
- (d) The practical application of electronic and radio aids to navigation. Appreciation and interpretation of data. Position fixing; fixed and variable errors, area of probability. The use of radar as an aid to collision avoidance.
- (e) The use of navigational publications and information commonly supplied or available to ships.

Master (Short Sea Trade) and Master (Port Operation) endorsement—Business and Law (Oral)

During the course of this examination the examiner may require certain questions to be answered in writing by the candidate. Such written questions shall be restricted to those deemed necessary to establish the competence of the candidate in this subject and shall not detract from the basically oral nature of the examination.

- (a) The certificate of registry and its legal significance.

- (b) Certificates required to be carried by South African ships. Procedure for obtaining certificates, including periodical surveys and inspections and periods of validity.
- (c) Engagement and discharge of crews. Manning scales. Agreement with crew. Discipline and treatment of disciplinary offences.
- (d) The official log book and the law relating to entries. Reports to be made in the event of injury to or death of crew or other personnel on board ship.
- (e) Customs house procedure for entering or clearing a South African ship.
- (f) Load-line marks. Entries and reports in respect of freeboard, draught and allowances.
- (g) The safety of the ship, crew and passengers. Assistance to vessels in distress. Duties in the case of stranding, collision or other casualty. Salvage.
- (h) The law relating to the reporting of dangers to navigation.
 - (i) Pollution: The Master's duties, obligations and liabilities, including the keeping of records.
 - (j) South African health regulations. Medical assistance available to a ship at sea.
- (k) An outline knowledge of the Master's obligations with respect to marine insurance and the contract of carriage of goods by sea. Protests, cargo surveys, certificates of seaworthiness.
- (l) An outline knowledge of the Master's obligations with respect to pilotage.

Master (Short Sea Trade) and Master (Port Operation) endorsement—Oral and Practical

Part A

- (a) A full knowledge of the content and application of the Collision Regulations.
- (b) Distress and pilot signals; penalties for misuse.
- (c) Proper knowledge of the principles of navigational watch-keeping at sea and anchor as laid down by IMO.
- (d) Knowledge of the contents and use of Department of Transport Merchant Shipping Notices, Admiralty Notices to Mariners and SAN Notices to Mariners.
- (e) IALA system of buoyage; wreck-marking system.
- (f) An outline knowledge of the regulations concerning life-saving and fire-fighting appliances and the Safety of Navigation Regulations.
- (g) Knowledge of the types of service available in the Admiralty List of Radio Signals *Port Operations and Vessel Traffic Management Information Services*.

Part B

- (a) The use and care of all deck and above deck appliances and fittings including winches, capstans, windlasses, davits, fairleads, emergency steering gear and fittings used between anchor and cable locker.
- (b)
 - (i) Effect of current, wind, shallows and draught on manoeuvring. Manoeuvring in rivers and harbours. Berthing alongside and leaving quays and oil terminals with or without the use of tugs.
 - (ii) Anchoring and working anchors and cables in all circumstances.
 - (iii) Management of ships in heavy weather, handling a disabled ship. Extra precautions to be taken before the onset of heavy weather. Use of oil.
 - (iv) Towing and being towed.
- (c) A thorough knowledge of search and rescue procedures. The use of direction finding for homing on to a casualty. Assisting a ship, boat or aircraft in distress. Rescuing the passengers and crew of a disabled ship, boat or ditched aircraft.
- (d)
 - (i) An outline knowledge of the regulations concerning life-saving and fire-fighting appliances.
 - (ii) Measures to be taken following accidental damage, including collision, grounding, heavy weather damage and leaks.
Beaching a ship.
 - (iii) Methods of dealing with fire on board ship. Prevention of fire at sea and in port. The organisation and direction of fire-fighting, lifeboat and life-raft preparation parties. Action to be taken to prevent the spread of fire.
- (e)
 - (i) Preparation for drydocking and undocking. Use of shores, bilge blocks and bilge shores. General procedures and precautions to be observed.
 - (ii) Measures to be taken to prevent the spillage of oil during cargo work, bunkering or oil transfer.

- (f) Routine inspection of living quarters and store rooms. A knowledge of personnel management, organisation and training aboard ship. Complaints procedure.
- (g) A knowledge of the Master's responsibilities as laid down in the Maritime Occupational Safety Regulations. A general knowledge of Code of Safe Working Practices for the Safety of Merchant Seamen. Pilot ladder rules.
- (h) The examiner may ask the candidate questions arising out of the written work if this is deemed necessary on account of lack of knowledge shown by the candidate.

ANNEXURE N

SYMBOLS AND ABBREVIATIONS

1. The symbols, abbreviations and conventions used in the examinations shall follow the SI system.
2. The following abbreviations shall be used:

(a) *Navigation and chartwork*

- (i) CP The chosen position is that position nearest to the observer chosen so that the altitude is an integral degree and the longitude is such that the local hour angle of the body at the time of observation is also an integral degree.
- DR The dead reckoning position is that obtained by allowing for courses steered and distances run only.
- EP The estimated position is that obtained by allowing for courses and distances and for leeway and current if any.

Sext alt: The sextant altitude is that read off a sextant.

- (ii) az azimuth
- C compass
- Co course
- Chron chronometer
- CPA closest point of approach
- tcpa time to closest point of approach
- HE height of eye
- IE index error
- LL lower limb
- M magnetic
- P/L position line
- T true
- UL upper limb

(b) *Stability and general ship knowledge*

- AP after perpendicular
- BP between perpendiculars
- FP forward perpendicular
- FWA fresh water allowance
- KB height of centre of buoyancy above the keel
- KN righting lever about keel
- MCTC moment to change trim 1 cm
- GZ righting lever about centre of gravity
- GM metacentric height
- KM height of metacentre above keel
- KG height of centre of gravity (vessel) above keel
- LCB longitudinal centre of buoyancy
- LCF longitudinal centre of flotation
- LOG longitudinal centre of gravity
- TPC tonne per centimetre immersion

- DWA dock water allowance
- BML longitudinal metacentric radius
- BMT transverse metacentric radius

(c) *Magnetism and compass*

- Hf Horizontal component of earth's magnetic field
- Z Vertical component of earth's magnetic field

ANNEXURE O

CERTIFICATE OF COMPETENCY AS MASTER SPECIAL GRADE

OBJECTIVES AND SYLLABUS

Objectives

The examination leading to the issue of a Master Special Grade certificate is voluntary and is intended for those officers who aspire to senior positions in the shipping industry, in Government service, and in nautical education where a sound knowledge of professional subjects, taken to a greater depth than for Class 1: Master Mariner, is in many cases an essential requirement. To ensure that candidates are adequately prepared not only to present themselves for examination but also for the positions they will eventually reach as holders of Master Special Grade certificates, their attendance at an approved Master Special Grade course shall be a requirement. Completion of field work in certain subjects and actual or hypothetical casework in other shall be a feature of the course, to complement the final examination by providing an appreciation of the practical application of studies undertaken. Exemption from course attendance may be granted generally and individually in certain cases to those who have already completed/enrolled for a part of a Master Special Grade examination before the date of publication of these regulations.

Examination entry requirements

All candidates shall hold a Master (Class I) certificate of competency valid under the South African Merchant Shipping Act. Before qualifying for admission to Part B of the Master Special Grade examination all candidates shall be required to reach a satisfactory standard in mathematics and physics to enable them to have a thorough understanding of the technical subjects dealt with in that Part.

The mathematics and physics syllabus appears hereunder, together with details of the internal assessment examination in these subjects, externally moderated by the Department of Transport, that shall be held after six months attendance at the approved courses. Candidates holding qualifications which are acceptable to the Department of Transport as evidence that the required standard has been reached in any of the subjects covered by the internal examination, shall be considered for exemption from the appropriate papers.

Examination

The final examination, which shall in every case be conducted by the Department of Transport, comprises five written papers; two of which form Part A and three Part B; candidates shall have the option of taking either Part first or both Parts together. Part A of the examination shall be designed for private study in order that prospective students might undertake preparatory reading for this Part at sea before embarking on the course.

A pass in a Part of the examination shall be valid for all time and shall be recorded by an endorsement to that effect on the candidate's Class I certificate.

Question papers shall be designed and set for completion in three hours, but candidates may be allowed one additional hour before being asked to conclude their work. The use of four-function single memory electronic calculators may be permitted in the examination.

"Candidates shall be required to attain at least 50% of the marks allocated to each paper, and an aggregate of 60% of the total marks allocated to each part of the examination, in order to achieve a pass in that part.

Candidates who have failed in one subject of Part B, but have attained the required aggregate for a pass, may be re-examined in that subject but will then be required to attain at least 60% of the marks allocated to that paper in order to achieve a pass.

Candidates who fail the examination for Part B may be re-examined in the individual subjects of that part, but shall be required to attain at least 60% of the marks allocated to each paper in order to achieve a pass. Candidates shall not be required to repeat subjects passed in Part B of the examination.

Candidates shall not be examined orally, nor shall they be required to pass the sight test."

Courses

Courses shall be conducted at nautical colleges as approved by the Director-General from time to time.

General

Full-time courses for preparation at an approved college shall be of about 36 weeks' duration, comprising a programme of study to cover the published syllabuses. Part A and Part B subjects shall be studied in parallel to prepare for both parts of the examination at the end of the course.

Some practical and experimental work shall be included; the exact nature of this work shall depend upon the availability of facilities and equipment but it is envisaged that it shall take place in such fields as:

Use of models to demonstrate shift of weights, suspended weights, inclining experiment, free surface effect, determination of the curve of statical stability, rolling experiments, squat demonstration. Demonstration and use of appropriate navigational equipment and analysis of observational errors. Practical hydrographic surveying exercises. Practical compass adjustment.

MASTER SPECIAL GRADE: MATHEMATICS AND PHYSICS SYLLABUS*Mathematics*

Theory of indices and logarithms. Fractional and negative indices. Inequalities. Equations in which the unknown occurs as an index.

Function as a mapping of sets. Composite and inverse functions. Graphs of functions in the cartesian plane.

Graphical solution of equations. Limits of functions. Linear and quadratic functions. Theory of quadratics. Partial fractions. Remainder and factor theorems. Determination of laws by reduction to linear form. Binomial expansion for positive integral indices. Use, without proof, of fractional and negative indices. Sequences and series. Elementary treatment of convergence.

Arithmetic, geometric, exponential and logarithmic series. Use of series in finding approximations and limits. The general angle. Degree and radian measure. Circular functions.

Trigonometrical identities. General solution of trigonometrical equations. Problems involving compound, multiple and sub-multiple angles. Inverse circular functions. Spherical triangles. Napier's analogies. Sine and cosine. Rules for spherical triangles.

Area of spherical triangle. Polar triangles. Derived formula including Haversine Formula and Four Part Rule. Differentiation of algebraic, circular, exponential, logarithmic and inverse circular functions.

Product, quotient and chain rules. Applications of differentiation to small errors, extrema and rates of change.

Successive differentiation. Integration as inverse of differentiation.

Integration by change of variable, by partial fractions and by parts. Applications of integration to the evaluation of plane areas, volumes, first and second moments of areas and volumes.

Mean values. Numerical integration; trapezoidal and Simpson's Rules, and proof thereof.

Solution of simple differential equations of the first order with variables separable. Homogeneous equations. Integrating factors. Numerical solution of equations is one unknown; Newton-Raphson method.

Mechanics and statistics

Addition and subtraction of vectors. Multiplication of scalar and vector. Force as a vector quantity. Resolution of coplanar forces. Resultant of system of coplanar forces acting at a point. Equilibrium. Three force problems, Lami's Theorem.

Stress, strain, Hooke's Law and Young's Modulus of Elasticity.

Parallel forces, moments, couples. Reduction of a system of coplanar forces acting on a rigid body. Equilibrium conditions. Friction. Centre of gravity. Loaded frameworks.

Displacement, velocity and acceleration as vectors.

Relative velocity and acceleration. Rectilinear motion of a particle with uniform acceleration. Motion of a particle under gravity. Connected particles. Projectiles.

Mass, momentum, force. Newton's Laws of Motion.

Impulse, work, energy, power. Principles of conservation of linear momentum and energy. Direct and oblique impact, including use of Newton's Experimental Law.

Shearing force and bending moment diagrams for point and uniformly distributed loads. Rectilinear motion of a particle with variable acceleration where the acceleration is a function of time or displacement. Simple harmonic motion.

Motion in a circle (horizontal and vertical).

Simple pendulum. Conical pendulum.

Moment of inertia, parallel and perpendicular axes theorems.

Angular momentum and kinetic energy of rotating bodies.

Newton's Law for rotating bodies.

Representation of numerical data. Frequency distributions.

Mean and standard deviation of discrete and grouped distributions.

Elementary probability theory, including conditional probability.

Probability distribution of a random variable.

Binomial, Poisson, rectangular and normal distributions.

Mathematical expectations, especially mean and variance.

Sampling distribution of the mean; standard error.

Confidence limits. Hypothesis testing. Testing means and difference between means.

Physics

S.I. Units shall be used throughout but questions may contain other practical units such as the minute, hour and degree Celsius.

Heat

Behaviour of an ideal gas with changes in pressure, volume and temperature. Simple kinetic theory of an ideal gas including derivation of the formula $p = \frac{1}{3} \rho c^2$ and use of Avogadro's number.

The relationship between temperature and molecular kinetic energy. Internal energy of a gas. First law of thermodynamics. Steady flow energy equation, enthalpy. Differences between the principal specific heat capacities of an ideal gas. Proof of $C_p - C_v = R$.

Ratio of specific heat and its dependence on atomicity. Reversible isothermal and adiabatic changes. Work done in isobaric, isothermal and adiabatic expansions. Saturated and unsaturated vapours. S.V.P. boiling, dew point and relative humidity. Specific humidity (humidity mixing ratio). Behaviour of real gases.

Critical temperatures. Thermal conductivity, calculation of linear steady-flow conditions. Newton's law of cooling, derivation of formula from statement of law. Thermal radiation. Electromagnetic spectrum.

Methods of detection. Prevost's theory of exchanges. Black-body radiation and distribution of energy. Variation of wavelength of maximum energy with temperature. Emissive and absorptive power. Kirchhoff's Law of Radiation. Stefan's Law. Solar constant and radiation received from the sun. Conversion of heat to work. Thermodynamic cycles. Carnot cycle. Thermal efficiency. Reversibility. Second Law of Thermodynamics. Entropy. Reversed cycles, reversed Carnot cycle and vapour compression cycle. Coefficients of performance for refrigerator and heat pump.

Waves

Descriptive treatment of free and forced vibrations, damping, resonance. Simple mathematical treatment of transverse and longitudinal waves, simple harmonic waves, progressive waves, relation between velocity, frequency and wavelength. Superposition of collinear waves, formation of standing waves. Beats.

Light

Knowledge of and use of formulae for formation of images by reflection at plane and spherical surfaces. Refraction at plane and spherical surfaces. Critical angle and total internal reflection. Knowledge of and use of thin lens formulae. Thin lenses in contact. Simple treatment of compound microscope, refracting and reflecting astronomical telescopes. Terrestrial telescope and binoculars. Magnification and exit pupil. (Details of eyepieces not required). Refraction and dispersion by prisms. Dispersive power. Condition for minimum deviation and the formula connecting refractive index. Thin prisms.

Descriptive treatment of spherical aberration, coma, astigmatism, curvature of field and distortion.

Chromatic aberration and achromatic doublet without calculations.

Spectra and colour.

Luminous intensity, luminous flux, illumination.

Photometers, photovoltaic cell.

Huygen's principle, derivation of laws of refraction and reflection at a plane surface.

Interference, Young's double slit experiment.

Thin films, normal incidence only.

Non-reflecting films, blooming.

Diffraction, single slit. Descriptive treatment of diffraction by circular aperture and resolving power of a telescope.

Natural phenomena; mirages, looming, halo, rainbow, corona.

Speed of light, Römer's and Michelson's methods.

Sound

Velocity of sound in gases, liquids and rods.

Factors affecting velocity.

Measurement of velocity in gases and rods.

Reflexion and refraction.

Effect of wind, velocity gradient on propagation.

Doppler effect.

Intensity of sound. The decibel scale. Loudness, the phone and DBA.

Descriptive treatment of noise, air-borne and structure-borne. Factors affecting transmission and damping.

INTERNAL ASSESSMENT EXAMINATION

1. Examinations shall be held shortly after the mid-year vacation. Candidates shall write one three-hour paper in Mathematics, one three-hour paper in Mechanics and Statistics, and one three-hour paper in Physics.

2. The mathematics paper shall consist of nine questions from which the candidate shall be required to select six questions for full marks.

The Mechanics paper shall consist of nine questions—seven on Mechanics and two on Statistics. Candidates shall attempt at least one question on Statistics. The Physics paper shall consist of three sections:

- (i) Heat: Four questions.
- (ii) Light: Three questions.
- (iii) Sound: Two questions.

Candidates shall attempt one question from each section and any other three from the remainder.

3. The pass mark shall be 55% overall. The minimum pass mark in each paper shall be 45%.

MASTER SPECIAL GRADE EXAMINATION SYLLABUS**PART A****PAPER 1—INTERNATIONAL MARITIME AGREEMENTS AND LEGAL KNOWLEDGE***Section A***1. IMO Conventions.****(a) Application:**

- (i) The functions of IMO and the implementation of conventions.
- (ii) Exempted and exempted ships.
- (iii) Non-convention ships.

(b) Certificates—the certificates required to be carried by vessels on international voyages.**(c) Safety of navigation:**

- (i) Arrangements for monitoring hazards and the duties of Masters.
- (ii) Traffic separation and control.
- (iii) Search and rescue.

(d) Cargoes:

- (i) Code for Safe Practice for Bulk Cargoes.
 - (ii) Dangerous Goods Code.
 - (iii) Grain.
 - (iv) Other codes relating to ships carrying specialised cargoes.
- (A detailed technical knowledge is not required.)

(e) (i) Reporting casualties and the findings of inquiries.**(ii) Reporting of substandard ships.****(f) Pollution—agreements on pollution.****2. Health.**

- (a) International agreements and measures to prevent the spread of disease by shipping.
- (b) International organisation for medical advice at sea.
- (c) International arrangements for medical assistance at sea.

3. Other international agreements and conventions affecting shipping.**4. Commercial.**

- (a) (i) Marine Insurance Act—an understanding of its content and meaning.
- (ii) York-Antwerp Rules—a knowledge of the rules.
- (iii) Hague-Visby Rules—a knowledge of the rules.

(b) Hague Rules—a general knowledge of the rules relating to the carriage of goods by sea.**(c) Chartering and Charter parties.***Section B***1. South African legislation resulting from the international agreements in Section A.****2. Merchant Shipping Act and related legislation as applied to:****(a) Crew:**

- (i) The engagement and discharge of seaman;
- (ii) the terms and conditions of their employment;
- (iii) offences and discipline;
- (iv) allotments and advances;
- (v) complaints procedure;
- (vi) manning and certification.

(b) General:

- (i) Investigations, inquiries and courts;
- (ii) prosecution of offences;
- (iii) detention of unseaworthy ships;
- (iv) wreck and salvage.

3. South African legislation relating to—

- (a) pollution of the atmosphere;
- (b) safe working conditions aboard ships.

PAPER 2—MARINE ENVIRONMENTAL STUDIES

Section A

1. Meteorology:

The Meteorological elements, weather systems and weather forecasting, as outlined in Government publications. In addition the following will be examined in some depth:

- (i) Adiabatic processes, lapse rates and stability.
- (ii) Coriolis and centrifugal effects; geostrophic wind equation; vorticity; jet streams; atmospheric circulation.
- (iii) Frontogenesis and frontolysis.
- (iv) Radiation processes and heat transfer.
- (v) Condensation and precipitation processes.

2. Oceanography:

- (i) General characteristics of the seas. Bottom topography. Nature of the sea bed. Coastlines and beaches.
- (ii) Physical properties of sea water. Light penetration and colour of the sea.
- (iii) Heat budget of the oceans, distribution of salinity, temperature and density. Water masses.
- (iv) Causes of ocean currents. Surface and subsurface circulation.
- (v) Ice formation, distribution, movement and decay.

3. Sea Surveying:

The techniques of surveying involved in the appreciation of the topics outlined in section 1.

- (i) Control.
- (ii) Position fixing.
- (iii) Seismic and sonar profiling.
- (iv) Sea-bed sampling.

4. Tidal theory:

A general knowledge of—

- (a) tide-raising forces—the equilibrium tide, modern tidal theory;
- (b) the earth's tides—
 - (i) their classification and principal harmonic components; methods of analysis and prediction;
 - (ii) determination of mean sea level;
 - (iii) establishment of datums along coast;
 - (iv) selection of sites for tide gauges;
 - (v) the use of co-tidal charts;
 - (vi) tidal streams and currents and their measurement;
- (c) seismic and meteorological surges, seiches, bores and related phenomena, seasonal and long-term changes in mean sea level.

5. Pollution of the sea by ships.

A general knowledge of the effects on the environment and the methods of international control for the following sources of pollution:

- (a) Oil.
- (b) Noxious substances.
- (c) Sewage.
- (d) Garbage.

*Section B*1. *Marine resources.*

(a) Fishing:

- (i) Types of fish, geographical location of fishing grounds; conservation of resources.
- (ii) Modern demersal and pelagic fishing methods.
- (iii) Factory vessels.
- (iv) Marine fish-farming.

(b) Minerals:

- (i) Methods of extracting minerals from sea water.
- (ii) Desalination processes.
- (iii) Sand and gravel dredging.
- (iv) Extraction of minerals from the sea-bed and sub-sea mining.

(c) Oil and gas:

- (i) Types of drilling rigs; drill ships, wellheads; production platforms; storage facilities and types of sea terminal.
- (ii) General ideas on drilling.
- (iii) Pipe-laying and the use of submersibles.

(d) Power:

General ideas on harnessing energy from the sea, tidal power stations.

PART B**PAPER 3—NAVAL ARCHITECTURE***Section A*

1. The application of Simpson's rules to the determination of area, centre of area, transverse and longitudinal second moment of areas, volumes and centre of buoyancy. Approximate position of the centre of buoyancy, e.g. Morrish's formula. Bonjean curves. Fluid thrust on plane and curved surfaces.

Centre of pressure

2. Transverse Stability. Stability at small angles of heel. The derivation of $BM = I/V$. The effect of shift of weights, suspended weights, free surface effects, including subdivision of tanks and cross-connected tanks. Stability at large angles of heel. Concept of righting moment and excitation moment. Limitation of GM as stability criterion. Effect of shift of weights and free surface on the curve of statical stability. Determination of righting moments, cross curves of stability, computer applications. The wallsided formula and its limitations. Theory of self-righting lifeboats. Dynamic stability, definition and method of determination. Residual dynamical stability and its use in determining the ability of the ship to survive given dangerous situations, e.g. heavy lift over the side, wind gusts, wave effects and passengers crowding. The effect of free trim on dynamical stability.
3. Longitudinal stability. Derivation of $BM_L = I/V$. Trim. True mean draught. Change in draught due to change in density. Loading problems.
4. Flooding of ships; its effect on statical and dynamical stability. Resulting heel and trim angles to unsymmetrical flooding. Application to box-shaped and ship-shaped vessels.
5. Drydocking of ships. General precautions and problems concerning block pressures, tripping of blocks, loaded ships, trim and change of stability. Grounding. An outline knowledge of the flooding requirements and calculations relating to floating docks.
6. Launching. Problems of launching from a slipway, launchways, cradle, poppets, stopping of the ship, e.g. drag chains. The launching diagram.
7. Stress and strain. Simple bending theory, section modulus, application to simple beams and to ships. Stresses and strains on a ship when in still water and in a seaway.

Murray's method. The use of load, shearing force and bending moment curves. Calculations relating to box-shaped vessels. Stress indicators.

8. A comprehensive knowledge of the use of all kinds of hydrostatic stability and stress data supplied to all types of vessels including container ships, LNG/LPG, fishing vessels and dredgers.
9. Manoeuvring and ship motions. Ship's measured mile and manoeuvring trials. Evaluation of steering characteristics and application to the design of hull and rudder. Angle of heel when turning. Shallow water effects on manoeuvring. Interaction. Ship motions. A general appreciation of waves and the concept of the seaway. The six degrees of freedom of a ship, the definition and cause of each ship motion.
The effect of ship motions on the stability and safety of the vessel, capsizing of ships due to beam seas and following and quartering seas. Methods of reducing ship motions.
10. Ship vibration. A general knowledge of ship structural vibration. The prevention and reduction of vibration.

Section B

Safety in design

A general understanding of the design features contributing to the safety of the following types of vessel:

- (a) Passenger and car ferries.
- (b) Type A and B ships.
- (c) Tankers.
- (d) Chemical carriers.
- (e) LNG/LPG ships.
- (f) Container ships.
- (g) Dredgers.
- (h) Hydrofoils.
- (i) Hovercraft.
- (j) Submersibles.
- (k) Fishing and off-shore supply vessels.
(i.e. subdivision, fire protection, freeboard, insulation, tank coatings, containment systems and specialised cargo handling systems, where applicable.)

PAPER 4—NAVIGATIONAL AIDS

A knowledge of electronic circuits shall not be required.

1. Position lines. Theory of position lines. Effects of observational errors in position lines and fixes. Statistical treatment of errors. Mathematical theory of hyperbola and the hyperbolic lattice.
2. Hyperbolic systems. A full understanding of the principles, characteristics, accuracy and errors associated with marine hyperbolic systems. Decca, Loran and Omega. Short-range high accuracy systems. Plotting and recording equipment.
3. Radio direction finding. Principles and characteristics. CRT and digital presentation. Radio beacons and rotating pattern beacons. Emergency position-indicating beacons.
4. Velocity, distance and depth-measuring instruments. Echo sounders. Logs. Berthing aids. Applications of Doppler principle.
5. Marine radar. Basic principles and practical use. Characteristics of modern radars. Secondary radar including Racon and Ramark. Collision avoidance systems. Plotting methods. Effects of errors in plotting. Analysis of casualties involving radar.
6. Satellite navigation. Basic theory and practical use.
7. Integrated navigation systems. Basic principles and practical use. "Kalman filtering techniques".
8. Research and development. An outline knowledge of other systems under development, for example:
 - (a) Laser beams.
 - (b) Infra-red techniques.
 - (c) Submarine acoustic transponders.
 - (d) Split beam channel guidance systems.
 - (e) Ship identification.

- (f) Dynamic positioning systems.
 - (g) Leader cables.
 - (h) Ring laser gyroscopes. New developments in gyroscopes.
 - (i) Navstar, G.P.S. and Geosat.
 - (j) Future global maritime distress and safety systems.
9. Gyro compass. A full theoretical and practical understanding of commercial gyro compasses in common use. The basic theory and practical use of internal navigation systems.

PAPER 5—NAVIGATION

Section A

1.
 - (a) A deeper understanding of the principles of navigation shall be required than for the lower grades.
 - (b) The properties of spherical triangles.
 - (c) Errors in astronomical terrestrial observations and position lines and fixes.
 - (d) Kepler's laws.
 - (e) Stellar magnitudes.
 - (f) Co-ordinated universal time.
 - (g) The content of the abridged nautical almanac.
 - (h) The theory of the sextant, corrections and errors in sextants.
 - (i) Geocentric and geographic latitude.
2. Derivation and application of the formula used for—
 - (a) rates of change of azimuth and altitude;
 - (b) maximum and minimum altitudes.
3. The theory and a general appreciation of the properties of the following projections:
 - (a) Mercator.
 - (b) Transverso Mercator.
 - (c) Gnomonic.
 - (d) Lamberts - conical orthomorphic.
 - (e) Stereographic.
4. Collision avoidance:
 - (a) Collision avoidance and manoeuvring systems.
 - (b) Routeing systems.
 - (c) Traffic control organisation.
5. Search and rescue:
 - (a) Procedures.
 - (b) Patterns.
 - (c) Plotting.
6. Special problems in navigation:
 - (a) High latitude navigation.
 - (b) Navigation of high speed craft and subsurface craft.

Section B

1. A full theoretical and practical understanding of the causes of deviation at the magnetic compass including conditions of no deviation and methods of practical correction.
2. The statutory requirements and contents of M notices concerning the provision, siting, and maintenance of ship's compasses, and the siting of other equipment in the vicinity.
3. Transmitting magnetic and gyro-magnetic compasses.
4. The theory of degaussing in ships.

ANNEXURE P

(SEE REGULATION 30)

ELECTRONIC NAVIGATION SYSTEMS COURSE**TRAINING IN THE USE OF RADAR AND OTHER ELECTRONIC NAVIGATION EQUIPMENT****GENERAL**

This Annexure covers requirements for training and certification in the operational use of radar and electronic navigation equipment.

1. The Electronic Navigation Systems course and its related examination replaced the Radar Observers' course as from 1 June 1984.
2. The Navigation Control course replaced the Radar Simulator course as from 1 June 1984.

ELECTRONIC NAVIGATION SYSTEMS COURSE**AIM**

The aim of the course is to equip the trainee officer with the fundamental knowledge and skills needed to operate electronic navigational systems commonly fitted in South African ships and to use the information presented to undertake the duties of a bridge watch-keeping officer on receipt of a first certificate of competency.

OBJECTIVE

At the end of the training the trainee should be able to perform competently the duties shown in the specification at *Sub-Annex A* and use the information obtained from electronic navigation equipment for the safe navigation of the ship.

TRAINING PLAN

The complete course of training has been designed in three progressive stages for completion during the two main college-based phases and the intervening period of sea service in the Department-approved training schemes. It is intended that the ENS course syllabus should be integral with and complementary to the related navigational studies in the main course of training. At least 118 hours should be devoted to the ENS course including assessment, but excluding final examination for which an additional two hours per candidate must be allowed during the college-based phases.

Alternatively, for persons seeking certificates of competency outside the approved schemes of planned training, the course may be run as a full time block of 150 hours duration.

SYLLABUS

The syllabus for the course is attached at *Sub-Annex B*.

CONDUCT OF THE COURSE

The interrelationship and safe use of all methods of navigation should be the keynote throughout the course.

Practical training is an essential feature to enable the student to acquire and demonstrate proficiency in the operation of specific items of equipment in relation to his role as a watch-keeping officer.

In the latter stages of the course simulation should be used for exercises which give students experience of real-time radar plotting and the use of radar for continuous position monitoring. Such exercises should, however, be related to the basic concepts of collision avoidance and navigational techniques, and not to complex exercises more appropriate to the Navigation Control course.

EQUIPMENT

The equipment specification for conduct of the course is attached at *Sub-Annex C*.

EXAMINATION AND ASSESSMENTS

The progress of students will be assessed at each stage of the course and be taken into account as part of the final examination.

The examination held at the end of the course consists of the construction and interpretation of radar plots, followed by an oral/practical test using equipment installed at the college.

Requirements for assessment and for entry to and conduct of the examination are attached at *Sub-Annex D*.

CERTIFICATES

A Department of Transport Electronic Navigation Systems Certificate will be awarded by the college to trainees who satisfactorily attend the complete course and who are successful in the final examination.

APPROVAL

The course must be conducted in accordance with the provisions of this ANNEXURE. Staff involved in teaching must be acceptable to the Department of Transport.

The course and examination must be open to inspection by officers of the Department of Transport to ensure that common standards are maintained.

SUB-ANNEX A TO ENS

Course specification

Skill/knowledge specification for electronic navigational equipment training

Job requirements	Skill	Knowledge
The following should all be prefaced with the words "The officer should have the ability to"		
1. Obtain and plot D/F bearings and position lines	1. Select and identify suitable radio beacons. Set up and tune, in manual or automatic mode, the D/F to a selected radio beacon or to a distress frequency. Obtain a bearing of a transmitting station and apply appropriate corrections. Plot bearings and position lines on a navigational chart.	1. Basic principles of radio direction finders (RDF). Description of D/F receivers in use at sea. The causes and effects of sky waves, semi-circular error, quadrantal error and coast effect. Calibration. Application of half convergence. Accuracy, range and other limitations of RDF. Use for "homing" on to a casualty. Purpose of the Admiralty List of Radio Signals, Volume II.
2. Use echo sounders	2. Operate typical echo sounding equipment. Correctly interpret the information on display	2. Basic principles of ship-borne echo sounders. Types in use at sea. The principal components of general-purpose navigational echo sounding equipment. Precautions to be observed in use and accuracy to be expected.
3. Obtain the ship's position using hyperbolic navigation systems:		3. Basic principles of hyperbolic navigation. The difference between systems which utilise the measurement of time difference and of phase difference.
(a) Decca Navigator.....	(a) Select the appropriate Decca navigator chain. Operate the equipment. Interpret information. Apply corrections and allowances for fixed and variable errors. Plot Decca co-ordinates on a Decca chart to obtain the ship's position. Determine expected accuracy.	(a) Description of the Decca navigator system and receivers in use aboard ships. Coverage areas and Decca charts. Interpretation of instructional notes in the Decca manual. Sources and causes of errors. Use of Decca data sheets.
(b) Loran C.....	(b) Select the appropriate Loran chain. Operate a Loran receiver. Interpret correctly the information on the display. Apply error corrections. Plot Loran co-ordinates to fix position. Determine expected accuracy.	(b) Description of the Loran system and typical receiver in use aboard ship; sources and causes of errors; corrections and expected accuracy. Coverage areas and Loran charts.
(c) Omega	(c) Select the appropriate Omega stations. Operate an Omega receiver. Interpret correctly the information on the display. Apply error corrections. Plot Omega data to fix position. Determine expected accuracy.	(c) Description of the basic Omega system and receivers in use aboard ships. Sources and causes of errors. Use of propagation correction tables. Positional accuracies. Coverage area and Omega charts.
4. Obtain the ship's position using satellite navigational equipment	4. Operate the receiver. Plot the position. Determine expected accuracy.	4. Basic description and principles of the satellite navigation systems. Typical receivers in use aboard ships. Sources and causes of errors. Corrections and expected accuracy. Coverage areas.

- | | | |
|--|---|---|
| 5. Operate basic radar equipment | 5. Switch on and set controls for optimum display. Check performance of equipment. Adjust operational controls to maintain optimum display. Recognise maladjustment. Measures ranges and bearings of targets. | 5. Description of basic marine radar installation. Identification of controls and basic principles of radar. |
| 6. Use the radar set as an aid to navigation | 6. Obtain bearing and/or ranges and fix position of the ship. Use parallel index techniques for continuous position monitoring. | 6. Detection and recognition of targets. Sources of errors in positions obtained. Use of radar for navigation in confined or coastal waters including parallel index techniques. |
| 7. Use radar for collision avoidance | 7. Maintain a radar watch by obtaining information from the display or by using radar plotting devices. Identify potentially dangerous targets. Appraise collision risk and assess effects of alterations in own and/or other vessel's course and speed in proposed collision-avoidance manoeuvres. Report information. | 7. Principles and construction of a radar plot. Use of plotting aids. Use of a plot to obtain information about targets. Assessment of collision risk. Effect of alteration of courses and speed in relation to collision avoidance. Radar reporting procedures. Application of collision regulations in restricted visibility. |
| 8. Use automatic radar plotting aids | 8. Switch on and set up equipment. Adjust operational controls to maintain optimum display. Maintain plot using automatic and manual acquisition of targets. Interpret and appreciate information displayed. Report information. | 8. Description and principles of operation of ARPA equipment. System performance and accuracy. Display presentation. Controls, system capabilities and information facilities. |

Sub-Annex B to ENS course specification

ELECTRONIC NAVIGATION SYSTEMS COURSE

GENERAL GUIDELINES AND SYLLABUS

Summary

Stage A—College-based

The objective of this stage of the training is to enable the trainee officer to be aware of the basic principles of operation of the various electronic navigational equipment and to operate this equipment so that he can provide accurate information to the bridge watch-keeping team during the succeeding sea phase of the planned scheme of training.

Stage B—Sea phase

During the period of sea service between the college-based phases the trainee officer should aim to consolidate the skills and knowledge acquired during Stage A by using, under supervision, all the radar and navigational aid equipment fitted aboard the ship(s) in which the sea service is performed.

Stage C—College-based

The objective of this stage is to develop a wider appreciation of navigational systems, together with an understanding of the accuracy, availability, limitations and use of navigational instruments in the context of overall requirements for navigation.

Related studies

For trainees following related phased training schemes, the ENS course syllabus should be covered in conjunction with the related practical navigation section of the main stream of training.

It should be noted that the Applied Science section of the Class 3 syllabus, concerned with AC Theory and Principles of Radio, forms useful background material to the study of radio direction finding and hyperbolic systems and when completed the two fields of study should form an integrated whole.

Official publications

Trainees will be expected to have knowledge of current official publications which are related to the use of radar and other navigational equipment, including the following:

- i. The Collision Regulations
- ii. Department of Transport Marine Notices
- iii. Safety of Navigation Regulations
- iv. Marine Radar Performance Specifications (HMSO and IMO)
- v. ARPA Performance Specifications (HMSO and IMO)
- vi. Reports of courts of marine enquiry relevant to safe navigation.

Case studies

Information about the use or misuse of equipment from actual incidents in the form of case studies provides a valuable learning resource which should be used throughout the course.

In this connection attention is drawn to the Marine Navigation Casualty reports published by the International Chamber of Shipping, 30/32 St Mary Axe, London EX3A 8ET.

Practical exercises

Practical exercises are an essential feature of the course. They should be designed to enable the student to demonstrate an ability to operate equipment and correctly use the information obtained as indicated in the specification in Sub-Annex A.

In the latter stages of the course, simulation should be used for exercises which give students experience of real-time radar plotting and the use of radar for continuous position monitoring. The depth of treatment of the syllabus covering ARPA equipment should, at this stage, be appropriate to the role of watch-keeping officer and should take account of the student's relatively limited practical experience at sea.

Syllabus

It should be assumed that each of the objectives is prefaced by the words "*The expected learning outcome is that the student.....*"

Stage A—College phase**Basic principles of electromagnetic propagation****A1* Electromagnetic energy**

- (1) Explains why most navigational aids use electromagnetic energy.
- (2) Defines the frequency of an electromagnetic wave.
- (3) Defines the wavelength of an electromagnetic wave.
- (4) States the average propagation velocity of an electromagnetic wave.
- (5) Describes Doppler effect.

A2* Heading, speed and distance instruments

Describes heading, speed and distance instruments

- (1) States that the master gyro is enabled to point in a fixed direction.
- (2) Describes the initial setting up and adjustments on voyage of the gyro compass installation.
- (3) Describes how to take a bearing to check for gyro error and how to name and apply the error.
- (4) Describes how the magnetic compass is able to point constantly in a fixed direction.
- (5) Describes how to take a bearing to check the magnetic compass, and how to name and apply the error.
- (6) Describes a transmitting magnetic compass.
- (7) States the instruments which receive heading information.
- (8) Describes the use and operation of autopilots, including off-course alarms.
- (9) Discusses methods of calculating distance steamed and speed through the water.
- (10) Describes types of towed and submerged speed and distance instruments, including Doppler types.

* Trainees following phased training schemes where the ENS course is integrated will be expected to cover paragraphs A1 and A2 under related studies.

Position fixing systems**A3. Demonstrates a knowledge of the basic principles of hyperbolic navigation**

- (1) Defines a hyperbola.
- (2) Draws a hyperbolic pattern around two foci with the base line divided into an exact number of equal divisions.
- (3) States the concept of lanes.
- (4) Shows how ambiguity occurs when the two foci are radio stations transmitting simultaneous signals.
- (5) States that ambiguity is removed by application of a time delay.
- (6) Defines base line extension area.
- (7) Explains why the hyperbolae/s have reduced accuracy in the base line extension area.
- (8) Combines two hyperbolic patterns to illustrate the method of ascertaining position.
- (9) Describes how a hyperbolic pattern (lanes) can be produced between two stations transmitting on the same frequency and an exact number of wavelengths apart with the signals starting in phase.
- (10) States that phase difference can be used to ascertain intermediate hyperbolic position lines between two whole lanes.
- (11) States that time difference can be used to ascertain intermediate hyperbolic position lines between two whole lanes.

A.4 Demonstrates the ability to operate the Decca navigation system

- (1) Describes the basic Decca navigation system.
- (2) States the extent of coverage areas.
- (3) Identifies the Decca chart and the additional information printed thereon.
- (4) Interprets the instructional notes in the Decca Manual.
- (5) Sets up a Decca receiver for a known position.
- (6) Sets up a Decca receiver by lane identification signals.
- (7) Describes types of Decca receivers, other than those in A.41 in use on ships.
- (8) Obtains Decca co-ordinates from the Decca receiver.
- (9) Uses data sheets to find and apply fixed error corrections and allowances for variable errors.
- (10) Fixes position by plotting data obtained from the Decca receiver.
- (11) Demonstrates inter-chain fixing techniques.
- (12) Summarises the contents of the Merchant Shipping Notices relating to the use of the Decca navigator.

A.5 Demonstrates the ability to fix positions using Loran co-ordinates

- (1) Describes types of Loran C receiver in use at sea.
- (2) Identifies the Loran chart and the additional information presented thereon.
- (3) Plots position by using Loran co-ordinates.

A.6 Demonstrates the ability to operate radio direction finders

- (1) States that a bearing can be obtained from a radio transmitter using a direction finder.
- (2) Describes the method of setting and checking the heading information supplied to the direction finder from the gyro compass.
- (3) Interprets information regarding radio beacons supplied in Admiralty List of Radio Signals, Volume II.
- (4) Obtains the bearings (using sense) of specific radio beacons, external or simulated.
- (5) Applied correction from calibration curve to relative bearing.
- (6) Converts corrected relative bearing to great circle bearing.
- (7) Converts a great circle bearing to a rhumb line bearing.
- (8) Describes the use of a radio direction finder for homing on to a casualty.
- (9) Plots rhumb line bearing on chart.

A.7 Demonstrates the ability to operate an Omega receiver

1. Describes Omega as a world-wide phase difference system indicating positions of transmitters.
2. Demonstrates ability to use correction tables.
3. Identifies the Omega chart and the additional information displayed thereon.
4. Demonstrates ability to select appropriate station pairs and set up Omega receiver prior to departure.
5. Demonstrates ability to apply corrections to Omega readings and to plot position on chart.
6. Describes methods of setting up receiver en route.

A.8 Demonstrates an understanding of the basic principles of echo sounding and the ability to operate an echo sounder

1. Describes the basic principles of a marine ultrasonic echo sounder.
2. States the accepted value of the velocity of sound in sea water and the limits within which the true value may lie.
3. States the physical factors which affects the velocity of sound in sea water.
4. Sketches a simple block diagram of an echo sounder and states the function of the various blocks.
5. Operates a typical echo sounder and demonstrates an ability to carry out user maintenance, e.g. change paper, adjust or change stylus, etc.
6. Distinguishes between 'range' and 'phase' and demonstrates an awareness of the dangers of using the wrong phase.
7. Relates the datum from which the soundings are measured to that of chart datum Radar.

A.9 Describes the method by which a radar installation gathers information and presents it on a visual display

1. Explains the echo principle and its application to radar pulses.
2. Identifies the components on a simple block diagram of a radar installation.
3. Describes the path followed by a single radar pulse from transmitter to target.
4. Describes the path followed by returning echo through the receiver to its application to the CRT.
5. Describes the method by which a CRT displays an echo at the correct range and bearing.
6. Identifies the radar horizon and the factors affecting the distance from the observer.
7. States the safety precautions necessary when in the vicinity of open equipment and the radiation hazards near antennas and open waveguides.

A.10 Demonstrates an ability to set controls to obtain an optimum display of targets

1. States the correct switching-on safeguards and procedures.
2. Identifies ship's Head Up, North Up and true motion presentation and aligns the display to a specific mode.
3. Demonstrates the correct adjustment of brilliance, gain and tuning controls. Recognises maladjustment.
4. Distinguishes the functions of the sea clutter and precipitation controls and demonstrates their correct adjustment.
5. Outlines a performance monitoring procedure and demonstrates its use.
6. Demonstrates the functions of the remaining controls and the use of range and bearing measurements controls and reporting procedures.
7. Recognises radar echoes and appreciates factors affecting the interpretation of a display, e.g. shadow sectors, radar-to-radar interference and other spurious echoes.

A.11 Describes the navigational information provided by radar and its practical application

1. Identifies the sources of error in the accuracy of radar ranges.
2. Identifies the sources of error in the accuracy of radar bearings.
3. Demonstrates the ability to fix the ship's position by plotting ranges and/or bearings.
4. Compares the chart and PPI for radar-conspicuous targets.
5. Describes the appearance of *Racons* and *Ramarks* on radar screens.
6. Demonstrates the practical use of navigational parallel index techniques.

A.12 Describes the use of radar as an aid to collision avoidance.

1. Describes the principles of relative and true radar plots.
2. Plots a succession of fixes as a relative plot, derives the true course and speed of target and predicts the CPA and TCPA.
3. Plots a succession of fixes as a true plot, obtains the true course and speed of targets and predicts the CPA and TCPA.
4. Appreciates the value of the knowledge of aspect of a target.
5. Describes the benefits of the use of a radar reflection plotter.
6. Recognises the factors involved in efficient radar watch-keeping.
7. Uses the correct report procedure.

A.13 Demonstrates the ability to use controls on an ARPA display

1. Outlines the information provided by ARPA equipment for navigation and collision avoidance.
2. Confirms the correct inputs of course and speed.
3. Operates the controls to acquire and cancel targets.
4. Selects true/relative vectors.
5. Adjusts vector length to assess CPA and TCPA.
6. Confirms data in .5 by use of alphanumeric data.

Stage B—Second Sea Phase

During the sea service between the college-based phases, the trainee officer should obtain practice on the following equipment, where fitted:

Decca Navigator.

Loran C.

Omega.

Satellite Navigator.

D/F.

Echo Sounder.

Radar.

Automatic Radar Plotting Aids (ARPA)

The following exercises should be conducted under the supervision of one of the ship's navigation officers:

1. Plotting of radar data to obtain—
 - (a) the ship's position on the chart;
 - (b) the course, speed, aspect, CPA and TCPA of ship targets.
2. Operation of the ship's echo sounder equipment to obtain soundings and their comparison with the charted depth of water.
3. The plotting of co-ordinates obtained from at least one of the types of hyperbolic navigation equipment listed above.
4. A record of D/F bearings together with calculations to obtain the relevant true bearings.
5. Operation of the equipment to obtain the information required in 1 to 3.

The trainee's record book should be endorsed in the relevant section when the exercises have been completed to the satisfaction of the officer(s) concerned. The amount of practical training required should take into account the assessment recorded by the college at the end of Stage A of the course.

The exercise should be undertaken whenever possible in conjunction with related practice in navigational procedures. It is vitally important in promoting the trainee officer's navigational skills the data obtained from electronic navigational equipment must, wherever possible, be checked by other methods. The hazards of navigating by reliance on scanty or unverified information must be stressed. In this respect the trainee officer should occupy a junior position in the bridge watch-keeping team wherever possible.

Stage C—College Phase**Position Fixing Systems****C.1 Revision and extension of systems employing hyperbolic navigation techniques**

1. Revises the basic principles of obtaining a position by finding co-ordinates of the hyperbolic lattice superimposed on navigational charts.
2. States the important navigational systems which utilise the measurement of phase difference and time difference techniques.

C.2 The Decca system

1. Revises *How the Decca System Works (Appendix 4 Decca Operating Instructions or similar)*.
2. Discusses the periodic broadening of the pattern to provide lane identification signals and the signalling sequence for the multi-pulse chain.
3. Describes the use of lane identification signals to set up the decimeters on entering coverage or on first setting up within coverage.
4. Describes the effect of sky-wave interference.
5. Discusses operation under conditions of low signal and/or high noise.
6. Discusses possible causes of lane slip.
7. Describes dangers of using Decca lanes as tracks.
8. Revises accuracy and errors of system and information provided by the marine data charts.
9. Explains the significance of errors and the probability factor of the accuracy of the position obtained.
10. States the warnings provided for chain malfunction.
11. Demonstrates methods of setting up and operating Decca receivers.
12. Obtains Decca co-ordinates and fixes position by plotting data.
13. Obtains Decca co-ordinates by inter-chain fixing and plots data to fix position.

C.3 The Loran system

1. Revises the production of a hyperbolic pattern resulting from staggered pulses between master and slave stations.
2. Defines *pulse repetition frequency, recurrence interval and time sharing*.
3. Describes the course measurement of time difference and performance by a Loran receiver.
4. Describes the cycle matching envelope produced by the Loran C receiver.
5. Describes the reception of ground and sky waves by the Loran receiver and the advantages of low frequency transmissions.
6. Indicates areas where mixed sky/ground signals or both sky wave signals would be received and describes procedure for plotting.
7. Describes the accuracy of the system and possible errors.
8. Describes the functions of the controls on a semi-automatic Loran receiver.
9. Describes a fully automatic Loran receiver.
10. Obtains Loran co-ordinates and fixes position on the Loran chart taking account of possible errors.

C.4 Radio direction finders

1. Revises the operation of radio direction finders.
2. Explains how the minimum signal indicates the direction of propagation when the sense aerial is in operation.
3. Describes the Bellini-Tosi system and operation of the search coil.
4. Describes how errors are caused by interaction between the propagated wave and reradiation from the ship's structure.
5. Explains how residual errors from 4 are plotted to produce a calibration curve.
6. Describes errors produced in the direction of the propagated signal by causes external to the ship—sky wave and coastal refraction effects—and discusses methods of minimising the effects of these errors.
7. Obtains DF bearings and fixes position on charts taking account of error corrections.
8. Summarises the use of direction finders in search and rescue.

C.5 The Omega system

1. Revises the operation of the Omega receiver.
2. States the advantages of the propagation of very low frequency radio waves.
3. States the advantages of a long base line.
4. States the factors affecting the choice of the hyperbolic lattice between a station pair.
5. Describes time sharing and the Omega stations signal format.
6. Describes the effects of the low altitude ionized layer on VLF radio waves and the diurnal and seasonal variations resulting.
7. Discusses the accuracy of Omega signals.
8. Discusses propagation anomalies and the effect of signal to noise ratio.
9. Explains why it may be necessary to change Synch station en route and procedure to follow.
10. Explains why it may be necessary to change LOP station en route and procedure to follow.
11. Describes use and operation of LOP recorder.
12. Describes lane slip detection and correction.
13. Describes precautions near to one transmitter.
14. Describes differential Omega.
15. Describes automatic position indicating devices based on reception of Omega signals.
16. Demonstrates knowledge of navigational warnings pertaining to Omega.

C.6 Revises the basic principles and operation of the transit satellite navigation system

1. Describes the general features of a navigational satellite.
2. Describes the orbits of satellites.
3. Describes the role of tracking and injection stations.
4. Describes the information transmitted by a transit satellite.
5. Describes how the integrated Doppler difference frequencies received from a transit satellite together with a knowledge of two satellite positions can define a hyperbolic or revolution.
6. Describes how two or more such hyperbolics can be combined to give an observer's position.
7. Describes errors due to single frequency transmission, speed over the ground, aerial height, angle of sight and geodetic differences.
8. Describes the Navstar satellite system.
9. Describes the information transmitted by Navstar satellite.
10. Explains how pseudo-range is measured.
11. Explains how equivalent user clock error is measured to produce an estimate of observer position.
12. Explains how independent range errors are calculated to give true user clock error and hence the true position of the observer.
13. Describes a typical Navstar receiver and sequence for initiating observations.
14. Describes routine operation of Navstar equipment.

C.7 Echo sounders

1. Revises the basic principles and operation of echo sounders.
2. Explains the causes of errors in recorded depth.
3. Summarises the content of Marine Notices relating to echo sounders.
4. Describes the precautions to be observed when using echo sounders.

RADAR**C.8 Describes the basic principles of radar**

1. Explains how range is determined.
2. Explains how bearing is determined.

C.9 Describes the application of the basic principles in practice

1. Describes how information is displayed.
2. Explains why output energy needs to be "pulsed".
3. Describes the effect of pulse duration on the display.

4. Explains the effect of pulse duration on range discrimination and minimum range.
5. Explains other factors affecting minimum range.
6. States the specification requirement on range discrimination and minimum range.
7. Explains why and when different pulse durations are used.
8. Explains the need for narrow *horizontal* beam width (HBW) but wide *vertical* beam width (VBW).
9. Describes the effect of HBW on the display.
10. States the specification requirement on HBW and VBW.
11. Illustrates output by polar diagrams.
12. Defines *half power points*.
13. States the specification requirement on bearing discrimination.

C.10 Demonstrates a non-technical knowledge of a radar set

1. Illustrates the functional units of a radar set by block diagram.
2. Describes functions of the block diagram units and their interrelation.
3. Describes how the heading marker is produced.
4. Explains possible bearing inaccuracies arising from 3.
5. States the specification requirement on heading marker accuracy.
6. Describes and illustrates different types of antennas in current use.
7. Explains how antenna design achieves the specification for HBW and VBW.
8. Describes the methods of measuring ranges on radar equipment, e.g. fixed and variable range markers, interscan markers.
9. Identifies possible sources of error in 8 and the relative accuracy of the different methods.
10. States the specification requirement for range accuracy.
11. Appreciates the need for regular checking of range accuracy and correction of or allowances for inaccuracies.
12. Describes the methods of measuring bearings on radar equipment, e.g. rotatable cursor on disc, EBI and other methods.
13. Identifies bearing inaccuracies due to parallax, heading marker displacement and centre maladjustment.
14. States the specification requirement for bearing accuracy.
15. Appreciates the need for regular checking of bearing accuracy and correction of or allowances for inaccuracies.

C.11 Uses controls to set up a radar display

1. Explains the need for control settings before switching on.
2. States the specification requirements on time lapse between switching on and activation.
3. Manipulates controls in a correct sequence to obtain an optimum picture in the desired mode.
4. Describes the effects of receiver noise on the display.
5. Justifies criteria for optimum control settings.
6. States dangers of maladjusted controls.
7. Detects maladjustment of control settings and corrects these maladjustments.
8. Appreciates the effects of siting radar units and storing spares near magnetic compasses.
9. Defines *magnetic safe distance* and *conceded safe distance*.

C.12 Interprets the display

1. Identifies spurious echoes, e.g. indirect, multiple, side lobe, second trace and interference.
2. Explains sources of spurious echoes.
3. Explains effect of antenna siting on display in relation to funnel, masts, superstructure, etc.
4. Defines blind and shadow sectors.
5. Describes recommended methods of measuring blind and shadow sectors.
6. Explains the appearance of sea clutter.
7. States the danger of sea clutter.

8. Performs a search in sea clutter.
9. Explains the appearance of precipitation on a display.
10. States the dangers of precipitation clutter.
11. Performs a search in and beyond precipitation.
12. Distinguishes between the effects of sea and precipitation clutter.
13. Explains the effect on a display of nearby pylons, large structures, power lines crossing rivers, estuaries and distortions of coastlines due to ice.
14. Compares the effects of differences between range scales.

C.13 Identifies factors affecting target detection

1. Employs overall performance monitor to determine performance standard and appreciates the need for regular checks on performance.
2. States the effects of loss of performance.
3. Defines *radar horizon*.
4. Calculates maximum detection ranges in standard meteorological conditions.
5. States the specification requirement for range performance.
6. Evaluates the effect of non-standard conditions on detection ranges.
7. States the conditions likely to cause super and sub-refraction.
8. Explains the effects of target characteristics on echo strength, e.g. size, shape, aspect and composition of targets.
9. Explains the displayed effects of pulse duration and beam width on topographical targets.
10. Explains the effects on target detection of the motion of the ship in seaway.

C.14 Uses a radar set for navigation

1. Fixes position by bearings and/or ranges.
2. States sources of error in positions.
3. Compares the accuracy of radar fixes obtained by different methods.
4. Compares the accuracy of radar fixes with other methods.
5. Appreciates the importance of cross checking the accuracy of radar fixes with fixes obtained by other methods.
6. Appreciates the value of using information from all available sources to obtain positions.
7. Describes the principle of operation and the appearance on displays of aids to detection, e.g. corner reflectors, racons, ramarks.
8. Employs radar in clear weather—
 - (i) to compare with visual observations;
 - (ii) to assess the relative accuracy of radar information;
 - (iii) to appreciate the capabilities and limitations of radar;
 - (iv) to compare charted features with features displayed by radar.
9. Uses parallel index techniques for continuous position monitoring.

C.15 Uses a radar set for collision avoidance

- (1) Appreciates on a relative motion display—
 - (i) the effect of own ship's movements;
 - (ii) the effect of a target's movements;
 - (iii) the advantages of compass stabilisation.
- (2) Appreciates the effect of movement of own and other ships on a true motion display.
- (3) Describes the effects of inaccuracies in compass stabilisation data on a relative motion display.
- (4) Describes the effects of inaccuracies in speed and compass stabilisation data on a true motion display.
- (5) Appreciates the limits of accuracy of information obtained from afterglow trails on displays.
- (6) Appreciates the development of a *close quarter situation*.
- (7) Identifies dangerous targets.

- (8) Uses plotting techniques to extract information about targets, e.g. CPA, TCPA, course, speed, aspect, rate and direction of tide.
- (9) Obtains the information in (8) by—
 - (i) unstabilised relative plot;
 - (ii) stabilised relative plot;
 - (iii) true plot.
- (10) Compares the advantages of the different methods of plotting.
- (11) Uses correct report procedure.
- (12) Appreciates the importance of radar observations reports being well defined.
- (13) Relates plotting interval to target approach speed and range.
- (14) Predicts track of targets on display.
- (15) Calculates effect of alteration of own ship's course on speed.
- (16) Identifies alterations in target's course and speed.
- (17) Determines required alteration of own ship's course and speed to have desired effect.
- (18) Relates own and target's expected action to the collision regulations.
- (19) Appreciates the importance of frequent regular observations.
- (20) Identifies the delay between a change of course and speed of a target and the detection of the change.
- (21) Identifies the effects of small as compared with substantial changes of course and speed on the rate and accuracy of detection of change.
- (22) Appreciates the dangers of assumptions made on inadequate information.
- (23) Appreciates the hazards of small alterations of course or speed.
- (24) Appreciates the advantages of safe speed when using radar to avoid collision.
- (25) Relates speed to CPA and TCPA and to the manoeuvring characteristics of vessels.
- (26) Appreciates the need for the early use of radar in clear weather at night when there are indications that visibility may deteriorate.
- (27) Describes mechanical aids to obtaining information, e.g. RAS plotter.
- (28) Explains the principle of and describes the advantages of the reflection plotter.

AUTOMATIC RADAR PLOTTING AIDS (ARPA)

C.16 Understands the principle of Automatic Radar Plotting Aids

- (1) Outlines the information provided by ARPA equipment for navigation and collision avoidance.
- (2) Discusses the various methods of displaying target data.
- (3) Discusses the possible risks of over-reliance on ARPA.

C.17 Examines factors affecting ARPA system performance and accuracy

- (1) Describes the input from the raw radar display.
- (2) States the effects of limitations in—
 - (a) radar range and bearing accuracy; and
 - (b) radar range and bearing discrimination.
- (3) Describes the inputs from course and speed instruments.
- (4) States the effects of maladjustments or inaccuracies in the course and speed inputs on the displayed ARPA data.
- (5) States the limits imposed on both manual and automatic acquisition facilities by multitarget situations, target fading and target swop.

C.18 Appreciates tracking capabilities and limitations of ARPA

- (1) Describes the methods employed for the acquisition of targets for tracking.
- (2) Discusses the criteria used for—
 - (a) automatic; and
 - (b) manual acquisition.
- (3) Describes the effects on the tracker of *lost* targets, target fading and target swop.

- (4) Describes the delays caused by the processing of ARPA data.
- (5) Describes routine user testing for malfunctions of the ARPA display and necessary precautions (after a malfunction occurs).
- (6) Appreciates the uses and limitations of ARPA alarms, guard rings and sector warning systems and describes the correct setting of these alarms.
- (7) Interprets displayed ARPA data and compares these data with manual plotting methods particularly with regard to threat assessment and the use of graphic representation of danger areas.
- (8) Describes the trial manoeuvre facility and explains its relationship to the forecast manual plotting.
- (9) Appreciates when and how to use the past history facility.

C.19 Uses an ARPA for collision avoidance

- (1) Describes the use of the operational controls and the methods of displaying data.
- (2) Demonstrates the correct setting up of an ARPA display.
- (3) Describes the operational warnings and additional alarms which may be fitted.
- (4) Describes the use of self-diagnostic routines when checking for malfunctions.
- (5) Compares information obtained from ARPA with that obtained from a basic radar plot.
- (6) Identifies critical echoes.
- (7) Uses information provided by ARPA to assess risk of collision.
- (8) Analyses the risk of collision.
- (9) Operates the past manoeuvre facility.
- (10) Operates the past history facility.
- (11) Determines the action to be taken to avoid close-quarter situations while ensuring that such action does not cause interaction with any other target.

USE OF ELECTRONIC NAVIGATION EQUIPMENT

C.20 Categorises and assesses accuracy of electronic navigational instruments and techniques in terms of specific area requirements

- (1) List instruments and techniques in general use.
- (2) States accuracy, availability and limitations of instruments and techniques in general use.
- (3) Categorises the usefulness of the systems in terms of the following areas—oceanic, landfall, coastal and estuarial.
- (4) Appreciates the need at all times to comply with the basic principles and operational guidance for officers in charge of a navigational watch, particularly in relation to the use of radar and ARPAs.

SUB-ANNEX C TO ENS COURSE SPECIFICATION

ELECTRONIC NAVIGATION SYSTEMS (ENS) COURSE

Equipment specification

- A. The following is the minimum outfit required for conduct of the ENS course (data outputs need not be co-ordinated):

A Decca navigator receiver controlled by a static simulator
a type-approved D/F receiver—live together with back-to-back goniometer and signal generator
a type-approved echo sounder controlled by a simulator or used in air
a complete basic radar outfit of a type which has been awarded a Department of Transport Certificate of Type Testing to the 1968 (or subsequent) Performance Specification
access to a radar simulator of a type approved by the Department of Transport or the use of VCR equipment which provides basic plotting exercises approved by the Department of Transport
access to equipment approved by the Department of Transport that is capable of displaying ARPA features
a satellite navigation receiver—live

- B. The following equipment is considered desirable and, if already fitted, should be used, however a decision on whether to fit new equipment or replace existing sets should be taken after consultation with the Department of Transport having regard to the extent to which the equipment is in general use at sea at any time. Effective visual aids, models and other facilities which clearly illustrate the procedures for operation of the equipment may then be accepted as an alternative:

'n Loran C receiver controlled by a static simulator

an Omega receiver—live

General requirements

- C. In order to provide an environment which closely resembles that found on board merchant ships, practical work on the course must be carried out using equipment of a type in general use aboard an SA merchant ship.

Radar instruction must be carried out on a fully operational civil marine radar type approved by the Department of Transport. The display of echoes should be realistic of a shipboard situation and demonstration equipment should therefore be installed in accordance with one of the following:

1. *At a site close to a shipping channel at the coast*

The following factors should be taken into account in determining a suitable site:

- (a) In order to demonstrate to students and for students to be examined in the techniques of observing moving targets in the vicinity of *own ship*, particularly when such targets may be obscured by sea clutter, it is essential that the site is close to and affords an unobstructed view of shipping in a main shipping channel and/or the entrance to a port.

The *maximum* distance from the shore is to be 200 meters, but this distance is only allowed when the other requirements of this Sub-Annex can be fully complied with.

- (b) the field of view shall be not less than 160°, uninterrupted, over the sea.
 (c) the height of the antenna shall be consistent with that necessary to obtain a clear view to seaward
 (d) the *radar view* to seaward shall be such that targets at longer range, i.e. not less than five miles, can be displayed
 (e) the *radar view* shall be capable of demonstrating shadow sectors e.g. from nearby buildings
 (f) visual observation of the area viewed by the radar shall be readily available so that comparison between radar and visual observation of targets can be easily made

2. *aboard a training vessel provided it is not confined to a dock or narrow river*

3. *at a college site using a video cassette recorder (VCR) system provided:*

- (i) One of the radar displays used on this course is fitted with a video cassette recorder (VCR) system which has been approved by the Department of Transport
 (ii) a library of tapes approved by the Department of Transport is available for use with the VCR system
 (iii) at least one fully operational marine radar set is installed in a location approved by the Department of Transport

SUB-ANNEX D TO ENS COURSE SPECIFICATION

ELECTRONIC NAVIGATION SYSTEMS CERTIFICATE

Assessment and examination arrangements

1. Introduction

- 1.1 The Electronic Navigation Systems Certificate will be issued to students who pass the examination described in Section 3 on completion of the course and who satisfactorily complete the in-course assessments referred to in Section 2. The results of these assessments will be taken into account during the final examination.
- 1.2 The examination and assessment arrangements must be approved by the Director-General. Assessments should be carried out by the lecturer involved in teaching each individual instrument.

2. Progress assessment

2.1 Stage A and Stage C (college phases)

1. The college should assess a student's practical ability to operate the individual instruments at the time that study of each particular instrument is completed.
2. A similar assessment should be made of the standard of chartwork performed when obtaining positions from co-ordinates derived from the various instruments.
3. In each stage, assessment of practical work should be recorded in the following format:

Electronic Navigational Systems Course						Stage A/C*	
Practical operation				Plotting			
Instrument	A	B	C	A	B	C	Remarks

KEY

A—Well able to cope with this level of work.

B—Able to cope with this level of work.

C—Unable to cope with the work at this stage.

* Delete as appropriate to indicate the stage of training to which the assessment refers.

4. The practical assessment procedures should complement the in-course assessment of theoretical knowledge required for a BTEC or SCOTVEC award. For students following other approved phased training schemes and equivalent assessment of theoretical knowledge will be required to be maintained during the progress of the course in a manner acceptable to the Department of Transport.
5. Students should endeavour to correct any low assessments during Stage A. At the end of Stage A students should be given a copy of the assessment sheet(s) to be returned to the college at the start of Stage C. During Stage B students should make every effort to improve their practical performance and understanding of the use of the equipment while at sea. A note of their progress could be made on the assessment sheet by the ships' officers.

Failing satisfactory improvement, a further effort to upgrade assessment should be made during Stage C.

2.2. Stage B (second sea phase of training scheme)

1. Appropriate entries should be made in the practical training record book as evidence that the trainee has completed exercise in the use of electronic navigational equipment, including position finding, radar, echo sounding and D/F, in conjunction with related practice in navigational procedures. (See also 5 above)
2. These entries should be scrutinised by the lecturer concerned when the student returns for Stage C.

2.3 On completion of Stage C

On completion of Stage C there will be a formal examination in radar, D/F and at least one other electronic navigation instrument. (See para 3) In some cases, however, it may be necessary to conduct the examination on the full range of equipment on which the course is based; in deciding on which equipment the examination should be conducted the examiner should study each candidate's assessment sheets to determine any areas of weakness in the operation of equipment or the fundamentals of knowledge required for their competent use aboard ship.

2.4 Modular courses

1. A progressive assessment of practical and theoretical knowledge must be maintained during the progress of modular courses in a way acceptable to the Department of Transport.
2. On completion of a modular course, the procedure for examination will be the same as that required at the end of Stage C for students following phased training schemes

3. Final examination and assessment

3.1 Entry

1. All candidates must have satisfactorily completed the ENS course and a minimum of 15 months' qualifying service at sea.
2. Trainees undergoing a phased scheme of training will be deemed to have completed the course where it is integrated with related studies, provided a minimum of 118 hours has been devoted to the ENS material and the assessments described in Section 2 have been satisfactorily completed. For other candidates, satisfactory attendance on the course should be judged by the college but it should be for not less than 150 hours and the assessments described in Section 2 must have been satisfactorily completed.
3. Candidates who do not meet the requirements may in exceptional circumstances enter the examination provided Departmental approval is obtained in each case.

*See Training Plan—page 1.

3.2 Format

The examination is in two parts:

Part 1: A one-hour examination in the construction and interpretation of radar plots.

Part 2: A practical/oral examination.

Part 1—Construction and interpretation of radar plots

Part 1 Consists of exercises in the construction and interpretation of radar plots from given information and a maximum of one hour is allowed for their completion. The information which the candidate is required to obtain from the plots should be chosen from the following:

1. An indication of fixed and moving targets, also closest point of approach of targets,
2. course and speed of moving targets,
3. aspects of targets,
4. rate and direction of tidal stream,
5. alteration of course needed to compensate for tidal set, and
6. effects of alteration of course and/or speed of observing ship and/or targets on CPA and TCPA.

Candidates must be allowed to construct the type of plot of their choice. Questions must not be framed in a way that restricts candidates to a particular type or types of plot.

Part 2—Practical/oral

In *Part 2* candidates must be individually tested on techniques concerned with the practical adjustment and use of radar, D/F and at least one other electronic navigation instrument. However, the examiner should be guided by the results of the in-course assessments (described in Section 2) in deciding whether to include other equipment in the practical examination and the scope of the oral test.

At the discretion of the colleges, oral/practical tests may either be conducted in one combined test for each candidate or, alternatively, on separate occasions for each item of equipment.

Practical Examination

The practical tests should be conducted so as to determine a candidate's competence to use equipment in accordance with the following guidelines:

Radar

Starting and stopping equipment by the correct procedure;

Adjustment of the display controls of the radar set in the correct sequence with reference to the indications of points of optimum settings;

recognition of maladjustment of operational controls:

brilliance/gain/video processor controls

focus controls

sea clutter control

centre controls

anti-rain or fast-time constant controls

manual tuning control;

optimum choice of range scales bearing in mind the varying conditions or circumstances of traffic, weather or proximity to land;

- use of fixed and variable range markers;
- accuracy and checking for inaccuracies;
- use of electronic bearing indicators;
- measurement of ranges and bearing for position fixing; limits of accuracy of fixes;
- observations to obtain information for aiding collision avoidance; passing information in an understandable form; radar reporting procedures;
- checking performance of radar equipment; use of performance monitor and need for frequent checks; display tuning control;
- oral questions on the use of true motion radar;
- oral questions on the principles, capabilities and limitations of ARPA.

Direction finders

Obtain a D/F bearing and apply any necessary corrections to enable the bearing to be laid off on a navigational chart; such bearing to be of an external source of radio transmission, e.g. a nearby radio beacon.

Electronic position fixing systems

Take readings from the various equipment after ensuring that the equipment has been set up according to the instructions laid down in the appropriate operating manuals;

plot such readings on a navigational chart making due allowance for any corrections which may be indicated by the examiner (the corrections may be given by the examiner in hypothetical form).

Echo sounders

Operate the equipment according to the instructions laid down in the operating manual.

Oral examination

The candidate must be questioned orally on the use of any of the equipment mentioned above, the effects of errors and misalignments and on any other subjects in the syllabus which will assist the examiner in judging the candidate's ability to obtain, interpret and use data from navigational equipment in a competent manner.

4. Issue of certificate

1. A candidate must obtain a pass in both parts of the final examination and achieve the standards required by the Department of Transport in the in-course assessment of theoretical knowledge to qualify for the issue of an *Electronic Navigation Systems Certificate*.
2. Seventy per cent of the marks available must be obtained to pass *Part 1*. To pass *Part 2* a candidate must satisfy the examiner as to his competence to use the equipment, bearing in mind the objectives of the course. A candidate who fails will be required to re-take the complete course before re-setting the examination unless the re-examination is attempted within 12 months of the first attempt.
3. With regard to partial passes, examiners may, at their discretion, allow a referral in either *Part 1* or *Part 2*. The referred part must, however, be attempted within six months of the first attempt. Only one referral will be allowed and a failure in this referral will mean that the candidate must re-take both parts of the examination at the next attempt.

5. Department of Transport approval and moderation

5.1 Progressive assessment of theoretical knowledge

In all cases, i.e. for students either TECHNIKON schemes, other approved schemes of phased training or modular courses, colleges shall submit for approval by Department of Transport their assessment plan for each topic listed in the syllabus. The plan may follow those accepted under the TECHNIKON assessment schemes or, in the case of modular courses, adopt a method of short written examinations set at intervals during the course, each examination covering the subject matter dealt with during the course up to the point of examination.

5.2 Assessment of plotting skills

Colleges shall submit for approval by the Department of Transport copies of question papers to be set under Part 1 of the final examination (these papers should be similar in content and standard to those approved under the Radar Observer examination).

5.3 Conduct of the examination

The examination shall be conducted on behalf of the Department of Transport by an examiner appointed by the college who is acceptable to the Department. However, the Department reserves the right of its officers to conduct an examination, either in whole or in part, at any time.

ANNEXURE Q

NAVIGATION CONTROL COURSE

AIM

To promote command decision-making based on data supplied by navigational instruments, a full appreciation of system errors, a thorough understanding of the operational aspects of modern navigational systems and effective bridge teamwork procedures.

INTENDED FOR

Officers with a minimum of 18 months' service as certificated watch-keeping officers. Possession of an NC certificate will be a prerequisite for issue of the *Class 2 Certificate of Competency and Command Endorsement certificates*.

OBJECTIVE

At the end of the training the officer should be able to evaluate navigational information derived from all sources in order to make and implement command decisions for collision avoidance and for directing the safe navigation of the ship.

To achieve this objective the course will extend the application of navigational and collision avoidance techniques already studied and practised and demonstrate the importance of their interrelationship and the optimum use of the navigational data normally available for conducting the safe navigation of the ship.

TRAINING PLAN

In drawing up the training plan it has been assumed that students will be proficient in basic parallel indexing, radar plotting and passage planning procedures.

When the NC course is taken as part of the college-based course of preparation for the Departmental *Class 2 Certificate of Competency* it should where practicable be complementary to and form the culmination of related studies in the Class 2 syllabus dealing with practical navigation and passage planning procedures. The course need not therefore be treated as a discrete module outside the mainstream of studies, but a minimum of 36 hours should be devoted to the simulator exercises which form part of the course.

Students who are not taking the NC course as part of a full Class 2 certificate study course may need additional time for revision of the basic procedures referred to above before commencing the exercises, and for such students the course may be run as a fulltime block of 60 hours duration.

COURSE PROGRAMME

The course programme and exercises to be conducted are given in Sub-Annex A.

Equipment

The list of equipment required for conduct of the course is given in Sub-Annex B.

Colleges may wish to consider utilising other suitable equipment where available, such as ship simulators and training vessels, for conducting exercises additional to the prescribed simulator exercises which would further enhance certain aspects and achievement of the overall aims of the course, particularly in relation to blind pilotage and bridge teamwork procedures.

ENTRY TO THE COURSE

Students entering this course must have a minimum of 18 months' service as certificated watch-keeping officers and be in possession of an Electronic Navigation Systems Certificate [or both a Radar Observer's Certificate and an Electronic Navigational Aids (Operation) Certificate]. Other categories of seafarers who do not have the required sea service for entry to this course but would, in the opinion of the college, benefit from this training, may be allowed entry to the course. Upon satisfactory completion of the course they may be issued with a college certificate of proficiency.

CONDUCT OF COURSE

It is for training establishments to decide on their own detailed planning of courses and timetable arrangements. However, in implementing the exercises to meet the stated objectives, the following guidelines should be taken into account:

- (i) The exercises should be intensive and appropriate to the maturity and grade of the students
- (ii) the environment in which the exercises are conducted should be conducive to learning through participation rather than formal classroom teaching or lectures
- (iii) the roles played by the students should be representative of the real situation to enable bridge teamwork procedures to be followed
- (iv) following every exercise there should be a general discussion amongst all the officers, during which the exercise is analysed and actions criticised.

ASSESSMENT

There will be no formal examination at the conclusion of the course but students' performance and understanding of the basic principles will be closely monitored throughout the course in accordance with the guidelines in Sub-Annex C.

CERTIFICATE

A Navigation Control Course certificate will be issued to officers who satisfactorily complete the course in accordance with the guidelines given in Sub-Annex C.

Where a student on an integrated course misses a particular session he should be required to make good the deficiency before a certificate is issued.

APPROVAL

Each course programme must be approved by the Department of Transport.

SUB-ANNEX A TO NAVIGATION CONTROL COURSE SPECIFICATION

COURSE PROGRAMME AND EXERCISES TO BE CONDUCTED

1. Introduction

- 1.1 The course must include the programme of simulator exercises described in this Annex, but training establishments are free, within the following general guidelines, to design the details of their own exercises to meet the objectives listed for each stage and to decide appropriate "playing areas" and duration for each exercise.

2. Design of exercises

- (1) The design and conduct of exercises should take into account the following:

- (i) The use and operation of the full range of navigation equipment, including radar and ARPA, will have been studied during the ENS course and some simulator exercises will have been undertaken at that stage.
- (ii) Principles of keeping a safe navigation watch, chartwork, passage planning and bridge teamwork procedures are studied as part of the related work for the certificate of competency syllabuses. Where a student is taking the NC course as part of a course of study leading to the Class 2 examination, instruction in basic techniques of, for instance, passage planning and revision of radar plotting should form part of that course of study. The NC course will reinforce the application of the principles involved through the extremely practical and realistic nature of the exercises.
- (iii) Officers taking the NC course other than as part of a *Class 2 certificate study course* may need additional time for revision of the basic techniques before commencing the NC exercises.
- (iv) Officers who have not attended an *Electronic Navigation Systems (ENS) course*, but who have taken the *Radar Observer and Electronic Navigational Aids (Operation) course*, prior to entry may need to extend Stage 1 of the NC course to provide a full coverage of paragraphs C16-19 of the ENS course syllabus, which includes instruction in the use of ARPAs.
- (v) Students will have gained at least 18 months' experience at sea as certificated watch-keeping officers prior to entering the course.

(2) In meeting the stated objective of the course, due regard should be paid to—

- (i) planning and execution of passages in confined and open waters;
- (ii) the use of radar and ARPA for anti-collision, navigation and blind pilotage;
- (iii) the selection and use of other navigation equipment and data as appropriate to prevailing circumstances;
- (iv) other services and information such as weather reports and the use of Radio Telephone Communications.

(3) Effective bridge teamwork procedures should be emphasised throughout the course.

3. Organisation

- (1) The objective of the course could not be achieved with less than four students in two teams of two each, or more than three students at any own ship.

4. Team roles

- (1) The roles played should be representative of the real situation to enable bridge team work procedures to be followed. For example, it is expected that the *Master* will act as the receiver/co-ordinator of information and will make overall decisions for the safe conduct of *own ship* while the *officer of the watch* will have a primary role in the conduct of the exercise appropriate to the duties of an officer in charge of a navigational watch, assisted by the third team member where available. The teams should device their own plan for the passage to be followed, in accordance with recognised procedures.

Suitable publications, e.g. Admiralty Pilot Books and Tide Tables should be available for this purpose.

- (2) Roles should be changed as appropriate during the course to give each student ample opportunity in command of *own ship* and to operate equipment at each *own ship* position.

5. Conduct of exercises

- (1) On completion of the first stage of the course the officer in command of *own ship* must be allowed to use the techniques he desires in planning the intended passage, in obtaining radar and navigational information and in manoeuvring his ship.
- (2) Discussions should be held amongst all the students following every exercise to analyse and criticise actions taken and records of the exercise should be available for this purpose. Discussions may be followed by demonstrations of the effects of any alternative action which could have been taken or which was suggested in discussion. On occasion it may also be beneficial to demonstrate and compare alternative types of display presentation.

6. Exercises

Stage 1—Collision avoidance exercises

Theme

Open water exercises involving encounters with one or two target ships, progressing to multiship encounters.

The initial exercise(s) should introduce the student to the equipment and update his knowledge of the use of a radar set for collision avoidance employing radar and ARPA techniques.

Objectives

- (i) To refresh the trainee's plotting and interpretation abilities and to increase his appreciation of plotting limitations and errors (including those associated with the use of ARPA systems).
- (ii) To recognise, where action is necessary, the need for generally making substantial alterations of course and/or speed at an early stage in the encounter.
- (iii) To recognise the possibility of cancelling actions being taken, particularly when bearings are initially changing slowly.

Outline of exercises

The exercises should include examples of all categories of realistic encounters which may call for alterations in *own ship* course and/or speed. It is important during this stage that exercises and demonstrations highlight those situations which have occurred in actual collision cases.

Stage 2—Navigation and collision avoidance

Theme

Exercises involving multi-ship encounters when approaching a coastline or other navigational hazard from open waters.

Objectives

To continue practice of collision avoidance manoeuvres involving single and multi-ship encounters and, at the same time—

- (i) enhance the student's ability to work as part of a team when making landfall and navigating in coastal waters;
- (ii) illustrate the need to ascertain the position of own ship and to monitor its progress into coastal waters;
- (iii) test each team's ability to monitor the ship's track in coastal waters and maintain an efficient radar watch.

Outline of exercises

The exercises should cover the following points:

Position fixing using electronic aids to navigation.

The production and execution of a navigation plan for landfall.

Monitoring of the ship's track in coastal waters, including use of parallel index techniques.

The effects on track keeping of tidal streams, current and wind.

The problems of interpreting ground stabilised true motion radar displays.

Collision avoidance manoeuvres.

The occasional malfunction of equipment used in navigation and collision avoidance.

Limitations of ARPA in the navigational role.

*Stage 3—Search and rescue**Theme*

Exercise(s) in either open or coastal waters involving the need to conduct a search and rescue operation while continuing practice in collision avoidance and navigational techniques and procedures.

Objectives

- (i) To practice, both in-ship and inter-ship, search and rescue procedures and techniques, emphasising the need for the search to be co-ordinated and planned to carry out a rescue in the minimum time using to maximum effect the resources available.
- (ii) To enhance the concept of effective bridge teamwork procedures.

Outline of exercise(s)

The casualty should be realistically controlled by the instructor and may, for instance, sink before rescue ships arrive on the scene. Each *own ship*, together with instructor-controlled targets [including helicopter(s)], should be involved in the response to the distress. Exercise(s) should include:

Navigation and anti-collision considerations.

The need for the casualty to assist location by others.

Use of D/F for homing (when provided on a simulator, this facility should be used to enhance the realism of the exercises).

Co-ordination and planning of the search and rescue.

*Stage 4—Navigation and collision avoidance**Theme*

Intensive exercises involving the approaches to and passage through areas of heavy traffic with navigational restrictions.

Objectives

To consolidate correct passage planning and watch-keeping procedures required for effective navigation control in confined waters with heavy traffic.

Outline of exercises

The exercises should stretch the ability of individuals and teams to the realistic maximum. They should include as many aspects as possible of navigation and collision avoidance.

Points covered in Stages 1 and 2 should be introduced as appropriate and the exercise(s) should also include the following:

The production and execution of a passage plan through an area containing focal points for traffic and traffic separation zones. Shore-based traffic information should be included.

Approach to pilot station and pilot embarkation.

At least one exercise should be of sufficient duration to enable realistic handovers to be effected between members of the team as appropriate to prevailing circumstances, e.g. the onset of restricted visibility.

SUB-ANNEX B TO NAVIGATION CONTROL COURSE SPECIFICATION

EQUIPMENT REQUIREMENTS

The following navigational minimum outfit is required for the conduct of the course:

1. A marine navigational equipment simulator¹ which has been awarded a Certificate of Type-Testing by the Department of Transport and which is installed in accommodation approved by the Director-General.
2. The simulator shall drive, in real time, at least three *own ship* positions. Each *own ship* position shall be provided with:
 - (i) A *basic* radar display with trainee control of *own ship* manoeuvring.
 - (ii) Data from (a) a Decca navigator (b) an MF/DF and (c) an echo sounder provided through real, representative or graphic displays, or in alpha-numeric forms.
 - (iii) Appropriate charts, manual plotting aids, a plotting table, a time clock, and compass and ship's speed readouts. Additionally a simulated radio-telephone communications system shall be provided [ship-to-ship and ship-to-shore (instructor's position)].
3. In addition to the requirements of paragraph 1 and 2, at least one² *own ship* position shall be provided with an ARPA display which may be either an integral part of the radar display required in 2 (i) above or a *stand alone* facility. In either case, the display of ARPA features shall be related to the simulation of the *own ship's* position.
4. The navigational displays and data outputs required in paragraphs 2 and 3 above shall be controlled by the simulator computer and be related to the respective *own ship* position with typical errors of these displays being controlled by the instructor. Where appropriate, the relevant operating instructions and error correction data shall be made available to the trainees.
5. Each *own ship* position shall be accommodated in a cubicle or room separated from the other *own ships*, the main simulator computer and the instructor's position by adequate sound proofing.
6. A space for briefing and debriefing shall be made available.
7. Until such time as existing simulators which do not meet the above requirements can either be updated or replaced, existing equipment may continue to be used provided agreement is obtained from the Director-General in each case.

Notes

¹ Simulators manufactured after 1 September 1981 shall comply with the (1980) Performance Specification for such simulators published by the Department of Transport.

² It is foreseen that there may be a requirement for at least two *own ship* positions to be equipped with ARPA, but a decision on this matter cannot be taken until experience of operating the course has been acquired. This additional requirement should be borne in mind when ordering new equipment.

SUB-ANNEX C TO NAVIGATION CONTROL COURSE SPECIFICATION

NAVIGATION CONTROL COURSE—ASSESSMENT

Notes for guidance

General

The principal aim of the assessment is to ascertain whether the student achieves the stated objectives of the course to a level which, in the opinion of the assessor, is considered satisfactory. The assessor must evaluate the performance of each student progressively over the *entire* duration of the course taking full account in the latter stages of any improvements in performance by the student as a result of his learning by participation with his peers. It is implicit that such assessment must be largely subjective and that no obvious "examination-style of objective marking" must be attempted. In most cases weaknesses will be highlighted during debriefing sessions and due account must be taken of any subsequent improvement in performance.

On the other hand, it is vital that a failed assessment should be considered where a student does not show a significant improvement in performance after initially reacting to potentially dangerous situations in an unacceptable manner. The certificate should be withheld until satisfactory retraining has been undertaken. Relevant weak points must be discussed between the assessor and the student concerned.

Criteria

At the end of the course the student should:

1. Take correct (and reasonable) decisions in accordance with the Collision Regulations.
2. Obtain and apply correctly data from the navigational instruments available to him.
3. Use navigational and collision avoidance data in a co-ordinated and interrelated manner for the safe navigation of his ship.
4. Effectively take charge of "own ship" when placed in command.
5. React effectively during emergency situations.
6. Appreciate the implications of allowing a dangerous situation to develop through failure to take early and positive countermeasures.
7. Justify actions taken, and learn from previous actions of himself and others.
8. Appreciate those environmental and operational factors which could restrict the manoeuvrability of "own ship" or other ships.

Footnote: Failure to comply with these criteria at specific points during the course should *not* imply a failed assessment if the student is subsequently aware of his mistake(s) and gives positive indications that his subsequent performance has improved to an acceptable level. Strictly "borderline cases" should be given the benefit of doubt and passed.

ANNEXURE R

AUTOMATIC RADAR PLOTTING AIDS COURSE

AIM

To provide training in the fundamentals and operation of ARPA equipment and in the interpretation and analysis of information obtained from this equipment.

INTENDED FOR

Masters and Officers in charge of a navigational watch serving or intending to serve on ships fitted with ARPA equipment [Note: This training programme forms an essential part of the *Electronic Navigation Systems (ENS) course*; possession of a *DOT ENS Certificate* will, therefore, meet the requirements for officers in charge of a watch of any ship fitted with ARPA equipment].

OBJECTIVE

At the end of the course the officer should be capable of effectively using ARPA equipment as a safe aid to navigation and collision avoidance through an ability to—

1. follow procedures for operating the equipment and maintaining the display;
2. obtain and analyse the data provided;
3. take action as required for the safe conduct of navigation based on correct interpretation and analysis of ARPA data.

SYLLABUS

The syllabus for this course is attached in *Sub-Annex A*.

EQUIPMENT

The minimum equipment for conduct of this course shall consist of an approved ARPA set which meets the IMO specification for such equipment (*IMO Resolution A422 (XI) refers*). The input to the ARPA shall be provided by a simulator with an inter-active capability approved by the Department of Transport.

ENTRY TO THE COURSE

Students entering this course must hold a *Radar Observer's Certificate*. They should ideally also be in possession of *Certificate of Attendance at a DOT approved Radar Simulator Course* and have a minimum of 18 months' sea service.

Officers required to undertake this course who have not previously attended a radar simulator course will be required to follow a preliminary intensive period of revision of basic radar plotting on a radar simulator. It is for the training establishment to decide on the extent of any such preliminary training needed to enable the objectives of the ARPA training to be achieved and whether to allow groups of students having a varied background of radar experience entry to the same ARPA course.

DURATION AND CONDUCT OF COURSE

The time needed to achieve the objectives will depend to a large extent upon previous experience and training and the equipment available for the conduct of the course. As a rule, the course should be based on a requirement that there will be no more than four students, divided into pairs, per ARPA display; that each pair should spend a minimum of 9 hours using the ARPA equipment, and that each student should be given equal opportunity to operate the equipment available.

The syllabus topics should be covered, as appropriate, by instruction, demonstrations and intensive simulator exercises in the use of ARPA. Attention is drawn to the need for the trainees to undergo a series of real-time exercises followed by debriefing and discussion of actions taken during the exercises. Due attention must be given to—

1. the need to act at all times in accordance with the provisions of the *Collision Regulations and the Basic Principles and Operational Guidance for Keeping a Safe Navigational Watch*;
2. the dangers inherent in over-reliance on ARPA data;
3. the capabilities and limitations of the system and those factors which can effect the system's performance and accuracy.

CERTIFICATES

An Automatic Radar Plotting Aids Course certificate will be issued to officers who attend and satisfactorily participate in the course.

APPROVAL OF COURSES

The facilities and course programme must be approved by the Department of Transport.

SUB-ANNEX A TO ARPA COURSE SPECIFICATION

TRAINING IN THE OPERATIONAL USE OF AUTOMATIC RADAR PLOTTING AIDS (ARPA)

1. General

- 1.1 The course must cover the fundamentals and operation of APRA equipment and the interpretation and analysis of information obtained.
- 1.2 In addition to formal instruction and demonstrations, students should complete a series of real-time exercises where the displayed radar information is either in the APRA format or in the basic radar format. Such flexibility of presentation will enable realistic exercises to be undertaken, providing for each group of students the widest range of displayed information available to the user and thus consolidating their ability to use effectively either basic radar or APRA systems.
- 1.3 Attention is drawn to the requirements under the section *Duration and conduct of the course* in the course specification, and to the need for preliminary additional training for students who have not previously undertaken a radar simulator course.
- 1.4 The detailed objectives to be achieved during the course are described in paragraph 2 below, while a more comprehensive syllabus of subjects to be covered by instruction/demonstration and practical exercises is given in paragraphs 3 and 4, respectively.

2. Objectives

On completion of the course, students should have:

2.1 Knowledge of—

- 2.1.1. the possible risks of over-reliance on ARPA;
- 2.1.2. the principal types of ARPA systems and their display characteristics;
- 2.1.3. the IMO performance standards for ARPA;
- 2.1.4. factors affecting system performance and accuracy;
- 2.1.5. tracking capabilities and limitations of ARPA;
- 2.1.6. processing delays.

2.2 Knowledge and ability to demonstrate in conjunction with the use of approved equipment—

- 2.2.1. setting up and maintaining APRA displays;

- 2.2.2. when and how to use the operational warnings, their benefits and limitations;
- 2.2.3. system operational tests;
- 2.2.4. when and how to obtain information in both relative and true motion modes of display, including—
 - (a) identification of critical echoes;
 - (b) use of exclusion areas in automatic mode;
 - (c) speed and direction of target's relative movement;
 - (d) time to and predicted range at target's closest point of approach;
 - (e) course and speed of targets;
 - (f) detecting course and speed changes of targets and the limitations of such information;
 - (g) effect of changes in own ship's course of speed or both;
 - (h) operation of the trial manoeuvre;
- 2.2.5 manual and automatic acquisition of targets and their respective limitations;
- 2.2.6 when and how to use true and relative vectors and typical graphic representation of target information and danger areas;
- 2.2.7 when and how to use information on past positions of targets being tracked;
- 2.2.8 application of the International Regulations for Preventing Collisions at Sea.

3. Syllabus—theory and demonstration

3.1 The possible risks of over-reliance on ARPA

- 3.1.1. Appreciation that ARPA is only a navigational aid and that its limitations, including those of its sensors, make over-reliance on ARPA dangerous, in particular to keeping a look-out. Need to comply at all times with the basic principles and operational guidance for officers in charge of a navigational watch.

3.2 The principal types of ARPA systems and their display characteristics

- 3.2.1. Knowledge of the principal types of ARPA systems in use; their various display characteristics and an understanding of when to use ground or sea stabilised modes and North up, course up or head up presentations.

3.3 IMO performance standards for ARPA.

- 3.3.1. An appreciation of the IMO performance standards for ARPA, in particular the standards relating to accuracy.

3.4 Factors affecting system performance and accuracy.

- 3.4.1. Knowledge of ARPA sensor input performance parameters—radar, compass and speed inputs; effects of sensor malfunction on the accuracy of ARPA data.
- 3.4.2. Effects of the limitations of radar range and bearing discrimination and accuracy; the limitations of compass and speed input on ARPA data.
- 3.4.3. Knowledge of factors which influence vector accuracy.

3.5 Tracking capabilities and limitations.

- 3.5.1. Knowledge of the criteria for the selection of targets by automatic acquisition.
- 3.5.2. Factors leading to the correct choice of targets for manual acquisition.
- 3.5.3. Effects on tracking of *lost* targets and target fading.
- 3.5.4. Circumstances causing *target swap* and its effects on displayed data.

3.6 Processing delays.

- 3.6.1. The delays inherent in the display of processed ARPA information, particularly on acquisition and re-acquisition or when a tracked target manoeuvres.

3.7 When and how to use the operational warnings, their benefits and limitations.

- 3.7.1. Appreciation of the uses, benefits and limitations of ARPA operational warnings; correct setting, where applicable, to avoid superfluous interference.

3.8 System operation tests.

3.8.1. Methods of testing ARPA systems for malfunctions, including functional self-testing.

3.8.2. Precautions to be taken after a malfunction occurs.

3.9 Manual and automatic acquisition of targets and their respective limitations.

3.9.1. Knowledge of the limits imposed on both types of acquisition in multitarget scenarios; effects on acquisition of target and target swap.

3.10 When and how to use true and relative vectors and typical graphic representation of target information and danger areas.

3.10.1. Thorough knowledge of true and relative vectors; derivation of target's true courses and speeds.

3.10.2. Threat assessment; derivation of predicted closest point of approach and predicted time to closest point of approach from forward extrapolation of vectors; the use of graphic representation of danger areas.

3.10.3. Effects of alterations of courses and/or speeds of own ship and/or targets on predicted closest point of approach and predicted time to closest point of approach and danger areas.

3.10.4. Effects of incorrect vectors and danger areas.

3.10.5. Benefit of switching between true and relative vectors.

3.11 When and how to use information on past position of targets being tracked.

3.11.1. Knowledge of the derivation of past positions of targets being tracked, recognition of historical data as a means of indicating recent manoeuvring of targets and as a method of checking the validity of the ARPA's tracking.

4. Syllabus—practical exercises

4.1 Setting up and maintaining displays.

4.1.1. The correct starting procedure to obtain the optimum display of ARPA information.

4.1.2. Choice of display presentation; stabilised relative motion displays and true motion displays.

4.1.3. Correct adjustment of all variable radar display controls for optimum display of data.

4.1.4. Selection, as appropriate, of required speed input to ARPA.

4.1.5. Selection of ARPA plotting controls, manual/automatic acquisition, vector/graphic display of data.

4.1.6. Selection of the time scale of vectors/graphics.

4.1.7. Use of exclusion areas when automatic acquisition is employed by ARPA.

4.1.8. Performance checks of radar, compass, speed input sensors and ARPA.

4.2 System operational tests.

4.2.1. System checks and determining data accuracy of ARPA including the trial manoeuvre facility by checking against basic radar plot.

4.3 When and how to obtain information from ARPA display.

4.3.1. Demonstrate ability to obtain information in both relative and true motion modes of display, including—

(a) identification of critical echoes;

(b) speed and direction of target's relative movement;

(c) time to and predicted range at target's closest point of approach;

(d) course and speed of targets;

(e) detecting course and speed changes of targets and the limitations of such information;

(f) effect of changes in own ship's course or speed or both;

(g) operation of the trial manoeuvre.

4.4 Application of the International Regulations for Preventing Collisions at Sea.

4.4.1. Analysis of potential collision situations from displayed information, determination and execution of action to avoid close-quarter situations in accordance with the *International Regulations for Preventing Collisions at Sea*.

BELANGRIKE AANKONDIGING

Sluitingstye **VOOR VAKANSIEDAE** vir

WETLIKE KENNISGEWINGS
GOEWERMENSKENNISGEWINGS **1994**

Die sluitingstyd is stiptelik 15:00 op die volgende dae:

- ▶ **24 Maart**, Donderdag, vir die uitgawe van Donderdag **31 Maart**
- ▶ **29 Maart**, Dinsdag, vir die uitgawe van Vrydag **8 April**
- ▶ **21 April**, Donderdag, vir die uitgawe van Vrydag **29 April**
- ▶ **5 Mei**, Donderdag, vir die uitgawe van Vrydag **13 Mei**
- ▶ **26 Mei**, Donderdag, vir die uitgawe van Vrydag **3 Junie**
- ▶ **6 Oktober**, Donderdag, vir die uitgawe van Vrydag **14 Oktober**
- ▶ **8 Desember**, Donderdag, vir die uitgawe van Donderdag **15 Desember**
- ▶ **22 Desember**, Donderdag, vir die uitgawe van Vrydag **30 Desember**

Laat kennisgewings sal in die daaropvolgende uitgawe geplaas word. Indien 'n laat kennisgewing wel, onder spesiale omstandighede, aanvaar word, sal 'n dubbeltarief gehef word

Wanneer 'n **APARTE Staatskoerant** verlang word moet die kopie drie kalenderweke voor publikasie ingedien word

IMPORTANT ANNOUNCEMENT

Closing times **PRIOR TO PUBLIC HOLIDAYS** for

LEGAL NOTICES
GOVERNMENT NOTICES **1994**

The closing time is 15:00 sharp on the following days:

- ▶ **24 March**, Thursday, for the issue of Thursday **31 March**
- ▶ **29 March**, Tuesday, for the issue of Friday **8 April**
- ▶ **21 April**, Thursday, for the issue of Friday **29 April**
- ▶ **5 May**, Thursday, for the issue of Friday **13 May**
- ▶ **26 May**, Thursday, for the issue of Friday **3 June**
- ▶ **6 October**, Thursday, for the issue of Friday **14 October**
- ▶ **8 December**, Thursday, for the issue of Thursday **15 December**
- ▶ **22 December**, Thursday, for the issue of Friday **30 December**

Late notices will be published in the subsequent issue, if under special circumstances, a late notice is being accepted, a double tariff will be charged

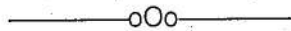
The copy for a **SEPARATE Government Gazette** must be handed in not later than three calendar weeks before date of publication

BELANGRIK!!

Plasing van tale:

Staatskoerante

1. Hiermee word bekendgemaak dat die omruil van tale in die *Staatskoerant* jaarliks geskied met die eerste uitgawe in Oktober.
2. Vir die tydperk 1 Oktober 1993 tot 30 September 1994 word Afrikaans EERSTE geplaas.
3. Hierdie reëling is in ooreenstemming met dié van die Parlement waarby koerante met Wette ens. die taalvolgorde deurgaans behou vir die duur van die sitting.
4. *Dit word dus van u, as adverteerder, verwag om u kopie met bogenoemde reëling te laat strook om onnodige omskakeling en stylredigering in ooreenstemming te bring.*



IMPORTANT!!

Placing of languages:

Government Gazettes

1. Notice is hereby given that the interchange of languages in the *Government Gazette* will be effected annually from the first issue in October.
2. For the period 1 October 1993 to 30 September 1994, Afrikaans is to be placed FIRST.
3. This arrangement is in conformity with Gazettes containing Act of Parliament etc. where the language sequence remains constant throughout the sitting of Parliament.
4. *It is therefore expected of you, the advertiser, to see that your copy is in accordance with the above-mentioned arrangement in order to avoid unnecessary style changes and editing to correspond with the correct style.*



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IS YOUR SITE REGISTERED?

Departement van Omgewingsake



Department of Environment Affairs

INHOUD

<i>No.</i>		<i>Bladsy No.</i>	<i>Koerant No.</i>
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	Vervoer, Departement van		
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