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# OFFICIAL GAZETTE



## GOVERNMENT OF GOA

### EXTRAORDINARY

#### GOVERNMENT OF GOA

Department of Inland Waterways

##### Notification

1/87/80-ILD

The following draft rules which the Government of Goa proposes to make in exercise of the powers conferred by section 29 of the Inland Vessels Act, 1917 (Central Act 1 of 1917) (hereinafter called the 'said Act'), are hereby pre-published as required by sub-section (1) of section 74 of the said Act, for the information of all persons likely to be affected thereby and notice is hereby given that the said draft rules will be taken into consideration by the Government after the expiry of thirty days from the date of publication of this Notification in the Official Gazette.

All objections and suggestions to the said draft rules may be forwarded to the Secretary, Inland Water Transport Department, Government of Goa, Secretariat, Panaji, before the expiry of thirty days from the date of publication of this Notification in the Official Gazette.

##### DRAFT RULES

In exercise of the powers conferred by section 29 of the Inland Vessels Act, 1917 (Central Act 1 of 1917), the Government of Goa hereby makes the following rules, namely:—

1. *Short title and commencement*:— (1) These rules may be called the Goa Examination and Grant of Certificate of Competency to Masters, Serangs, Inland Engineers and Engine Drivers of Inland Mechanically Propelled Vessels Rules, 1996.

(2) They shall come into force at once.

2. *Certificates granted to persons who pass examination*.— Certificates of Competency shall be granted to those persons who pass the requisite examinations and otherwise comply with the

requisite conditions. For this purpose, examiners shall be appointed and arrangements made for holding examinations whenever necessary at the Ports of Panaji and Mormugao.

3. *Date and time of examination*.— The examination shall be held by prior appointment on all week days except on Sundays and other holidays between 10 a. m. and 5 p. m.

4. *Application how to be made*.— Candidates for examination shall make their application in Form No. 1 appended to these rules which shall be filled up at the Captain of Ports Office, Panaji or Mormugao. The Form properly filled in, together with the candidate's testimonials and discharges, shall be lodged with the President of the Board of Examiners not later than seven days before the day of examination.

5. *Testimonials required*.— Testimonials of character and of sobriety, experience, ability and good conduct on board the vessels and at least twelve months service preceding the date of application shall be required to be produced by all applicants. Applicants who have not served on board a vessel, within the last twelve months shall be required to produce, in addition to the testimonials hereinbefore mentioned, certificates of a like nature from their employers. No candidate shall be allowed to be examined unless he has served on board a vessel at sea or on inland waters for at least two years within the last six years and six months within the last three years, preceding the date of his application to be examined.

6. *Verification of Service*.— For all grades of certificates, Service in capacities other than those belonging to the Department i. e. as Cook, Steward, Clerk, Carpenter, etc., for which the candidate is to be examined, shall not be accepted.

Testimonials of service shall ordinarily be based on the employer's office records.

Services claimed which cannot be verified from the employer's office records shall be authenticated by affidavits of persons under whom such service has been performed as well as by an affidavit of the candidate himself.

7. *Certificate as to age*. — If any doubt arises as to the age of a candidate, he shall be required to produce a certificate of birth or baptism.

8. *Gaps in Service*. — Candidates shall be required to account for any gaps in their service with documentary evidence.

#### SIGHT TESTS

9. (a) *Prescribed tests*. — Every candidate for a deck certificate of competency shall pass the prescribed sight test before a certificate may be issued to him. If circumstances render it necessary for him to proceed with the examination in navigation and seamanship before undergoing the sight tests, he shall be informed that the Examination in navigation and Seamanship shall be cancelled in the event of his failure to pass either of the sight tests.

*Notes:* Detailed information with regards to the conduct of examination and standard required is contained in appendices A, B, C and D to these rules.

(b) *Letter test*. — Every candidate for a deck certificate of competency shall undergo the letter test. He shall be required to pass a Higher Standard viz. normal vision using both eyes or either eye separately.

(c) *Lantern test*. — Every candidate for a deck certificate of competency shall undergo the lantern test on every occasion on which he presents himself for examination for his first certificate of competency, but if he then passes, he shall not be required to undergo lantern test on any subsequent occasion.

(d) *Passing or failure in examination letter test*. — If the candidate passes the letter test, he shall be required to undergo the lantern test, unless, he holds a certificate of competency. If he fails in the letter test, he may,— (i) proceed to the lantern test in which case the result of both tests will be taken into consideration in deciding whether he has passed, or

(ii) break off the examination and present himself for re-examination in not less than three months time.

(e) *Lantern test*. — If the candidate passes the lantern test after passing the letter test, he shall be deemed to have passed the test.

If the result of the lantern test is inconclusive, or if the candidate passes it after failing in the letter test, his case shall be submitted to the Captain of Ports, Panaji, who shall decide whether he has passed or failed, or whether he has to be referred for a special examination.

If the candidate fails to pass a lantern test, the examiner shall point out to him the condition stated in sub-rule (g) under which he may appeal. Appeals shall be made through the Captain of Ports and forwarded to the Government with the Examiner remark.

A candidate who fails to pass the lantern test, shall not be re-examined unless the Captain of Ports decides that he may be

re-examined after a lapse of three months. A certificate shall be issued to the candidate stating whether he may or may not be re-examined.

(f) *Special examination*. — In case of a candidate who is referred for further examination, the Captain of Ports shall make arrangements for a special examination for which no additional fee shall be charged.

(g) *Appeal cases*. — A candidate who is adjudged to have failed in the lantern test may appeal to the Government, which may, if it deems fit, remit the case to a special body of examiners for decision. Such candidate shall be required to pay a special fee of Rs. 50/- which shall be returned to him if he is declared to have passed the special examination.

(h) *Candidates to attend punctually for special examination*. — Candidates who are referred to for a special examination or who appeal against the result of the local tests, shall be notified by the Government of the time at which they should attend for special examination and the candidates shall inform the Captain of Ports whether or not they will be able to attend at that time. Any candidate who, after informing the Captain of Ports that he will attend, fails to appear at the time appointed, shall be liable to have his examination postponed indefinitely, and also if he has appealed under sub-rule (g), shall forfeit the appeal fee of Rs. 50/- and shall be required to deposit a further fee of the same amount before further arrangements are made for his special examination.

(i) *Failure in special examination*. — Where, during the course of a special examination, a candidate who has appealed or has been referred under sub-rule (f) is found to have a permanent defect in his eye-sight such as to render him unfit for a sea career, he shall be finally rejected and shall not be allowed to be examined again in the sight test on any future occasion:

Provided that, if the candidate is still dissatisfied, it shall be open to him, if he so desires, to present himself for a second special examination on payment of a fee of rupees seventy five. Such candidate shall be required to bring with him a friend to witness the examination.

A second examination under this sub-rule shall be entirely voluntary and shall form no part of the examination for a Certificate of Competency. The Government may take into consideration the result of such examination in determining whether a certificate should be granted.

The special appeal fee of rupees seventy five shall not be refundable unless, in the special circumstances of an individual's case, the Government thinks fit to refund it.

#### Qualifications for Certificates of Competency as Serang.

10. *Examination in prescribed sight tests*. — All candidates for certificates of Competency as Serang shall first be examined in the sight tests as laid down.

11. *Age.* — A candidate for a Certificate of Competency as Serang of an inland vessel shall be not less than 25 years of age and shall produce satisfactory testimonials of sobriety and intelligence.

12. *Qualifications.* — (1) A candidate for a Certificate of Competency as Serang shall have minimum qualification of Seventh Standard passed in English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(2) Such candidates who, desire to appear for the examination of Competency as Serang should produce the Certificate of New Entrants Training Course in the Maritime School, Britona, for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(3) Candidates who have passed Seventh Standard prior to year 1989, and in possession of Advanced/Refresher Training Course Certificate as Serang should undergo present Advanced/Refresher Training Course as Serang in the Maritime School, Britona, and produce certificate for verification.

(4) Such candidates must have six years of service at sea or on Inland waters, one year of which service shall be as helsman or as Assistant Master (Deck) or Sukani or total of six years' service as sailor, and should have performed at least six months service on board the vessel plying in the Port/Inland Rivers of the State where the Candidate is appearing for the examination of Serang.

4 (1) Such candidates who have passed IX Std. must have four years of service at sea or on Inland waters, one year of which service must be as Helsman or as Asstt. Master or Sukani or total of four years of service as Sailor and should have performed at least six months service on board the vessel plying in the Port/Inland Rivers of the State Candidate is appearing for the examination of Serang and shall be examined in the following subjects:

(a) the rules of the road as regards both sailing vessels and mechanically propelled vessels, their regulation, lights, fog and sound signals;

(b) the marking and use of the lead line and knowledge of the compass;

(c) management of a boat under oars or sail;

(d) steps to be taken in the event of vessel grounding;

(e) management of inland vessels under all conditions;

(f) management of inland vessels under tow or when towed;

(g) practical questions on carriage of iron ore;

(h) the provisions of the rules made by Captain of Ports in respect of Life Saving and Fire Appliances and general discipline.

13. *Failure.*— If a candidate fails in an examination for a Certificate of Competency as Serang, he shall not be re-examined

till he has rendered additional service for three months as Helsman, or Assistant Master or Sukani or Sailor and produces Medical Sea Fitness Certificate.

#### Qualifications for Certificate of Competency as Second Class Master

14. *Examination in prescribed sight tests.*— All candidates for Certificates of Competency as Second Class Master shall first be examined in the sight tests, as laid down.

15. *Age.*— A candidate for a Certificate of Competency as Second Class Master of an Inland Vessel shall be not less than 27 years of age and not more than 55 years of age and shall produce testimonials of sobriety and intelligence.

16. *Qualifications.* — (1) A candidate for certificate of competency as Second Class Master shall have minimum qualification of Seventh Standard passed and should hold Certificate of Competency as Serang.

(2) Such candidates who desire to appear for the examination of Competency as 2nd Class Master should undergo Advanced Refresher training course of II Class Master in the Maritime School, Britona the candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(3) Such candidates must have two years service as Helsman/Sukani of inland vessel having not less than 50 N. H. P./282 BHP or three years service as Serang of an inland motor Vessel having less than 50 N. H. P./282 BHP. A candidate for certificate of competency as Second Class Master shall be examined viva voce in the following subjects:—

(a) management of inland vessels and inland mechanically propelled vessels under all conditions;

(b) knowledge of storm and distress signals;

(c) knowledge of the compass;

(d) knowledge of inland waters of Goa, its anchorages, shoals, buoyage, beacons, lights and other such matters.

17. *Failure.* — If a candidate fails in an examination for a Certificate of Competency as Second Class Master, he shall not be re-examined until he has rendered additional service for three months as Helsman of a vessel of not less than 50 nominal horse power 282 BHP or as Serang in charge of an inland vessel of not less than 50 nominal horse power/282 BHP.

18. *No.refund of fee permitted.*— The fee which the candidate has paid shall not be refunded to him and on presenting himself, when entitled so to do, for re-examination for the higher grade of certificate, he shall be required to pay the full fee again.

Qualifications for Certificates of Competency  
As First Class Master

19. *Examination in prescribed sight tests.*— All candidates for Certificate of Competency as First Class Master shall first be examined in the sight tests, as laid down.

20. *Age.*— A candidate for a Certificate of Competency as First Class Master of an inland vessel shall not be less than 29 years of age and shall produce testimonials of sobriety and intelligence.

21. *Qualifications.*— (1) A candidate for Certificate of Competency as First Class Master shall have minimum qualification of Seventh Standard passed in English or Hindi or Marathi or Gujarathi and knowledge of regional language.

(2) Such candidate should hold Certificate of Competency/Service as Second Class Master.

(3) Such candidates who desire to appear for the examination of Competency as 1st Class Master should undergo Advanced Refresher Training Course/1st Class Master in the Maritime School, Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(4) Such candidate must have served:—

(a) as Master of a Motor vessel of not less than 40 nominal horse power 226 BHP for a period not less than 1 1/2 years, while holding a Certificate of Competency as Second Class Master,

or

(b) as Assistant Master of a vessel of not less than 100 nominal horse power 565 BHP while holding a certificate of competency as Second Class Master for a period of not less than 2 years.

22. *Additional Knowledge.*— In addition to the knowledge required for the grades of Serang and Second Class Master, a Candidate for Certificate of Competency as First Class Master shall be examined in viva voce in each of the following subject:

(a) knowledge of tide-tables and effect of currents;

(b) knowledge of hydrographic charts of inland waters of Goa;

(c) how to turn a vessel of any size or type short round, bring her to an anchor and get underway, also how to bring a vessel alongside a jetty, pier or wharf and take her off again and precaution to be taken with regard to engines. Handling of twin screw vessels, writing of log books, and weather, loading of ore, cargo and other general cargoes;

(d) knowledge of fire fighting appliances, light and sound signals, life saving appliances and their uses;

(e) knowledge of the provisions of the Inland Vessels Act, 1917 (Central Act 1 of 1917), and the rules framed thereunder;

(f) knowledge of Mormugao and Panaji Port Rules and also Customs Regulations in-so-far as they are applicable to inland mechanically propelled vessels;

(g) signalling, recognition of alphabet and numbers through the international Code of Flage and Morse, use of ensign flag;

(h) working knowledge of English or Hindi or Marathi or Gujarathi with minimum qualification of Seventh Standard passed and knowledge of the regional language;

(i) seasons and general weather of the area throughout the year;

(j) he should be fully conversant with the use of Mariner's Compass and be able to make use of weather reports issued for the area;

(k) towage.

23. *Failure.*— If a candidate fails in an examination for a Certificate of Competency as first Class Master, he shall not be re-examined until he has rendered additional service for six months.

24. *Report.*— The examiner may call for a report on medical check up of a candidate for Certificate of Competency as First Class Master from the nearest Government Hospital or Doctor before examining him.

Qualifications for Certificate of Competency as Second  
Class Engine drivers of Inland Motor Vessels

25. *Age.*— A candidate for a Certificate of Competency as Second Class engine driver of an inland motor vessel shall not be less than 25 years of age, and not more than 55 years of age.

26. *Qualifications.*— (1) Such candidate shall have minimum qualification of Seventh Standard pass in English, or Hindi or Marathi or Konkani and knowledge of regional language.

(2) Such candidate who desire to appear for examination of Competency as Second Class Engine Driver of inland vessel should undergo New Entrants Training course for Engine Room in the Maritime School, Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(3) Candidates who have passed Seventh Standard prior to year 1989, and in possession of Advanced/Refresher Training Course Certificate as Second Class Engine Driver should undergo present Advanced/Refresher Training Course as Second Class Engine Driver in the Maritime School, Britona and produce certificate for verification.

(4) Such candidate must have served:—

(a) for a period of not less than five years in the engine room of a motor vessel of not less than 226 brake horse power, of which period not less than one year must have been served as Assistant Driver or total of six years service as Sailor (engine);

(b) for period of not less than six years in the engine room of a motor vessel having engines of not less than 85 brake horse power, or eight years in the engine-room of a vessel having engines of not less than 40 brake horse power of which period not less than one year must have been as assistant driver or oilman.

(c) Such candidate who has passed 9th Std. must have four years of service at Sea or on Inland Waters, one year of which service must be as an Oilman or as an Asstt. Driver or total of four years of service as Sailor and should have performed at least six months service on board the vessel plying in the Port/Inland Rivers of the State/candidate is appearing for the examination of 2nd class engine driver.

27. *Knowledge required.*— Such candidate shall:—

(a) satisfactorily pass a viva voce examination on the working of the various types of internal combustion engines and be able to name the principal parts of the machinery;

(b) be required to know what attention is required by the various parts of the machinery, understand the use and management of the different valves, corks, pipes and connections and be familiar with the various methods of supplying air and fuel to the cylinders.

(c) be required to be able to describe the chief causes which may make the engine difficult to start and explain how he would proceed to remedy any defects connected therewith; he shall also be able to show that he understands the mechanism of the starting and reversing arrangements and that he is competent to deal with defects therein;

(d) be required to be able to overhaul an engine, to adjust the working parts and to put the engine together again in good working condition. He shall also be required to understand how to make good the result of ordinary wear and tear to the machinery and how to correct defects from accidents;

(e) be required to be familiar with the nature and properties of the various fuel oils used in internal combustion engines. He must understand what is meant by flash point; and

(f) be required to know the danger resulting from leakage from the fuel oil tanks and must understand the precautions to be taken against explosion. He shall also be able to take the necessary precautions to guard against the escape of inflammable vapour from the vapourizer when the engines are stopped. He must know how to deal with fire should it break out.

28. *Practical Test.*— The candidate shall also be able, if required to show his practical knowledge by actually working the engines of a motor vessel in the presence of the Examiner.

#### Qualifications for Certificates of Competency as First Class Engine Drivers of Inland Motor Vessels

29. *Age.*— A candidate for a Certificate of Competency as First Class Engine Driver of an inland motor vessel shall be not less than 27 years of age.

30. *Qualifications.*— (1) Such candidate should possess Certificate of Competency/Service as 2nd Class Engine Driver.

(2) Such candidate shall have minimum qualification of Seventh Standard passed in English or Hindi and knowledge of regional language.

(3) Such candidate who desire to appear for examination of Competency as First Class Engine Driver of an inland motor vessel should undergo Advanced Refresher Training Course for 1st Class engine driver in the Maritime School, Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(4) Such candidate must have served:—

(a) for a period not less than one year as Assistant Engine driver on regular watch on the main engines of a motor vessel of not less than 565 brake horse power, while holding a Second Class Engine Driver's Certificate for motor vessels; or

(b) for a period of not less than 18 months as Assistant Engine Driver/Oilman with a Second Class Engine-Driver's certificate of motor vessels in charge of a watch on the main engines of a motor vessel of not less than 226 brake horse power; or

(c) for a period of not less than four years in the engine room of a motor vessel of not less than 226 brake horse power of which period not less than one year must have been served as an assistant driver or oilman whilst holding a Second Class Engine/Driver's Certificate for motor vessels; or

(d) for a period of not less than 18 months with a Second Class Engine Driver's Certificate for motor vessels as driver incharge of the engine of a motor vessel of not less than 113 brake horse power.

31. *Additional qualifications:*— (1) Such a candidate shall pass viva voce examination similar to that required by rule 27 for a Second Class Enginedriver's Certificate but of a more advanced stage.

(2) Such candidate who desire to appear for examination of Competency of First Class Engine Driver should be able to overhaul an engine, to adjust the working parts and to put the engine together again in good working condition. He shall also be required to understand how to make good the result of ordinary wear and tear to the machinery and how to correct defects from accidents. He must know valve setting and injector setting of marine engine and be able to replace liner and head of engines with appropriate knowledge of torquese and must also have knowledge of trouble shooting of engines.

#### Qualifications for Certificate of Competency as Engineers of Inland Motor Vessels

32. *Age.*— A candidate for a certificate of Competency as engineer of an inland motor vessel shall not be less than the age of 29 years.

33. *Qualifications.*— (1) Such candidates shall have minimum qualification of Seventh Standard passed of English or Hindi or Marathi or Gujarathi and knowledge of regional language.

Such candidates who desire to appear for examination of Competency as Engineer of an Inland Motor Vessel should

undergo Advanced Refresher Inland Engineer Training Course in the Maritime School, Britona. The candidate is required to produce the said certificate for verification. The training period of the respective course shall be considered as a sea service for the purpose of computing the total qualifying service.

(2) (a) He should hold 1st Class Engine Driver's Competency Service Certificate under the Inland Vessels Act, 1917 (Central Act I of 1917).

(b) He should have worked for 18 months on a vessel having engines more than 226 BHP and less 565 BHP/or he has to work more than 27 months on a vessel having less than 226 BHP while holding 1st Class Engine Driver Certificate issued under the Inland Vessels Act, 1917 (Central Act I of 1917).

(3) *Knowledge required:*— Such candidate should:—

(a) be able to write a legible hand and have a good knowledge of arithmetic upto and including vulgar and decimal fractions and square root. He shall also be able to work out questions relating to spring or level loaded safety and relief valves, consumption of oils and stores, capacities of tanks, to bunkers, speed of vessel and other similar problems and be able to calculate suitable working pressures for air receivers of given dimensions and the stress per square inch on crank and tunnel shafts and other parts of the machinery when the necessary data are furnished;

(b) be able to give a clear explanation of the principles on which oil, gas or other internal combustion engine works, including the methods of ignition, to point out the differences between them and to show by means of illustrative sketches and otherwise that he understands the details of the construction of those in general use;

(c) be familiar with the various methods of supplying air and fuel to the cylinders in the different types engines, the construction of the apparatus for carburetting, atomising or gasifying the fuel, and the means for cooling the cylinders, pistons, etc.

(d) have satisfactory knowledge of the process employed in the construction of internal combustion engines in the workshop and of the methods used in fitting the machinery on board a ship;

(e) know what attention is required by the various parts of the machinery and understand the use and management of the different valves, cocks, pipes and connections;

(f) be able to state and describe the chief causes which may make the engines difficult to start and explain how he would proceed to remedy any defects arising therefrom. He must also be able to show that he understands the mechanism of the starting and reversing arrangements and is competent to deal with defects therein;

(g) understand how to make good the result of ordinary wear and tear to the machinery, how to test the fairness of shafting, etc., and how temporary or permanent repair could be affected in case of derangement or total break-down;

(h) understand the construction of the pressure gauge, barometer, thermometer and other instruments used in the engine room and the principles on which they work;

(i) understand the construction and working of centrifugal bucket and plunger pumps and the principles on which they act.

(j) understand the construction and working of air compressors, gas producers, steering engines, electric light engines, dynamoes, electric motor, refrigerating, hydraulic and other auxiliary machinery found on board a ship;

(k) possess a good working knowledge of the construction and management of auxiliary steam boilers and machinery and be familiar with the prominent facts relating to combustion, heat and steam;

(l) be familiar with the nature and properties of the various oils, etc., generally used in internal combustion engine and understand what is meant by "flash point" and have knowledge of the explosive properties of gas or the vapour given off by those oils etc., when mixed with definite quantities of air, and be thoroughly conversant with the danger of exposing such gas or vapour to a naked light or of allowing any leakage from the oil tanks particularly into the vessel's bilges, and non ventilated spaces, or from gas producers, pipes vapourizers, etc.;

(m) thoroughly understand the precaution to be taken against fire or explosion from oil or gas, and know how to deal with fire, should it break out. He should also be familiar with the action of wire gauge diaphragms when placed in pipes and connections to oil tanks, etc., for the purpose of preventing the explosion or ignition of oil vapour therein;

(n) be able to explain the principal, construction and arrangement of primary and secondary batteries and induction coils so far as it necessary for the efficient management of an oil engine;

(o) be able to take off and calculate indicator diagrams and understand the action of the gas in the cylinder as shown thereby; and

(p) have a fair knowledge of the rudiment of projection and be able to make a dimensioned working drawing of some simple part of the machinery with which he ought to be familiar or to complete and develop a given example. Drawing boards and T-squares will be provided but candidates shall have to bring with them any drawing instruments they require.

34. *Motor vessel certificate to Steam Vessel Engineers.* — An engineer in possession of a (steam) Certificate of Competency as an engineer is also eligible for a certificate as an engineer of inland motor vessels under the following conditions:—

(a) he must have served, for not less than six months, as an assistant engineer on regular watch on the main engines of a sea-going ship propelled by internal combustion, engines of a not less than 565 brake horse power or nine months in a similar inland vessel whilst holding a First Class Certificate of

Competency for sea-going steamships granted or recognised as valid under the Merchant Shipping Act, 1958 (Central Act 44 of 1958). He shall also satisfy the Examiners that he is fully conversant with internal combustion and be able to show both in writing and in a viva voce examination that he has satisfactory knowledge of the subjects covered by sub-rules (c) to (h) and (m) to (p) of rule 33 of these rules; or

(b) he must have served for not less than twelve months as an assistant engineer on regular watch on the main engine of a sea-going ship propelled by internal combustion engines of not less than 565 brake horse power or eighteen months in a similar inland vessel whilst holding a Second Class Certificate of Competency for sea-going steamships, granted or recognised as valid under the Merchant Shipping Act, 1958 (Central Act 44 of 1958). He shall also satisfy the Examiners that he is fully conversant with internal combustion engines and be able to show both in writing and in a viva voce examination that he has satisfactory knowledge of the subjects covered by sub-rules (c) to (h) and (m) to (p) of rule 33 of these rules.

35. *Motor endorsement on steam vessel certificate.* — Engineers in possession of steam Certificates of Competency as engineers granted under the Inland Vessels Act, 1997 (Central Act 1 of 1997) may be examined for motor endorsement on their certificates provided that they have served for not less than twelve months as assistant engineers on regular watch on the main engines of sea-going ship propelled by internal combustion engines of not less than 565 brake horse power or eighteen months on a similar inland vessel whilst holding certificate as engineer.

#### General Rules as to Examination

36. *Candidates not to take books, etc. into examination room.* — All books necessary for the use of candidates under examination shall be provided by the Government and applicants shall not be permitted to take into the examination room any books, paper, documents, or memoranda of any description whatsoever; and, subject to the provision referred to hereafter, they will also not be allowed to work out their problems on a slate or on waste paper.

37. *Supply of additional papers.* — Candidates shall be allowed in the time allotted to cancel any part of their work, and when required, additional papers shall be supplied by the examiners. These additional sheets must be attached to and form part of, the examination papers.

38. *Punishment for breking rules.* — In the event of any candidate being found copying from another, or affording any assistance or giving any information to another, or communicating in any way with another during the time of examination, he shall be regarded as having failed in his examination, and shall be debarred from re-examination for a period of three months, as if he had failed in the practical part of the examination, and no part of the fees paid for examination shall be refunded to him.

39. *Leaving examination room.* — If a candidate leaves the room before answering any question which has been given to him, he shall not afterwards be permitted to answer it, but the examiners may substitute the question by other data or another question.

40. (a) *Questions and answers.* — The examination of candidates for Certificates of Competency as engineers shall consist of four parts, namely:— Arithmetic, Drawing, Elementary Questions and viva voce.

41. *Answer in the Form.* — The Form on which these answers are to be written, shall contain also some questions as the experience of the applicant, to be answered by him in writing.

42. *Additions to questions.* — Examiners may add to their viva voce examinations questions on practical management of steam engines and boilers.

43. *Standard required to pass examination.* — If, at the expiration of the time allowed, the candidate has worked out correctly the whole of the questions set to him, and gives satisfactory answers in the viva voce examination, he shall be declared to have passed the examination.

If, at the expiration of the time allowed, he has not worked out the whole of the question set to him, but if the result of the viva voce examination taken in connection with the answers to such of the questions as he has worked out, is sufficient to satisfy the examiner that the applicant is competent to take charge of engines, he shall be declared to have passed the examination. In other cases, he shall be declared to have failed the examination.

44. *Report of examination.* — A Report of the examination and the examination papers, shall be forwarded to the Captain of Ports, Panaji.

45. *Issue of Certificate of Competency to successful candidate.* — On receipt of report from the Captain of Ports certifying that the candidate is eligible for grant of certificate of competency of the grade applied for by the candidate, the Government shall issue a Certificate of Competency in the respective Form under "Appendix-E" appended to these rules to the successful candidates.

If a candidate fails in the viva voce or practical part of the examination, he may not present himself for re-examination until he produces proof of three months further service afloat. If he fails in arithmetic or drawing only, he may come up again for examination at any time. Engine Drivers may be examined de novo after six months service afloat.

#### Fees

46. *When fees are to be paid.* — Candidates for examination, in making their applications, shall be required to pay the examination fees before any step is taken, whether by inquiring into their services or testing their qualifications, etc. No part of the fee shall under any circumstances be returned to them; but should it be found their service is not sufficient to entitle them to be examined or that their testimonials are unsatisfactory, they shall be allowed to present themselves for examination without paying any further fees, when they have fulfilled the requisite service or are able to produce satisfactory testimonials, as the case may be.

47. *Where fees are to be paid.* — The fee for examination shall be paid in the office of the Captain of Ports, Panaji or Mormugao. If a candidate is found offering money to any person other than the Cashier, and in any place except in the cash section, the



candidate so offering money shall be regarded as having committed an act of misconduct, and shall be debarred from examination and shall not be allowed to be examined for twelve months from the date of such debarring.

48. *Refund of Fees.*— The fees for deck certificate include the fee of rupees five for re-examination in sight tests, and if a candidate fails to pass these tests, this fee shall, with the exception of rupees five, be re-funded to him. If a candidate fails to pass any other part of the examination, no part of the fees paid shall be refunded to him.

If a candidate for engine-room certificate fails in his examination, no part of the fees paid shall be refunded to him.

49. *Scale of fees.*— Fees for examination for Grant of Certificate of Competency as Masters or Serangs, Engineers or Engine Drivers shall be Rs. 200/-.

### General

50. *Candidates who undergo courses at Maritime School Britona.*— Candidates who produce certificates of having completed the respective courses at the Maritime School, Britona, shall be given remission of service to the extent of half the time attended at the school in cases of first Certificates of Competency only.

51. *Forms of Certificates.*— Certificates of Competency described above shall be made and issued in the Forms appended to these rules as Appendix—“E”.

52. *Certificate to be in duplicate.*— Every Certificate of Competency shall be made in duplicate and one copy shall be delivered to the person entitled to the certificate and the other shall be kept for record by the Captain of Ports, Panaji.

53. *Certificates granted by other Governments.*— A Certificate of Competency or service granted by the Government of any other State in India shall be endorsed by the Government as having effect in this State after the holder thereof has passed a supplementary examination before the examiner as to his local knowledge of the port in respect of which he desires a certificate. Half the usual fee shall be charged for this examination.

### APPENDIX 'A'

(see rule 9)

### SIGHT TESTS

Details as to the conduct of the test:

The object of these tests is 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. Experience has shown that for this purpose he must be able to reach certain minimum standard both of form and colour vision.

The tests employed are two, a letter test and a lantern test details of which are given below. The letter test is a test of form vision only and the lantern test is a test of form and colour vision

combined.

The test shall be conducted under the strict personal supervision of the Examiner. A careful record shall be kept of all mistakes made by the candidate both in the letter test and in the lantern test.

Each Examiner shall keep a record of all candidates passed by him for reference when required.

*Spectacles not allowed.*— During the examination in the sight test, candidates below the age of 30 years shall not be allowed to use spectacles or glasses of any kind or any other artificial aid to vision. They will, however, have the option of using either eye separately or both eyes together.

### (I) Letter Test

(1) *Letter test to be taken first.*— The first test which the candidate is required to undergo is the letter test.

(2) *Apparatus used.*— The letter test to be used for all candidates is that conducted on Shellen's principle by means of sheets of letters.

(3) *Standard of vision required.*— Every candidate shall be required to read five of the six letter in the sixth line and four of the seven letters in the seventh line, using either eye or both eyes, at his option.

(4) *Method of testing.*— The test sheet should be hung on the wall in good light, but not in direct sunlight, at a height of five or six feet the ground. The candidate should be placed at a distance of exactly 4.88 meters from the sheets and exactly opposite them. This distance should be carefully measured and should never in any circumstances be varied.

One of the sheets should then be exposed and the candidates should be asked to read the letters on each sheet beginning at the top and going downwards. Any mistakes which he makes should be carefully noted. If then it is found that he has read carefully at least five letters and four letters in the seventh line of a sheet, the candidate may be considered to have normal vision and should be marked passes in the appropriate column of the Form of Application.

*Passing or failure.*— If, at the conclusion of the test the candidate is found to reach required standard, he may be considered to have passed and the Examiner should proceed with the lantern test, unless the candidate holds a Certificate of Competency. If the candidate fails to reach the standard required for the certificate entered for, he should be tested with at least four sheets and the Examiner should record on Form No. 3 appended to these rules, the number of mistakes made in each line of each sheet, and explain to the candidate the alternative mentioned in rule 9 (d).

Failure to pass letter test is due to some defect in form vision, and such defects are sometimes curable. Therefore, if a candidate fails to pass this test, the examiner should advise him to consult an ophthalmic surgeon with a view to ascertaining what is the nature of the defect in his form vision and whether it is curable.



(6) *Test to be varied.* — The examiner should take care, by varying the order of the test sheets and by every other means in his power, to guard against the possibility of any deception on the part of the candidate.

**II—Lantern Test**

(7) *Apparatus.* — A special lantern and a mirror have been provided for this test. The lantern should be placed directly in front of the mirror so that the front part of the lantern is exactly 3.048 meters from the mirror. Care should be taken that the lantern is properly placed, that is to say, the light reflected in the mirror must show clearly when viewed from the position of the candidate on the left of the lantern. The examiner should always satisfy himself that these conditions are fulfilled before commencing the examinations.

(8) *Darkness adaption.*— If a candidate make mistakes at the beginning of the lantern test, he should be kept in a completely or partially darkened room for at least quarter of an hour and should then begin the test again.

Before the examination commences, the examiner shall satisfy himself that the room in which it is conducted is so darkened as to exclude all daylight.

(9) *Method of testing:* The lantern supplied for the examination is so constructed as to allow one large or two small lights to be visible and is fitted with 12 glasses of three colour viz red, white and green. At the commencement of the examination, the examiner should show to the candidate a series of lights through the large aperture and should required him to name the colours as they appear to him. Care should be taken in showing the white light to emphasize the fact that the light is not a pure white. If a candidate makes a mistake of calling this light red, a proper red light should be shown immediately after and the candidate's attention directed to show the difference between the two.

After series of light through the large aperture has been shown, the examiner should make a complete circuit with the two small apertures requiring the candidate to name the colours of each set of two lights from left to right. To prevent any possibility of the order in which the lights are arranged from being learnt, the examiner should at least twice in each circuit go back a varying number of colours.

A record of any mistakes made with either the large aperture or the two smaller apertures should be kept in prescribed Form No. (3) and enclosed in accordance with the instructions thereon.

(10) *Passing or failure.* — If a candidate with either the large aperture or the two smaller apertures of the lantern mistakes red for green or green for red, he should be considered to have failed in the lantern test.

If the only mistake made by the candidate with the lantern is to call the white light "red" and if after his attention has been specially directed to the difference between the two, he makes no further mistake of this nature, he should be considered to have passed in the lantern test.

If a candidate makes any other mistake with the lantern i. e. if he calls white "red" repeatedly or red "white" at all, or confuses

green and white, his case should be reported to the Captain of Ports, Panaji, and he should be told that the decision as to whether he has passed or failed, or must undergo a further examination, will be communicated to him in due course. Pending the receipt of the Captain of Ports instructions, such a candidate should only be allowed to proceed with the remainder of the examination for a certificate of competency on the express undertaking that the latter examination will be cancelled in the event of failure in the Sight Tests.

(11) *Further examination and appeals.*— If, in the cases covered by the preceding paragraphs, the Captain of Ports decided that a further examination is necessary, arrangements shall be made for a special examination.

If, however, on the report of the examiner, the Captain of Ports decides that the nature of the mistakes made shown conclusively that a candidate's sight is so defective as to render him unfit to hold a certificate, the candidate shall be considered to have failed.

In cases, where, upon the report of the examiner, a candidate is failed by the Captain of Ports, as well as in the case of a special examination, the Government may allow a candidate who is dissatisfied with the decision to appeal for a further examination, subject to the conditions set out in para (8).

**APPENDIX "B"**

.....hereby certify that .....has served with me in the engine room of ..... as..... for a period of ..... during which time he has discharged his duties to my entire satisfaction.

I consider that he fully understands the working of an engine and has sufficient tact, presence of mind, and energy to look after and manage the working of the engines of an inland vessel having engine of 30 nominal horse-power or upwards, but less than 80 nominal horse-power.

Dated:.....

Signed:.....

No. and description of certificate

Any engineer giving a testimonial in this form should be very careful in doing so, as the document may materially influence the applicants eligibility as a candidate.

**APPENDIX "C"**

**Examination in rough working drawing for an Engineer's Certificate of Competency.**

(1) The regulations in regards to the qualifications of a candidate for an engineer's Certificate of Competency are:

He must be able to make rough working drawing of the different parts of the engines and boilers.

He must be able to state the general proportions borne by the principal parts of the machinery to each other.

(2) In accordance with these clause, a candidate for an engineer's certificate is required to make a rough working drawing of the parts specified. A mechanic, who has been some years in charge of marine engines and boilers ought by this time to have familiarity in his mind, the general construction of at least one set of engines and boilers, say that set he was last with. Fine drawing is not expected, and in the proportions of the parts a wide margin will be allowed, absurd dimensions will entail failure in practical knowledge.

(3) The drawing must, however, be practically a working/drawing, giving, a sufficient number of views to show the parts fully-sections, plans or elevations just as the candidate would required to be supplied to him if he had to make the parts to the design of another person.

(4) A clear hand sketch showing the construction completely and fully dimensioned, will be accepted if the candidate prefers this alternative.

(5) A portion only of the parts specified may be accepted in place of the whole, if the portion is sufficient to show that the candidate has a good practical idea of the construction of the parts, and a fair notion of their general proportions or dimensions.

(6) Candidates are hereby cautioned not to put on paper what they have not fully considered, and deliberately intend to be understood as their statement of what they know about the construction of any part required.

(7) The statements given in by a candidate may be in themselves, apparently, of little importance, but, as sample material from which the state of the candidate's knowledge of engines and boilers is to be inferred, every detail which is glaringly inconsistent with a sound knowledge of the use of the part, or in which as essential consideration as evidently been overlooked is an important element in the description which the candidate is giving of his own qualifications.

(8) The candidate is advised not to begin more than he can clearly finish in the time allowed. An important object in this part of the examination is to ascertain whether the candidate can be trusted to mark all necessary dimensions upon a sketch or a drawing. The test of this is, practically, the making of the part from the sketch without having to supply additional dimensions and without measuring the drawing. To provide this ability, the candidate must fully dimensions the parts shown in his sketch or drawing notwithstanding that the parts may be correctly drawn to scale. A drawing is fully dimensions when no part of it is left to the option of the person or the person who is to work to the drawing.

(9) To prevent misunderstanding, however, when the candidate has been led into showing more of the details than he has time fully to finish, he should name, in the statement on the other side, the particular parts which he has fully dimensioned.

(10) All dimensions should have lines and arrow heads to indicate distinctly the points between which the dimensions are given.

(11) The candidates should not write cross dimensions upon centre lines, or upon longitudinal dimension lines. This is not an order but a recommendation.

(12) The candidate is not expected to design any thing but to sketch or draw something with which he is expected to be already familiar.

(13) Make sure that there will be sufficient room on the draw-sheet to show all the necessary views. There may be another sheet of drawing paper, if necessary. All the papers used must be forwarded with the drawing.

(14) Fill in and sign the following statements:

(SPECIMEN)

Subject for examination in rough working drawing

(Read the foregoing general instructions)

A common slide valve with its spindle. Show also an outline section of the parts at the cylinder face. Show the provision for connecting the slide valve to the spindle.

The candidate is required to fill up the following and to attach this paper to his drawing:—

Statement by the candidate.

The accompanying drawing, made by me this day, without reference to any document, and without the assistance of any person is intended by me to be sufficient for the new construction of the parts above described to fit the places of similar parts which are to be removed. The construction is similar to what I have been with in the..... steamer..... but the dimensions may be different.

The diameter of the cylinder is  
The stroke of the piston is  
The travel of the valve is  
The cover at top end of steam side is  
The cover at bottom end on steam side is  
The load at top is intended to be  
The load at bottom is intended to be  
The inside cover is  
The thickness of the face of valve is  
The thickness of the body of valve is  
The greatest opening for steam will be  
That gives an area equal to one  
The opening for exhaust when the  
crank is on the top centre is  
That gives an area equal to ..... of the piston  
The valve will cut off steam  
on the top stroke at  
The valve will cut off  
steam on the down stroke

The candidate may omit  
this part if he choses.

The parts fully dimensioned  
in ink, are

Date at ..... this..... day of.....19.....

Applicant.

## APPENDIX "D"

Specimen Elementary Questions for the Examination of  
Engineers for Certificate of Competency.

- (1) What parts of an engine are generally made of wrought-iron?
- (2) What parts of an engine are generally made of cast-iron?
- (3) For what parts of an engine is steel sometimes used?
- (4) What parts of an engine are generally made of brass or gunmetal?
- (5) Where is white metal sometimes used? On account of what property possessed by it is it adopted? What objection is there to its more general use?
- (6) For what parts is Muntz metal sometimes used? Is it malleable?
- (7) What difference is there in the composition of cast-iron, of wrought iron and of steel?
- (8) How can cast-iron, wrought iron, and steel be distinguished from each other?
- (9) What are the different properties of cast-iron, of wrought-iron and of steel?
- (10) What is meant by the terms breaking stress, proof stress, safe working stress?
- (11) What is the cohesive strength or breaking stress of good ordinary wrought iron?
- (12) Tempering steel how is it done, and in what order do the colours come?
- (13) What is case hardening?
- (14) Which of the common metals or alloys can be forged, and which of them are brittle or short?
- (15) What is meant by welding? Which of the common metal can be welded?
- (16) The expansion of metals by heat; give examples of this in the engine and in the boiler.
- (17) In the construction of cylindrical marine boilers for what parts have plates to be worked hot? When the material is steel what precautionary treatment of these plates is afterwards necessary?
- (18) What is double reventing? In what parts of cylindrical marine boilers is double reventing employed? In which of the shell seams is it most necessary?
- (19) What is "Caulking" and how are seams prepared for caulking?
- (20) Describe the different ways of fastening the ends of the main stays of a boiler. What are the merits, or objections to the different methods?
- (21) What strain per square inch is allowed on boiler stays?
- (22) Describe a reveted stay, and state where such stays are commonly used?
- (23) Where are thin plates to be looked for in a boiler as it wears and how is the thinness to be detected?
- (24) How are boiler tubes fixed? What are "Stay tubes" and how are they secured?
- (25) Where is it generally that boiler-tubes leak? How is this defect repaired? What are causes of this leaking?
- (26) What are the causes of cracked tube plates? Where are the cracks situated? How are they repaired?
- (27) What is the difference between a dry 'Up take' and a 'Wet Uptake' which required most repair? Why? Where have you seen a wet uptake?
- (28) What is a superheater? What is its construction? What valves are on it? There is sometimes a gauge glass on it; what is that for?
- (29) What parts of a marine tubular boiler are first injured by shortness of water?
- (30) Where are angle irons sometimes used in the construction of a boiler, and where are flanged plates used?
- (31) Priming: to what causes as it attributed? What means are applied to prevent it? What evils may be produced by it?
- (32) Funnel draught: What makes it? What check it?
- (33) Flame is sometimes seen at the top of a funnel: What causes this appearance: Is it beneficial or it is detrimental? Why so?
- (34) A blast pipe: What is its construction? Where is it placed? for what is it used?
- (35) How many bottom blow off cocks are generally fitted to each boiler and why are they so fitted?
- (36) Blow-off cocks are sometimes fitted with a spanner guard for what purpose is this? Describe how the guard is formed.
- (37) Test cocks or water gauge: cocks: Where are they placed? At what heights? Must the cocks themselves be at these heights? What provision is made for clearing these cocks? Should they ever become choked. When there are no test cocks, how is the height of the water ascertained?
- (38) What is a dead-weight safety valve? Of what are the rubbing surfaces formed? How is a lock up valve arranged to admit of lifting it or of turning it round, and to prevent adding to the weight?

- (39) About what area of safety valve is now required by the Board of Trade? What area was formerly required and on what ground has that been altered? What is the effect of suddenly opening a safety valve when steam is up? To about what extent to safety valves rise when blowing of without being eased by hand?
- (40) Spring-loaded safety valves: What advantages have they that are not possessed by dead-weight valves? what are the disadvantages as compared with dead-weight valves?
- (41) Of what pieces does a glass water-gauge mounting consist? How does it act? Where is it placed? At what height? Is liable to derangement? How is its working tested?
- (42) Glass water-gauges have sometimes pipe connections top and bottom? What is the object of the arrangement? Should there be cocks at the extremities of these pipes?
- (43) Describe a Bourdon's steam-gauge. Some gauge have an inverted syphon-pipe below them: What is its use?
- (44) Why is a small cock sometimes put on the pipe leading to a steam-gauge? Where should it be placed, and what error might be made by omitting to use it?
- (45) Do steam-gauges indicate the total pressure of the steam, or only a portion of that pressure? what is the pressure measured from?
- (46) What is meant by the salting of the boiler? How is this prevented? What is the density of ordinary sea water? How is the density of ordinary sea water? How is the density ascertained? What is the difference between the formation of scale and the salting of the boiler? what is the maximum density at which boilers should be worked at sea?
- (47) Scum cocks and pipes? How are they arranged? Where are they placed? At what height in the boiler? When are they used? When must they be shut? Neglect of these cocks lead to what dangers?
- (48) Scale of what does it consist? where is it most objectionable? How is it removed? How is its formation prevented? What evil effects are produced by it?
- (49) What is a salinometer? Of what does it consist? How does it act? How is it graduated? Can it be used at any temperature indiscriminately?
- (50) What harm may be done through the check valve of one of a set of boilers being defective while underway? How would you work to avoid this harm?
- (51) How is the leak from a split tube stopped in a boiler at sea?
- (52) what is the use of dampers? Where are they fitted? When they should be used?
- (53) When there are no dampers fitted, what is used instead? What evil to the boiler is sometimes attributed to this? When the heating surface is clean, does this occur?
- (54) Describe the piston of a steam cylinder with its different rings and their uses. There are generally round pieces let in flush on one side of a piston: What are they? How are these pieces fixed?
- (55) Cylinder drain cocks: What is their use? there is sometimes a valve upon each cock: What purpose does it serve?
- (56) Cylinder escape valves: of what does they consist? How protected? How regulated? When are they most needed? To what danger do they expose these engines? What precaution is sometimes used to obviate this danger?
- (57) What is compound engine? What different kinds are there for screw steamers in respect to the number and arrangement of their cranks and cylinders? What is a triple expansion engine?
- (58) What is link motion? What are some of its advantages? In modern engines for the screw-propeller: when there is no link motion, what takes its place?
- (59) What is a separate expansion valve? Why is it not fitted to all engines? What effect has an expansion valve upon the starting and upon the reversing of the engines?
- (60) What arrangement is applied to reduce the friction of a slide valve? To what is the friction due?
- (61) Describe a loose eccentric. How does it set? In what engines is the loose eccentric still employed?
- (62) What is the travel of eccentric rod? How is it measured on the eccentric? What is the travel of the slide valve when the link motion is in mid gear and the engine still moving?
- (63) What are "double-boat" "Valves"? why are they not generally used for safety valves? Are they ever used instead of the Valve? What objections are there to their use.
- (64) What is a circulating pump? Is it always worked by the main engine? Give an example from your last steamer of the three water temperatures Generally noted by careful engineers.
- (65) An air valve is sometimes fitted to a circulating reciprocating pump: What purpose does it served?
- (66) What is the difference between a bucket air pump, a piston air pump, and a plunger air pump?
- (67) Whether double acting air pumps are made with plungers, with pistons or with buckets?
- (68) What is an air pump trunk? When is it necessary? How is it attached to the bucket?
- (69) What class of air pump requires both feet and delivery valves and in what other class can either of these valves be in some cases dispensed with?
- (70) When underway, when the air-pump bucket is at the top of its stroke, at what height is the water in the condenser?

- (71) With a surface condenser and a single acting air-pump, what is the effect of a leaky foot valve and what is the effect of a leaky bucket when there is also a foot valve?
- (72) Air pump pet cock or valve where is it placed? How does it act? What is its object? Does it in every case reduce the effective capacity of the pump? Is it equally applicable to double acting pumps?
- (73) At what temperature is the bet well worked? What is the effect of higher temperatures? What is the effect of lower temperature? What limits the lowness of temperature? Has very low temperature any disadvantages?
- (74) Bilge injection with common condensers: What are the fittings required? When is it used? What precautions are necessary in using it?
- (75) When surface condensers are used what takes place of the bilge injection? To what is the connection made? How is its valve formed? Why is this necessary?
- (76) What are the practical guides to the proper amount of opening of the inlet valve for the circulating pump?
- (77) Food-pump pet cock or valve: Where is it placed? What is its use? How does it act? Is it always a necessary fitting?
- (78) What are some of the ways of fastening the ends of surface condenser tubes? About what size and about what thickness are condenser tubes? What parts of a surface condenser are made brass?
- (79) What is a blow-through valve or cock? To what is it attached? There is sometimes a valve that when opened admits steam from slide valve causing to the exhaust part? What is its use? To which cylinder is it fitted?
- (80) What is a snifting valve? What is its use? Where is it placed? Can it be placed too high? Can it be placed too low? At what height should it be placed? Was there one in your last steamer, if so, where was it? Why are snifting valves generally omitted now?
- (81) What connections are generally fitted to the donkey-pump? And to what services can it be applied?
- (82) When the engines are stopped with steam up, what are to be shut and what are to be opened?
- (83) How is an engine heated up before starting? What precautionary examinations as made before starting?
- (84) What is an interceptor or catch-water? Where is it fixed? What is its construction? How does it act and what attention does it require?
- (85) Describe an air pump bucket, with its valve or valves and its pacing of what are the valves generally made?
- (86) Of what materials are airpumps rods made? Why so?
- (87) What is the racing of the engine? When does it occur? What is done to prevent it?
- (88) What are marine Governors? What is their general constructions? How does they act?
- (89) What is meant by the pitch of a screw propeller? How is it measured?
- (90) Explain the difference between a right hand and left hand propeller and state how each of them revolves?
- (91) what is the slip of a screw propeller? How is its amount expressed in figures?
- (92) Which of the valves about engines and boilers have to be worked by hand, which of them work self-acting, and which are worked by the motion of the engines?
- (93) Why is soda sometimes put into a boiler, and how is it put in while under weight? What is the kind of soda used?
- (94) Tallow cups for cylinders were sometimes made with two small cocks or with only one small cock or with one large hollow plug cock, or with one small cock and a valve which of those is suitable for a high pressure cylinder and which form the cylinder of a condensing engine? Describe how the cup with only one cock is used. What is now generally used instead of these? How has this change come about.
- (95) Does a cylinder escape valve, self-acting, allow all the water to escape, if not how much is left in the cylinder?
- (96) What is a steam lubricator (Sometimes called an imperator) Explain its action, to what part of the engine is it connected, whether will throwing cold water over it make it work faster or slower? Describe the one used in your last steamer?
- (97) A common paddle wheel; of what is the centre made? of what are the arm formed? What is the form of the bolts which attach the floats to the arms? How are the arms attached to the centres?
- (98) Why have some paddle wheels one or more cast-iron-flats in each wheel? With what engines are these most required? At what part of the circumference are they placed?
- (99) Why are paddle wheel floats sometimes made of different breadth in the same wheel? With what description engine is this most needed? Where are the board floats placed and where are the narrow floats placed in the circumference of the wheel?
- (100) what difference is there between a radiapaddle wheel and one with feathering floats? What is the object of feathering floats? Are all the eccentric roads attached in the same way, and are they all of the same form?
- (101) Where about is the centre of the eccentric of a paddle wheel with feathering floats placed? In what case are the feathering lovers on the striking face or on the back of the float? When the paddle shaft has an outer hearing how is the eccentric made?

- (102) Of what material are the working surfaces of a paddle wheel with feathering floats? Are they all lubricated? With what?
- (103) What is a disconnecting paddle engine? At what place is the disconnecting affected? How is it accomplished? In which of the cranks of a disconnecting engine are the crank pins fixed?
- (104) Whether is the link motion valve gear or the loose eccentric generally used for disconnecting paddle engine? For what steamers are disconnecting paddle engines frequently employed?
- (105) What are expansion joints? Where are they necessary? What attention do they require? Of what should the working surface be made?
- (106) What omission in the construction of expansion joints may lead to a serious accident when steam is first applied? How is this prevented in the construction of a steam trunnion pipe for an oscillating engine?
- (107) Describe an oil cup with syphon worsted. How is the worsted arranged? How is it cleaned? How far down the tube does it extend?
- (108) Describe a thrust bearing; Which of the surface wears? Why are there sometimes a number of oil tubes for one thrust bearing?
- (109) What parts of a screw shaft are generally covered with brass? Why is this necessary? About what thickness is the brass?
- (110) What is stern tube or screw shaft pipe? why is a pipe of such a length required? Of what is it made? How is it fixed at each end?
- (111) What is lignum vitas bearing? How is the wood fitted? Where is such a bearing generally used?
- (112) How is a screw propeller fixed on the shaft? What means are used to prevent its getting loose at sea?
- (113) Where are sluice valves placed? what large sluice is there in almost all screw steamers? From what position should this valve be worked? Why so? What attention should it receive?
- (114) With a condensing engine what valves or cocks are on the skin of the ship in the engine-room and in the stokehole?
- (115) what are the necessary fittings of a marine boiler?
- (116) With a surface condensing engine what cocks or valves are open some time before the engine is started so as to be ready for starting whenever the order is given?
- (117) What is a steam jacket? What cocks are on it? In what engine or jackets most generally used? Do they require to be felted?
- (118) What parts of an engine or its fittings should be felted or otherwise protected from radiation?
- (119) What are the small cylinders sometimes fitted on the slide valve casing cover of vertical engines? Explain their action? To what are they connected by a pipe? why so?
- (120) Name the principal pipes in connection with the engine boilers of a steamer? and state to what the ends of these pipes are connected?
- (121) Through what cocks or valve, pipe and chambers does the water pass on its way from the sea inlet rose plate to the water space of the boiler with a jet condenser?
- (122) Through what cocks or valves, pipes and chambers does the circulating water of a surface condenser pass?
- (123) Through what cocks or valves, pipes and chambers does the steam pass from the boiler until it is in the form of water in the hot well?
- (124) Name the pieces of the engine through which the pressure of the steam is transmitted from the piston to the screw propeller. Name them in the order in which they act?
- (125) What is an air vessel? How does it act? at what parts of an engine or of its fittings are air vessels generally applied?
- (126) What is the construction of a mud box? where should mud boxes be placed? why are they necessary? How should the space be divided by the rose plate and why?
- (127) What is a trunk engine? When used in a horizontal engine for a right-hand screw propeller, at which side of the vessel should cylinders be placed? Why so?
- (128) What is an oscillating engine? For what steamers are oscillating engines generally adopted? How is the steam conveyed to and from the slide valve casing?
- (129) Of what parts does the valve motion gear of an oscillating engine consist?
- (130) For what have geared engines sometimes been used? Of what were the cogs of the large wheel made?
- (131) At what part of a screw steamer is the pressure that propels it applied to the hull?
- (132) At what part of a paddle steamer is the pressure that propels it applied to the hull?
- (133) About how much fuel per indicated horse-power per hour is required by modern engines, common, compound and triple expansion?
- (134) What is the explanation of the economy of the surface condenser?
- (135) what is the construction of a surface condenser? Of what are its tubes made? How are they fixed? How are they kept tight? What is done a split tube?
- (136) where do surface condensers foul? How are they cleaned?

- (137) What non-conducting substances are employed to prevent radiation and how are they applied?
- (138) In the construction of smoke box and of dry up takes, what provision is made to lessen the amount of radiation?
- (139) How can the formation of black smoke be prevented? Describe smoke-preventing apparatus?
- (140) What is meant by "Circulation" in a boiler? And what are the results of defective circulating?
- (141) What means are sometimes adopted to improve in the circulation in a boiler?
- (142) By what arrangements is the circulation promoted in a "Haystack" boiler?
- (143) Describe a ship's side air pump discharge valve; in what respect does it sometimes differ from a common step valve; and what attention does it require?
- (144) What is the construction of a feed-escape valve, to what is its discharge connected and how is its loading regulated?
- (145) When there is no feed-escape valve what is the arrangement of the feed valve cocks?
- (146) What is the measure of a horse-power? How is indicated horse-power ascertained?
- (147) Has nominal "horse-powers" a fixed meaning? what is the use of this expression? what is generally taken as the measure of one horse-power nominal?
- (148) What is "Back Pressure" in a cylinder about how much is it in each of the cylinders in your last steamer? It excessive cushioning over a trouble in certain conditions in modern engines? Say when and why and in which cylinder this occurs?
- (149) What is meant by "speed of piston"? About how much is the speed of piston in modern marine engines?
- (150) What is "atmospheric pressure"? What is its average amount? What instrument tell this amount?
- (151) What is "gross pressure" or "absolute pressure"? What pressure is it that is shown by the steam-gauge?
- (152) What is meant by "cutting of steam"? How is it done? What part of the valve regulate the cut off?
- (153) What is a piston slide valve? Describe its construction. Why are such frequently employed in place of the common slide valves. What is a great drawback to the use of these valves?
- (154) What fixes the time of closing the exhaust? After the exhaust is closed and before the port opens for steam, what become of the steam that is in the cylinder?
- (155) What is the "load" of the valve? what is its object? About what amount is it?
- (156) What is the 'cover' or 'lap' of the valve? What is its object about what amount is it?
- (157) What is the "exhaust cover" of a slide valve? What is its effect upon cushioning and upon exhaust?
- (158) What is "minus cover" or "minus lap" on the exhaust? what is its effect upon the exhaust and upon cushioning?
- (159) What is "ushicking" or "compression" in a steam cylinder? How is it affected by the amount of cover or of minus cover there may be upon the exhaust? How is it affected by the exhaust pressure?
- (160) What is mean effective pressure? How is its amount ascertained?
- (161) What is a dial vacuum gauge? What is its construction? For what is it used? About what amount should it show when the engine is working all right? what effect has the variation it indicates on the performance of the engine?
- (162) Does the vacuum gauge enable to tell what pressure that is in the condenser or must you have recourse also to the barometer to arrive at that? How would you ascertain the actual amount back pressure there is in the condenser?
- (163) What is a barometer? What is its construction? Is a barometer sometimes used instead of a vacuum gauge? In what respect does the weather barometer differ from the vacuum gauge barometer?
- (164) The common vacuum gauge and the common steam gauge in which of them are the graduations marked from atmospheric pressure? Does either of them tell what is the true actual pressure in the boiler or in the condenser?
- (165) Do steam and vacuum gauges vary with the variations of the weather barometer? When the weather barometer varies from 28 to 31, how much will the vacuum gauge vary and how will that effect the working of the engines?
- (166) Vacuum is generally stated as so many inches. What is meant by say 20 inches vacuum? What does that tell us about the absolute pressure than in the condenser?
- (167) From what depth will pump draw water? Is there any limit? Why?
- (168) What is vacuum? Can vacuum move a piston? When the temperature of the water in the condenser is 212°. What is the greatest degree of vacuum there can be in the condenser?
- (169) What is a thermometer? Its construction? What is the property of matter, that is, the principle of its construction? What temperatures are regularly noted by careful engineers?
- (170) What is the temperature of (1) melting ice, (2) of boiling water, (3) of steam about 60 lbs. pressure by the steam gauge, (4) of Steam about 100 lbs. and (5) of steam about 150 lbs. also (6) of smoke in the funnel, and (7) of water in the hot well?



- (171) What is meant by the conduction of heat? Give examples of it in the boiler and in the engine.
- (172) What is meant by the "convection" of heat? Give examples of it in the boiler and in the engine.
- (173) What is meant "radiation" of heat? Give examples of it in the boiler and in the engine.
- (174) What is convection, which is radiation, and which is conduction in the following cases; (1) Heat from the glowing fuel to the furnace crown; (2) Heat passing from one side of furnace crown plate to the other (2) Heat passing from the steam pipe in the engine rooms (4) the heat of evaporation?
- (175) What are the effecting heating surface of a marine boiler? What is an objection to vertical heating surfaces?
- (176) What parts of a marine engine are exposed to danger when the temperature is below freezing point?
- (177) What precautions are necessary in cold climates when the temperature is below freezing point?
- (178) State as many ways as you can by which a boiler might not get its full food; that is, a boiler or one of the set of boilers gets short or water although the feed valve is open its proper amount; to what causes might this be due?
- (179) Of what are furnace bars generally made? About what thickness are they at top? About what space is between them? Whether are the bars put further apart for New Castle coal or for Welsh coal?
- (180) Which burns faster, New Castle coal or Welsh coal? Which makes smokes?
- (181) About how many tons of steam coal will be burnt per day in four furnaces, each 3' 0" wide and of about the usual length. On what grounds do you say so?
- (182) About how many tons of steam coal will be burnt per day with good compound engines to drive an ordinary steamer of 45 ft beam 10 knots an hour steam alone? On what grounds do you say so? What percentage more coal would be required to propel the same steamer if not faster?
- (183) About how many tons steam coal will be burnt per day with a good compound engine, surface condensers, the low pressure cylinder 70 inches diameter, doing average work? On what grounds do you say so?
- (184) A pair of inverted cylinder direct acting engine there is a liner half an inch between the ahead eccentric rod and the eccentric strap, in over hauling the engine this piece is lost and forgotten; What difference will its commission make in the working of the engine on the admission, on the cut of and of the exhaust of the steam? Which will take place earlier and which latter, distinguishing between the up stroke & the down stroke?
- (185) A pair of inverted cylinders direct acting engines driving a right hand screw; on which of the crosshead guide bars is the pressure greatest in the up stroke, and on which in the down strike.
- (186) A screw propeller is getting loose, it has a little plate on the shaft, side ways on the key or feather; how will this show in the engine-room?
- (187) How would you prove whether the centre line of the trunnions of an oscillating cylinder be fair with centre line of the main shaft?
- (188) How can the fairness of a line of screw shafting be tested without lifting the shafts?
- (189) Where are steel gorgings generally used in marine engines?
- (190) What is the composition of nickel steel? Where is it sometimes used in engines and boilers?
- (191) How is forced draught generated on board ship and supplied to boiler furnaces? Is the air heated before delivery? If so, how?
- (192) What is the "induced" draught? Compare the merits of "forced" and of "induced" draught.
- (193) How is the intensity of the draught measured? What is the usual pressure employed in the merchantile marine?
- (194) An explosive gas is liberated from bunker coal. Usually in well ventilated bunkers this gas escapes into the atmosphere without doing harm. In ill-ventilated bunkers the gas, after mixing with a certain proportion of common air, has been brought in contact with. What is the composition of the gas? Where is it found? In bunkers, between docks, pockets and coal sheets? how may it be got rid of as soon as it evolves from the coal? How many cubic feet of air to one of the gas forms a violent explosive mixture?
- (195) A lighted lamp or candles has sometimes been lowered into an apparently empty paraffin tank and produced an explosion resulting in injury to the person holding the light. What did the tank probably contain, and what produced the explosion?
- (196) In vessels carrying coal cargoes it has been observed that, generally speaking, the gas which escapes from the body of the coal is found more abundantly at the forward end of the hold than at the after end. Why should this be so?
- (197) In recently opened ballast tanks, double-bottoms, and boilers, which are lowered into either has sometimes been extinguished. What would, in all probability cause this?
- (198) In double-bottom steamers where does the bilge water lie, and where are the roses of the bilge pipes fitted?
- (199) What is the advantage of a large rose over a small one?
- (200) Why specially in vessels carrying cargoes liable to shift, should engine, room bilge suction be fitted to both wings of the bilge?

- (201) In a heavily listed vessel, why is it difficult to keep steam?
- (202) If the engine bilge pumps get choked and water accumulated in the stokehold bilges, what effect does the water have upon the bilges boards and stokehold plates, when the ship is rolling violently?
- (203) In a triple-expansion engine, what spare gear do you consider necessary in the case of foreign-going ship? Also what stores would you provide for a voyage to New Zealand?
- (204) What means are sometimes provided for temporarily coupling together the broken parts of, say a turner-shaft? Describe the fitting.
- (205) Does the pressure on the trust-collars vary with the horse power or with the speed of the ship, or how?
- (206) If the holding down belts of a thrust bearing should become slack, what effect would it have upon the working of the engines?
- (207) In an engine with three cranks, which of the three is subject to the greatest torsional stress, (1) ingoing ahead, (2) going astern?
- (208) Is it usual to make the crank shafts of a triple or quadruple expansion engine in one piece? Is the diameter of shaft uniform and to end? Give your reason for the practice which prevail?
- (209) In a "built" crank shaft how are the webs rigidly secured to the pins and to the body of shaft?
- (210) There are various descriptions of donkey engines in use on board ship for pumping purposes. Some pumps are fitted with escape-valves, some are not, why should this be?
- (211) Explain the function of an air-vessel fitted to a feed pump, make rough hand sketch of (1) a satisfactory vessel? (2) an unsatisfactory vessel, where, say the air-spring has been destroyed by carelessness, or has never been properly provided.
- (212) Should cocks or escape-valves be fitted to air vessels, why or why not?
- (213) Where, by preference, should the escape-valves of a feed pump be placed? Why?
- (214) Scum cocks are sometimes fitted to boiler-shells at a height convenient for engineers to manipulate when standing in the stokehold; the scum pipes in such cases are led upward, inside the boiler, to a little above the combustion chamber tops, what danger may arise from this arrangement?
- (215) Cocks for testing the water level of boilers are sometimes fitted within reach of the engineer who is standing in the stokehold. These may have internal pipes leading upward and terminating at various levels. Under what circumstances may these become misleading?
- (216) Why should the pipe which leads from the bottom of the water gauge column with to the bottom of the boiler front, or back, be covered with non-conducting materials? Why also should it never have lengthy horizontal bends?
- (217) In your own experience, how frequently is this pipe removed and cleared?
- (218) Why, even with the best of water-gauges, is it advisable to occasionally use the drain-cock?
- (219) Steam pipes have sometimes been inadvertently made in this length of piping leading from the top of the water-gauge column to the of the boiler. Roughly sketch such loop and explain the danger arising from its existence.
- (220) Describe your method of thoroughly testing the water-gauge system to satisfy yourself that all the cocks and pipes are clear. Your answer can be written on a supplementary sheet of foolscap which the examiner will hand you. Hand sketches, more lines indicating pipes and circles indicating cocks, should be made. Identify the cocks and pipes by letters of numerals.
- (221) Describe the construction of a water-tube boiler mentioning the type selected?
- (222) In a water tube boiler, how is an economiser fitted, and what is its duty.
- (223) How is the water gauge fitted? are glass-gauges used?
- (224) The pressure of the steam in water tube boilers is sometimes greater than at the engines. Why is this, and what percentage above the engine pressure does it amount to. How is the difference of pressure maintained?
- (225) Describe any automatic method of feeding water-tube boilers. Of what material are the tube made?
- (226) Describe the construction of any steam turbine you are acquainted with, which is used on board ship. How is the expansion of steam effected? How many propeller shafts are employed, and how many propellers?
- (227) Is the same power available to go astern as to go ahead?
- (228) Of what material are the propellers made?
- (229) How many pounds of coal per indicated horse-power per hour are burnt with this type of engine? Name the type of boiler in use?
- (230) Describe the construction of a feed water-heater and give the name of its manufacturer—
- (231) Describe any well-known ash-ejector.
- (232) Describe any well-known independent feed pumps?
- (233) Are independent feed pumps automatic in their action? Explain the action.

- (234) What advantage, if any, have independent feed pumps, over feed pumps worked by the main engines.
- (235) To about what temperature is the feed water raised by passing through a feed heater?
- (236) What fitting are usually placed on a feed-heater? Why are they necessary.
- (237) Describe the construction of a feed fitter enumerating its valves and cocks.
- (238) How can the filter be cleaned? And what ingredients are generally removed when cleaning takes place?
- (239) What is the intercepting material made of? How is it fitted?
- (240) Describe an evaporator; and mention the types?
- (241) What fittings are necessary with evaporator?
- (242) How is the brine got rid of?
- (243) How may the coils be cleaned?
- (244) What is a dynamo? Describe its various parts. For what is it used?
- (245) In what respect does an electric motor differ from a dynamo? Where are electric motors sometimes used on board ship?
- (246) Describe a system of electric lighting employed on board ship?
- (247) How is the position of a fault in the circuit discovered?
- (248) What is "sparking" and may it under some circumstances (naming them) be a danger?
- (249) What is "short-circuiting" and to what evil may it give rise?
- (250) What means are employed to prevent any part of the circuit becoming overheated?
- (251) Describe the construction of an arc lamp.
- (252) Describe the construction of glow-lamp?
- (253) What is the usual candle-power of the small glow-lamps in general use on board ship?
- (254) Define the terms: Ampers, Volt, Ohm, Watt, what is the measure of an electrical horse-power?
- (255) Explain the use of switches, brushes, commutators, cutouts, field magnets, armatures and resistance-coils?
- (256) Why is it desirable to fit a dynamo in a cool place on board ship?
- (257) What undesirable effect will ultimately occur to an electric wire, whose section area is constantly diminishing say through corrosion?
- (258) What danger might arise loading electric wire through coal bunkers.
- (259) Is it better to load electric wires above or below sidecuttles, why?
- (260) What instruments are used on board ship to ascertain the strength of an electric current.
- (261) Many ocean-going steamers are fitted with hydraulic cranes, etc., From where do they obtain their power? How is the hydraulic pressure kept at a relatively constant amount?
- (262) Is any difficulty experienced in working hydraulic cranes in frosty weather? If so, why?
- (263) Describe any steam steering gear you are acquainted with?
- (264) When the helm is put hard over and the ship is going full speed ahead what prevents the rudder returning to the amid-ship position?
- (265) In the case of steamship under way, does the officer, or man manipulating the steam steering wheel overcome any resistance exerted by the rudder?
- (266) Explain clearly what is being done by a helmsman manipulating the weel of a steam steering engine.
- (267) Is there any difference between the amount of horse-power required to put a helm hard over in a given time when the vessel is going full speed ahead, and when she is going full speed astern? This question refers to a case a steamer fitted with one rudder on and demand as more complete answer than merely "yes" or "no".
- (268) What precautions should be taken before removing a man-hole door from a steam boiler and why are precautions necessary. In the absence of such precautions what casualties might occur?
- (269) Describe the chief features of the engine-governor fitted to a steam you have served in. Describe its action. Give the Maker's name of ship.
- (270) Name the principal parts of an oil motor, and briefly state their functions. Give the name of the makers of the motor.
- (271) What kind of oil is usually employed in oil motors? What is its flashpoint? What is its specific gravity? What is its clarific value? What precautions are taken in its storage to guard the public against casualty by fire or explosion?
- (272) How many cylinders are generally used in oil motors? What kind of piston is fitted? How frequently (measured in revolution) is explosion per cylinder effected? How is explosion in the cylinder carried out?
- (273) Describe how an oil motor is started. If starting prove difficult where would you chiefly look for defects? How is piston speed modified? How is the speed of a vessel verified? How is reversing effected?
- (274) Before examining an oil motor with a naked light. what steps should be taken for safety's sake?
- (275) How frequently should an oil motor, working 12 hours a day be opened up for examination, cleaned and its parts read-

justed? What difficulty arises when the internal parts become fouled with carbonized oil?

Note: Questions isolated from their context should be read in the light of the context. Thus the "sparking" referred to in question (248) relates to the sparking in an electric lighting circuit on board ship. See question 246.

APPENDIX — E  
By the Government of Goa  
GOVERNMENT OF GOA  
Certificate of Competency  
as

Serang of an Inland Vessel  
under Central Act 1 of 1917

To \_\_\_\_\_

Whereas it has been reported to the Government that you been found after examination, duly qualified to fulfil the duties of Serang of an Inland Vessel, I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency as Serang.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

By order and in the name of the Governor of Goa  
Secretary/ Under Secretary to the Government of Goa.  
Registered at the Office of the Captain of Ports, Panaji-Goa

(On the reverse)  
page-2

No. of Certificate:— \_\_\_\_\_ Date of passing Examination \_\_\_\_\_  
Bearer \_\_\_\_\_ Date\* and place of Birth showing  
Village, Taluka and District \_\_\_\_\_ Residence, showing Village,  
Taluka and District \_\_\_\_\_

Height \_\_\_\_\_

Personal description, stating particularly any permanent marks or scars  
\_\_\_\_\_

Signature or L. H. T. I. \_\_\_\_\_

Any Serang who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B.— Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

Issued at Panaji on the \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

(Captain of Ports)

Panaji

By the Government of Goa  
GOVERNMENT OF GOA  
Certificate of Competency  
as  
Second Class Master  
of an Inland Vessel under Central Act 1 of 1917

To \_\_\_\_\_

Whereas it has been reported to the Government that you been found after examination, duly qualified to fulfil the duties of Second Class

Master of an Inland Vessel, I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency as Second Class Master.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

By order and in the name of the Governor of Goa.  
Secretary/ Under Secretary to the Government.

Registered at the Office of the Captain of Ports, Panaji-Goa.

(On the reverse)  
page-2

No. of Certificate:— \_\_\_\_\_ Date of passing Examination \_\_\_\_\_  
Bearer \_\_\_\_\_ Date\* and place of Birth showing  
Village, Taluka and District \_\_\_\_\_ Residence, showing Village,  
Taluka and District \_\_\_\_\_

Height \_\_\_\_\_

Personal description, stating particularly an permanent marks or scars  
\_\_\_\_\_

Signature or L. H. T. I. \_\_\_\_\_

Any Master who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B.— Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

Issued at Panaji on the \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

(Captain of Ports)  
Panaji

GOVERNMENT OF GOA  
Certificate of Competency  
as

First Class Master  
of an Inland Vessel under Central Act 1 of 1917

To \_\_\_\_\_

Whereas it has been reported to the Government that you been found after examination, duly qualified to fulfil the duties of First Class Master of an Inland Vessel. I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency as Such First Class Master.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

By order and in the name of the Governor of Goa.  
Secretary/ Under Secretary to the Government of Goa.  
Registered at the Office of the Captain of Ports, Panaji-Goa

(on the reverse)  
page-2

No. of Certificate:— \_\_\_\_\_ Date of passing Examination \_\_\_\_\_  
Bearer \_\_\_\_\_ Date\* and place of Birth showing  
Village, Taluka and District \_\_\_\_\_ Residence, showing Village,  
Taluka and District \_\_\_\_\_

Height \_\_\_\_\_

Personal description, stating particularly any permanent marks or  
\_\_\_\_\_

Signature or L. H. T. I. \_\_\_\_\_

Any Master who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B.— Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

Issued at Panaji on the \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_  
(Captain of Ports)  
Panaji

Motor Vessel having engines of under 565 Brake horse Power. I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency as Engine Driver.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

By order and in the name of the Governor of Goa

Secretary/ Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji-Goa.

( Reverse )  
page-2

GOVERNMENT OF GOA

Certificate of Competency

as

Second Class Engine Driver  
of an Inland Vessel under Act 1 of 1917

To \_\_\_\_\_

Whereas it has been reported to the Government of Goa that you been found after examination, duly qualified to fulfil the duties of SECOND CLASS ENGINE DRIVER of an Inland Steam Vessel having Engines of under 40 nominal horse-power, I do hereby, in pursuance of Act 1 of 1917 grant you this Certificate of Competency as ENGINE DRIVER.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

By order and in the name of the Governor of Goa.

Secretary/ Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji-Goa

( Reverse )  
page-2

No. of Certificate:— \_\_\_\_\_ Date of passing Examination \_\_\_\_\_  
Bearer \_\_\_\_\_ Date\* and place of Birth showing  
Village, Taluka and District \_\_\_\_\_ Residence, showing Village,  
Taluka and District \_\_\_\_\_

Height \_\_\_\_\_

Personal description, stating particularly any permanent marks or scars  
\_\_\_\_\_

Signature or L. H. T. I. \_\_\_\_\_

Any Engine Driver who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B.— Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

(Captain of Ports)  
Panaji.

GOVERNMENT OF GOA

Certificate of Competency

as

First Class Engine Driver  
of an Inland Motor Vessel under Central Act 1 of 1917

To \_\_\_\_\_

Whereas it has been reported to the Government that you been found, duly qualified to fulfil the duties of First Class Engine Driver on an Inland

Height \_\_\_\_\_  
Personal description, stating particularly any permanent marks or scars  
\_\_\_\_\_

Signature or L. H. T. I. \_\_\_\_\_

Any Engine Driver who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B.— Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

(Captain of Ports)  
Panaji.

GOVERNMENT OF GOA

Certificate of Competency

as

Engineer  
of an Inland Motor Vessel under Central Act 1 of 1917

To \_\_\_\_\_

Whereas it has been reported to the Government that you been found, duly qualified to fulfil the duties of Engineer of an Inland Motor Vessel, I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

By order and in the name of the Governor of Goa.

Secretary/ Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji-Goa

( Reverse )  
page-2

No. of Certificate:— \_\_\_\_\_ Date of passing Examination \_\_\_\_\_  
Bearer \_\_\_\_\_ Date\* and place of Birth showing  
Village, Taluka and District \_\_\_\_\_ Residence, showing Village,  
Taluka and District \_\_\_\_\_

Height \_\_\_\_\_

Personal description, stating particularly any permanent marks or scars  
\_\_\_\_\_

Signature or L. H. T. I. \_\_\_\_\_

Any Engineer who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B. — Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

(Captain of Ports)  
Panaji



FORM No. 3

Part of

Rotation No.

Date 19 \_\_\_\_\_

**SIGHT TEST**

Issued by

The Government of Goa

*Note for the Examiner:*— A report to be sent to the Captain of Ports on this form in each case in which a Candidate does not pass the tests for Form or Colour Vision. The Examiner should pay strict attention to the instructions laid down for his guidance in App. A. Candidates must not be examined in the colour vision test until they have passed the Form Vision test.

Name, etc. of Candidate

1. Christian names at full length.
2. Surname.
3. Date of birth.
4. Place of Birth.
5. If Candidate has served at sea, state:—
  - (i) No. of years
  - (ii) Presenting Rating and No. and Grade of certificate (if any).
6. If candidate has not served at sea, state:—
  - (i) If about to go to sea.
  - (ii) In what capacity.

If Candidate has been previously examined the Sight Tests, here state when and where the last examination took place and insert "Passed", "Failed" or "Not examined" as the case may be against each subject:—

7. Date
8. Port
9. Form Vision test:—
10. Colour Vision test.

Present description of Candidate

11. Height:— Metres Centimetres

12. Complexion

13. Colour of:—

- (i) Hair
- (ii) Eyes

14. Personal Marks or peculiarities, if any.

Signature of Candidate

Present address

I beg to state that I have reported the Candidate named above as having failed in the test on (a) Form Vision (b) Colour Vision.

Signature of Examiner

To,

The Captain of Ports, Panaji-Goa.

**I—Form Vision**

(1) Did the Candidate pass or fail in the test for Form Vision?

(2) If the Candidate fails to reach the required Standard the following Table must be filled up and submitted to the Captain of Ports for instructions as to whether the Candidate should be regarded as passed or failed (See Rule 9 and Appendix A).

*Eyc sheets used	Number of mistakes in each line of each sheet						
	1st line	2nd line	3rd line	4th line	5th line	6th line	7th line
First ... ..							
Second ... ..							
Third ... ..							
Fourth ... ..							

\* State whether Candidate used both eyes together or only his better eye.

(3) What was the condition of the light when the Candidate was examined?

**II—Colour Vision**

(1) Did the Candidate fail or is the case referred in the test for colour Vision?

The Examiner is reminded that, if the candidate fails in this test when case is referred for consideration all mistakes (if any) made in the Lantern test should be recorded on, and pieces (about an inch) of the skeins of wool, if any, incorrectly selected by him, or incorrectly left in the heap a report should be submitted and forwarded together with this form (See rule 9 Appedx. A containing the directions for the conduct of this test). Any remarks on this test which the Examiner has to offer should be made in the Report.

General remarks and record of mistakes in Lantern Test.

FORM No. 1

Rotation No.



GOVERNMENT OF GOA

Application for an Inland Certificate of Competency as Master,  
Serang or Driver

*Note:— Divisions (A), (B), (C), (D) and (E) of the Form are to be filled up by the Applicant and handed to the Captain of Ports, with his Testimonials and former Certificates.*

**(A) Name etc. of Applicant**

Name in full	Permanent Address	Nationality
1	2	3

Date of birth			Place of birth	
Day	Month	Year	Town/ /Village	Country
4	5	6	7	8

**(B) Particulars of Previous Certificate (if any)**

Previous attempts, if any	Whether any application for Certificate of Competency is pending
9,	10

No.	Grade	Where issued	Date of issue	C. D. C. No.
11	12	13	14	15

**(C) Certificates of Competency required**

16

FORM No. 2

Name of Applicant:—  
Rotation No.:  
Grade for which Passed:—  
Authority given to the above candidate to obtain his certifi-

No.

No.

Examiner's authority for delivery of a Certificate of Competency to an Applicant who has passed his examination.

(N. B. This authority is subject to the approval of Government of Goa).

cate of Competency from the Office of the Captain of Ports, Panaji-Goa.

Date \_\_\_\_\_ 19 \_\_\_\_

Examiner

Name of Applicant ...  
Grade for which passed ...  
Height ... Metre ... Centi-  
metre, Colour of eyes ... Hair ...  
Complexion ... Tattoo or other marks...

Signature of Applicant

Please deliver to the above named person on his complying with the Office Regulations the Certificate of Competency forwarded to you by the Government of Goa.

Dated at \_\_\_\_\_ this \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_

Signature of Examiner

To

The Captain of Ports,  
Panaji-Goa

To

The Captain of Ports,  
Panaji-Goa

**(D) Declaration to be made by Applicant**

*Take Notice:— Any person who makes, procures to be made or assists in making any false representation for the purpose of obtaining for himself or any other person a Certificate of Competency is for each offence liable to be punished as for a misdemeanour.*

I do hereby declare that the particulars contained in Divisions (A), (B), (C) and (F) of this Form are correct and true to the best of my knowledge and belief; and that the PAPERS enumerated in division (F) and sent with this Form are true and genuine documents, given and signed by the persons whose names appear on them.

And I make this declaration conscientiously believing it to be true.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_

Signature of Applicant

**(E) Receipt for fee**

Amount received	Date of Receipt			Office at which received
	Day	Month	Year	
17	18	19	20	21

Rs. ....

The declaration marked (D) above was signed in my presence and the Fee named in Division (E) has been received by me.

Captain of Ports.



**(F) List Testimonials and Statement of service**

(The testimonials to be numbered consecutively according to the number given in column 21 below)

No. Testimonials if any	Ship's Name	Horse Power	Port of Registry & Official Number	Service of Applicant Time in each ship							Repairs Lay up		Remarks	Initials of verifier In Captain of Ports Office
				Rank	Date of Commencement	Date of Termination	Years	Months	Days	Months	Days			
22	23	24	25	26	27	28	29	30	31	32	33	34	35	
				Total Service. Time served for which Certificates are now produced. Time served for which no Certificates are produced										

**(G) Certificates of Examiners**

Note:— Examiners should fill up Division (G) and in all cases as soon as possible forward this Paper alongwith testimonials and previous Certificates to the Captain of Ports, Panaji.

Date and Place of Verification			Certificate of Competency to be issued
Date	Place	Form and Colour Vision	
36	37	38	39

**(II) Personal Description of Applicant**

Height		Com-plexion	Personal Marks of peculiarities if any	Colour of	
Feet	Inches			Hair	Eyes
40	41	42	43	44	45

I hereby certify that the particulars contained in Division (G) are correct.

This Form and the Testimonials are forwarded to the Captain of Ports.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

(Signature of Examiner)

To  
The Captain of Ports,  
Panaji.

By order and in the name of the Governor of Goa.

APPENDIX 'E'

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as First class Master of an  
Inland Vessel under Central Act 1 of 1917

To,

Whereas it has been reported to the Government that you have been found after examination, duly qualified to fulfil the duties of First Class Master of an Inland Vessel, I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency as such First Class Master.

By order and in the name of the Governor of Goa.  
This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji-Goa

(On the reverse)  
(page-2)

No. of Certificate: \_\_\_ Date of passing Examination: \_\_\_ Bearer: \_\_\_

Date \* and place of Birth showing Village, Taluka and District: \_\_\_  
Residence, showing Village, Taluka and District: \_\_\_  
Height: \_\_\_

Personal description, stating particularly any permanent marks or scars: \_\_\_ Signature or L. H. T. I.

Any master who fails to deliver up a certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B.— Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

Issued at Panaji on the \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

Captain of Ports, Panaji.

If not known exactly shall be stated on the best information or evidence. Page 3 Photograph of the holder renewal every ten years.

Pages 4 and 5 Endorsements.

FORM I  
EXN. 2 (b)



**APPLICATION**

Rotation No.

for an  
**INLAND CERTIFICATE OF COMPETENCY**

as

**MASTER, SERANG OR DRIVER**

**Govt. of Goa, Daman and Diu**

*Note:—* Divisions (A), (B), (C), (D) and (F) of this Paper are to be filled up by the Applicant and handed to the Captain of Ports, with his Testimonials and former Certificates

(A)

Name etc. of Applicant

Name in full 1			Permanent Address 2			Nationality 3		
Date of birth			Place of birth					
Day 4	Month 5	Year 6	Town/Village 7			Country 8		
Previous attempts, if any 9			(B) Particulars of previous Certificates (if any)			Whether any application for Certificate of Competency is pending. 10		
No. 11	Grade 12	Where issued 13	Date of issue 14	C. D. C. No. 15				
(C) Certificate of competency required 16								

(D)

**Declaration to be made by Applicant**

*Take Notice:—* Any person who makes, procures to be made or assists in making any false representation for the purpose of obtaining for himself or any other person a Certificate of Competency is for each offence liable to be punished as for a misdemeanour.

I do hereby declare that the particulars contained in divisions (A), (B), (C) and (F) of this Form are correct and true to the best of my knowledge and belief; and that the PAPERS enumerated in division (F) and sent with this Form are true and genuine documents, given and signed by the persons whose names appear on them.

And I make this declaration conscientiously believing it to be true.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_

( Signature of Applicant )

(E)

**Receipt for fee**

Amount received 17	Date of receipt			Office at which received 21
	Day 18	Month 19	Year 20	
Rs. ....				

The declaration marked (D) above was signed in my presence and the Fee named in Division (E) has been received by me.

Captain of Ports,

(F)

**List of Testimonials and Statement of service**

(The Testimonials to be numbered consecutively according to the number given in column 21 below)

No. Testimonials if any	Ship's Name	Horse Power	Port of Registry & Official Numbers	Service of Applicant								Remarks	Initials of verifier  In Captain of Ports Office
				Rank	Date of Commencement	Date of Termination	Time in each ship						
							Years	Months	Days	Repairs Lay up			
										Months	Days		
22	23	24	25	26	27	28	29	30	31	32	33	34	35
Total Service ... ..													
Time served for which Certificates are now produced... ..													
Time served for which no Certificates are produced... ..													

(G)

**Certificate of Examiners**

Note: — Examiners should fill up Division (G) and in all cases as soon as possible forward this Paper alongwith testimonials and previous Certificates to the Captain of Ports, Panaji.

Date and Place of Verification			Certificate of Competency to be issued
Date 36	Place 37	Form and Colour Vision 38	
			39

(H)

**Personal Description of Applicant**

Height		Complexion	Personal Marks of Peculiarities, if any	Colour of	
Feet 40	Inches 41			Hair 44	Eyes 45
		42	43		

I hereby certify that the particulars contained in Division (G) are correct.  
This Form and the Testimonials are forwarded to the Captain of Ports.  
Dated this \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_.  
To

APPENDIX — 'E'  
By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as Second Class Master of an  
Inland Vessel under Central Act 1 of 1917

To:

Whereas it has been reported to the Government that you have been found after examination, duly qualified to fulfil the duties of Second Class Master of an Inland Vessel. I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency as Second Class Master.

By order and in the name of the Governor of Goa.  
This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_

Secretary/ Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji-Goa.

(On the reverse)  
(Page-2)

No. of Certificate: \_\_\_\_\_ Date of passing Examination  
Bearer: \_\_\_\_\_

Date\* and place of Birth showing Village, Taluka and District:  
\_\_\_\_\_ Residence, showing Village, Taluka and District:  
\_\_\_\_\_ Height: \_\_\_\_\_

Personal description, stating particularly any permanent marks  
or scars \_\_\_\_\_ Signature or L. H. T. I.

Any master who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

*N. B.*— Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

Issued at Panaji on the \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_

Captain of Ports, Panaji

\* If not known exactly must be stated on the best information or evidence Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as Serang of an Inland Vessel  
under Central Act 1 of 1917

To:

Whereas it has been reported to the Government that you have been found after examination, duly qualified to fulfil the duties of

Serang of an Inland Vessel, I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency as Serang.

By order in the name of the Governor of Goa.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports Panaji-Goa.

(On the reverse)  
(Page-2)

No. of certificate: \_\_\_\_\_ Date of passing Examination  
Bearer: \_\_\_\_\_

Date\* and place of Birth showing Village, Taluka and District:  
\_\_\_\_\_ Residence, showing village, Taluka and District:  
\_\_\_\_\_ Height: \_\_\_\_\_

Personal description, stating particularly any permanent marks  
or scars \_\_\_\_\_ Signature or L. H. T. I.

Any Serang who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

*N. B.*— Any person other than the owner thereof becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji- Goa.

Issued at Panaji on the \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_

Captain of Ports, Panaji

\* If not known exactly must be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 endorsements.

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as First Class Engine Driver of  
an Inland Motor Vessel under Central Act 1 of 1917

To:

Whereas it has been reported to the Government that you have found duly qualified to fulfil the duties of First Class Engine Driver of an Inland Motor Vessel having Engines of under 100 nominal horse power, I do hereby, in pursuance of Central Act 1 of 1917, grant you this Certificate of Competency as Engine Driver.

By order and in the name of the Governor of Goa.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_

Secretary/ Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji-Goa.

(Reverse)  
(Page-2)

No. of certificate: \_\_\_\_\_ Date of passing Examination \_\_\_\_\_  
Bearer: \_\_\_\_\_

Date\* and place of Birth showing Village, Taluka and District \_\_\_\_\_  
Residence, showing Village, Taluka and District: \_\_\_\_\_ Height: \_\_\_\_\_

Personal description, stating particularly any permanent marks or scars \_\_\_\_\_ Signature or L. H. T. I.

Any Engine Driver who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B.— Any person other than the owner thereof becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji- Goa.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

Captain of Ports, Panaji

\* If not known exactly must be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as Engineer of an Inland Motor Vessel under Central Act 1 of 1917

To: .....

Whereas it has been reported to the Government that you have been found duly qualified to fulfil the duties of Engineer of an Inland Motor Vessel, I do hereby, in pursuance of Central Act 1 of 1917, grant you this Certificate of Competency.

By order and in the name of the Governor of Goa.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

Secretary/ Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji-Goa.

(Reverse)  
(Page-2)

No. of certificate: \_\_\_\_\_ Date of passing Examination \_\_\_\_\_  
Bearer: \_\_\_\_\_

Date\* and place of Birth showing Village, Taluka and District: \_\_\_\_\_  
Residence, showing Village, Taluka and District: \_\_\_\_\_ Height: \_\_\_\_\_

Personal description, stating particularly any permanent marks or scars \_\_\_\_\_ Signature or L. H. T. I.

Any Engineer who fails to deliver up a Certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

N. B.— Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji- Goa.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_

Captain of Ports, Panaji

\* If not known exactly must be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.

APPENDIX 'B'

... hereby certify that ... has served with me in the engine room of ... as ... for a period of ... during which time he has discharged his duties to my entire satisfaction.

I consider that he fully understands the working of an engine, and has sufficient tact, presence of mind, and energy to look after and manage the working of the engines of an inland vessel having engine of 30 nominal horse-power or upwards, but of less than 80 nominal horse-power.

Dated: ...

Signed: ...

No. and description of certificate

Any engineer giving a testimonial in this form should be very careful in doing so, as the document may materially influence the applicant's eligibility as a candidate.

APPENDIX 'C'

Examination in rough working drawing for an Engineer's Certificate of Competency

1. The regulations in regard to the qualifications of a candidate for an engineer's certificate of competency are.—

He must be able to make rough working drawing of the different parts of the engines and boilers.

He must be able to state the general proportions borne by the principal parts of the machinery to each other.

2. In accordance with these clauses, a candidate for an engineer's certificate is required to make a rough working drawing of the parts specified. A mechanic, who has been some years in charge of marine engines and boilers ought by this time to have familiarity in his mind, the general construction of at least one set of engines and boilers, say that set he was last with. Fine drawing is

not expected, and in the proportions of the parts a wide margin will be allowed; absurd dimensions will entail failure in practical knowledge.

3. The drawing must, however, be practically a working/drawing, giving, a sufficient number of views to show the parts fully-sections, plants, or elevations just as the candidate would require to be supplied to him if he had to make the parts to the design of another person.

4. A clear hand sketch showing the construction completely and fully dimensioned, will be accepted if the candidate prefers this alternative.

5. A portion only of the parts specified may be accepted in place of the whole, if the portion is sufficient to show that the candidate has a good practical idea of the construction of the parts, and a fair notion of their general proportions or dimensions.

6. Candidates are hereby cautioned not to put on paper what they have not fully considered, and deliberately intend to be understood as their statement of what they know about the construction of any part required.

7. The statements given in by a candidate may be in themselves, apparently, of little importance, but, as sample material from which the state of the candidate's knowledge of engines and boilers is to be inferred, every detail which is glaringly inconsistent with a sound knowledge of the use of the part, or in which as essential consideration as evidently been overlooked is an important element in the description which the candidate is giving of his own qualifications.

8. The candidate is advised not to begin more than he can clearly finish in the time allowed. An important object in this part of the examination is to ascertain whether the candidate can be trusted to mark all necessary dimensions upon a sketch or a drawing. The test of this is, practically, the making of the part from the sketch without having to supply additional dimensions and without measuring the drawing. To provide this ability the candidate must fully dimension the parts shown in his sketch or drawing notwithstanding that the parts may be correctly drawn to scale. A drawing is fully dimensioned when no part of it is left to the option of the person or the person who is to work to the drawing.

9. To prevent misunderstanding, however, when the candidate has been led into showing more of the details than he has time fully to finish, he should name in the statement on the other side, the particular parts which he has fully dimensioned.

10. All dimensions should have lines and arrow heads to indicate distinctly the points between which the dimensions are given.

11. The candidates should not write cross dimensions upon centre lines, or upon longitudinal dimension lines. This is not an order but a recommendation.

12. The candidate is not expected to design anything but to sketch or draw something with which he is expected to be already familiar.

13. Make sure that there will be sufficient room on the drawing sheet to show all the necessary views. There can be another sheet of drawing paper, if necessary. All the papers used must be forwarded with the drawing.

14. Fill in and sign the following statements:

(SPECIMEN)

Subject for examination in rough working drawing

(Read the foregoing general instructions)

A common slide valve with its spindle. Show also an outline section of the parts at the cylinder face. Show the provision for connecting the slide valve to the spindle.

The candidate is required to fill up the following and to attach this paper to his drawing:—

Statement by the Candidate

The accompanying drawing, made by me this day, without reference to any document, and without the assistance of any person is intended by me to be sufficient for the new construction of the parts above described to fit the places of similar parts which are to be removed. The construction is similar to what I have been with in the ... steamer ... but the dimensions may be different.

The diameter of the cylinder is

The stroke of the piston is

The travel of the valve is

The cover at top end of steam side is

The cover at bottom end of steam side is

The load at top is intended to be

The load at bottom is intended to be

The inside cover is

The thickness of the face of valve is

The thickness of the body of valve is

The greatest opening for steam will be

That gives an area equal to one

The opening for exhaust when the crank is on the top centre is

That gives an area equal to ... of the piston

The valve will cut off steam on the top stroke at

The valve will cut off steam on the down stroke

The parts fully dimensioned in ink, are

The Candidate may omit this part if the choses

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

Applicant

## APPENDIX 'D'

Specimen Elementary Questions for the Examination of  
Engineers for Certificates of Competency

1. What parts of an engine are generally made of wrought-iron?
2. What parts of an engine are generally made of cast-iron?
3. For what parts of an engine is steel sometimes used?
4. What parts of an engine are generally made of brass or gun-metal?
5. Where is white metal sometimes used? On account of what property possessed by it is it adopted? What objection is there to its more general use?
6. For what parts is Muntz metal sometimes used? Is it malleable?
7. What difference is there in the composition of cast-iron, of wrought-iron and of steel?
8. How can cast-iron, wrought-iron, and steel be distinguished from each other?
9. What are the different properties of cast-iron, of wrought-iron and of steel?
10. What is meant by the terms breaking stress, proof stress, safe working stress?
11. What is the cohesive strength or breaking stress of good ordinary wrought-iron?
12. Tempering steel how is it done, and in what order do the colours come?
13. What is case hardening?
14. Which of the common metals or alloys can be forged, and which of them are brittle or short?
15. What is meant by welding? Which of the common metals can be welded?
16. The expansion of metals by heat; give examples of this in the engine and in the boiler?
17. In the construction of cylindrical marine boilers for what parts have the plates to be worked hot? When the material is steel what precautionary treatment of these plates is afterwards necessary?
18. What is double reventing? In what parts of cylindrical marine boilers is double reventing employed? In which of the shell seams is it most necessary?
19. What is "caulking" and how are seams prepared for caulking?
20. Describe the different ways of fastening the ends of the main stays of a boiler. What are the merits, or objections to the different methods?
21. What strain per square inch is allowed on boiler stays?
22. Describe a reveted stay, and state where such stays are commonly used?
23. Where are thin plates to be looked for in a boiler as it wears and how is the thinness to be detected?
24. How are boiler tubes fixed? what are "stay tubes" and how are they secured?
25. Where is it generally that boiler-tubes leak? How is this defect repaired? What are causes of this leaking?
26. What are the causes of cracked tube plates? Where are the cracks situated? How are they repaired?
27. What is the difference between a dry 'uptake' and a "wet uptake" which required most repair? Why? Where have you seen a wet uptake?
28. What is a superheater? What is its construction? What valves are on it? There is sometimes a gauge glass on it; What is that for?
29. What parts of a marine tubular boiler are first injured by shortness of water?
30. Where are angle irons sometimes used in the construction of a boiler, and where are flanged plates used?
31. Priming: To what causes as it attributed? What means are applied to prevent it? What evils may be produced by it?
32. Funnel draught: What makes it? What checks it?
33. Flame is sometimes seen at the top of a funnel: What causes this appearance: Is it beneficial or it is detrimental? Why so?
34. A blast pipe: What is its construction? Where is it placed? For what is it used?
35. How many bottom blow off cocks are generally fitted to each boiler and why are they so fitted?
36. Blow-off cocks are sometimes fitted with a spanner guard for what purpose is this? Describe how the guard is formed.
37. Test cocks or watergauge: cocks: Where are they placed? At what heights? Must the cocks themselves be at these heights? What provision is made for clearing these cocks? Should they ever become choked. When there are no test cocks, how is the height of the water ascertained?
38. What is a dead-weight safety valve? Of what are the rubbing surfaces formed? How is a lockup valve arranged to admit of lifting it or of turning it round, and to prevent addition to the weight?



39. About what area of safety valve is no required by the Board of Trade? What area was formerly required and on what ground has that been altered? What is the effect of suddenly opening a safety valve when steam is up? To about what extent to safety valves rise when blowing of without being eased by hand?
40. Spring-loaded safety valves: What advantages have they that are not possessed by dead-weight valves? What are the disadvantages as compared with dead-weight valves?
41. Of what pieces does a glass water-gauge mounting consist? How does it act? Where is it placed? At what height? Is it liable to derangement? How is its working tested?
42. Glass water-gauges have sometimes pipe connections top and bottom? What is the object of the arrangement? Should there be cocks at the extremities of these pipes?
43. Describe a Bourdon's steam-gauge. Some gauges have an inverted syphon-pipe below them: What is its use?
44. Why is a small cock sometimes put on the pipe leading to a steam-gauge? Where should it be placed, and what error might be made by omitting to use it?
45. Do steam-gauges indicate the total pressure of the steam, or only a portion of that pressure? What is the pressure measured from?
46. What is meant by the salting of the boiler? How is this prevented? What is the density of ordinary sea water? How is the density ascertained? What is the difference between the formation of scale and the salting of the boiler? What is the maximum density at which boilers should be worked at sea?
47. Scum cocks and pipes? How are they arranged? Where are they placed? At what height in the boiler? When are they used? When must they be shut? Neglect of these cocks lead to what dangers?
48. Scale: Of what does it consist? Where is it most objectionable? How is it removed? How is its formation prevented? What evil effects are produced by it?
49. What is a salinometer? Of what does it consist? How does it act? How is it graduated? Can it be used at any temperature indiscriminately?
50. What harm may be done through the check valve of one of a set of boilers being defective while underway? How would you work to avoid this harm?
51. How is the leak from a split tube stopped in a boiler at sea?
52. What is the use of dampers? Where are they fitted? When they should be used?
53. When there are no dampers fitted, what is used instead? What evil to the boiler is sometimes attributed to this? When the heating surface is clean, does it occur?
54. Describe the piston of a steam cylinder with its different rings and their uses. There are generally round pieces let in flush on one side of a piston? What are they? How are these pieces fixed?
55. Cylinder drain cocks? What is their use? There is sometimes a valve upon each cock? What purpose does it serve?
56. Cylinder escape valves: Of what does they consist? How protected? How regulated? When are they most needed? To what danger do they expose these engines? What precaution is sometimes used to obviate this danger?
57. What is compound engine? What different kinds are there for screw steamers in respect to the number and arrangement of their cranks and cylinders? What is a triple expansion engine?
58. What is link motion? What are some of its advantages? In modern engines for the screw propeller, when there is no link motion, what takes its place?
59. What is a separate expansion valve? Why is it not fitted to all engines? What effect has an expansion valve upon the starting and upon the reverting of the engines?
60. What arrangement is applied to reduce the friction of a slide valve? To what is the friction due?
61. Describe a loose eccentric. How does it set? In what engines is the loose eccentric still employed?
62. What is the travel of the eccentric rod? How is it measured on the eccentric? What is the travel of the slide valve when the link motion is in mid gear and the engine still moving?
63. What are "double-boat" "Valve"? Why are they not generally used for safety valves? Are they ever used instead of the valve? What objections are there to their use.
64. What is a circulating pump? Is it always worked by the main engine? Give an example from your last steamer of the three water temperatures generally noted by careful engineers.
65. An air valve is sometimes fitted to a circulating reciprocating pump: What purpose does it serve?
66. What is the difference between a bucket air pump, a piston pump and a plunger air-pump?
67. Whether double acting air pumps are made with plungers, with pistons or with buckets?
68. What is an air-pump trunk? When is it necessary? How is it attached to the bucket?
69. What class of air-pump requires both feet and delivery valves and in what other class can either of these valves be in some cases dispensed with?
70. When underway, when the air-pump bucket is at the top of its stroke, at what height is the water in the condenser?

71. With a surface condenser and a single acting air-pump, what is the effect of a loady foot valve and what is the effect of a leaky bucket when there is also a foot valve?
72. Air-pump pet cock or valve where is it placed? How does it act? What is its object? Does it in every case reduce the effective capacity of the pump? Is it equally applicable to double acting pumps?
73. At what temperature is the bet well worked? What is the effect of higher temperatures? What is the effect of lower temperature? What limits the lowness of temperature? Has very low temperature any disadvantages?
74. Bilge injection with common condensers? What are the fittings required? When is it used? What precautions are necessary in using it?
75. When surface condensers are used, what takes place of the bilge injection? To what is the connection made? How is its valve formed? Why is this necessary?
76. What are the practical guides to the proper amount of opening of the inlet valve for the circulating pump?
77. Food-pump pet cock or valve: Where is it placed? What is its use? How does it act? Is it always a necessary fitting?
78. What are some of the ways of fastening the ends of surface condenser tubes? About what size and about what thickness are condenser tubes? What parts of a surface condenser are made brass?
79. What is a blow-through valve or cock? To what is it attached? There is sometimes a valve that when opened admits steam from slide valve causing to the exhaust part? What is its use? To which cylinder is it fitted?
80. What is a snifting valve? What is its use? Where is it placed? Can it be placed too high? Can it be placed too low? At what height should it be placed? Was there one in your last steamer, if so, where was it? why are snifting valves generally omitted now?
81. What connections are generally fitted to the donkey-pump? And to what services can it be applied?
82. When the engines are stopped with steam up, what are to be shut and what are to be opened?
83. How is an engine heated up before starting? What precautionary examinations as made before starting?
84. What is an interceptor or catch-water? Where is it fixed? What is its construction? How does it act and what attention does it require?
85. Describe an air-pump bucket, with its valve or valves and its packing of what are the valves generally made?
86. Of what materials are air-pumps rods made? Why so?
87. What is the racing of the engine? When does it occur? What danger attaches to it? What is done to prevent it?
88. What are marine Governors? What is their general constructions? How does they act?
89. What is meant by the pitch of a screw propeller? How is it measured?
90. Explain the difference between a right hand and left hand propeller and state how each of them revolves?
91. What is the slip of a screw propeller? How is its amount expressed in figures?
92. Which of the valves about engines and boilers have to be worked by hand, which of them work self-actingly, and which are worked by the motion of the engines?
93. Why is soda sometimes put into a boiler, and how is it put in while under weight? What is the kind of soda used?
94. Tallow cups for cylinders were sometimes made with two small cocks or with only one small cock or with one large hollow plug cock, or with one small cock and a valve which of those is suitable for a high pressure cylinder and which for the cylinder of a condensing engine? Describe how the cup with only one small cock is used. What is now generally used instead of these? How has this change came about.
95. Does a cylinder escape valve, self-acting, allow all the water to escape, if not how much is left in the cylinder?
96. What is a steam lubricator (sometimes called an impereator) Explain its action; To what part of the engine is it connected; Whether will throwing cold water over it make it work faster or slower? Describe the one used in your last steamer?
97. A common paddle wheel; Of what is the centre made? Of what are the arms formed? What is the form of the bolts which attach the floats to the arms? How are the arms attached to the centres?
98. Why have some paddle wheels one or more cast-iron-flats in each wheel? With what engines are these most required? At what part of the circumferences are they placed?
99. Why are paddle wheel floats sometimes made of different breadth in the same wheel? With what description engine is this most needed? Where are the board floats placed and where are the narrow floats placed in the circumference of the wheel?
100. What difference is there between a radia paddle wheel and one with feathering floats? What is the object of feathering floats? Are all the eccentric rods attached in the same way, and are they all of the same form?
101. Whereabout is the centre of the eccentric of a paddle wheel with feathering floats placed? In that case are the feathering lovers on the striking face or on the back of the float? When the paddle shaft has an outer bearing, how is the eccentric made?

102. Of what materials are the working surfaces of a paddle wheel with feathering floats? Are they all lubricated? With what?
103. What is a disconnecting paddle engine? At what place is the disconnecting effected? How is it accomplished? In which of the cranks of a disconnecting engine are the crank pins fixed?
104. Whether is the link motion valve gear or the loose eccentric generally used for disconnecting paddle engine? For what steamers are disconnection paddle engines frequently employed?
105. What are expansion joints? Where are they necessary? What attention do they require? Of what should the working surface be made?
106. What omission in the construction of expansion joints may lead to a serious accident when steam is first applied? How is this prevented in the construction of a steam trunnion pipe for an oscillating engine?
107. Describe an oil cup with a syphon worsted. How is the worsted arranged? How is it cleaned? How far down the tube does it extend?
108. Describe a thrust bearing; which of the surface wears? Why are there sometimes a number of oil tubes for one thrust bearing?
109. What parts of a screw shaft are generally covered with brass? Why is this necessary? About what thickness is the brass?
110. What is the stern tube or screw shaft pipe? Why is a pipe of such a length required? Of what is it made? How is it fixed at each end?
111. What is a lignum vitas bearing? How is the wood fitted? Where is such a bearing generally used?
112. How is a screw propeller fixed on the shaft? What means are used to prevent its getting loose at sea?
113. Where are sluice valve placed? What large sluice valve is there in almost all screw steamers? From what position should this valve be worked? Why so? What attention should it receive?
114. With a condensing engine what valves or cocks are on the skin of the ship in the engine-room and in the stokehole?
115. What are the necessary fitting of a marine boiler?
116. With a surface condensing engine what cocks or valves are open some time before the engine is started so as to be ready for starting whenever the order is given?
117. What is a steam jacket? What cocks are one it? In what engine or jackets most generally used? Do they required to be felted?
118. What parts of an engine or its fittings should be felted or otherwise protected from radiation?
119. What are the small cylinders sometimes fitted on the slide valve casing cover of vertical engines? Explain their action. To what are they connected by a pipe? Why so?
120. Name the principal pipes in connection with the engine boilers of a steamer? And state to what the ends of these pipes are connected?
121. Through what cocks or valves, pipes and chambers does the water pass on its way from the sea inlet rose plate to the water space of the boiler with a jet condenser?
122. Through what cocks or valves, pipes and chambers does the circulating water of a surface condenser pass?
123. Through what cocks or valves, pipes and chambers does the steam pass from the boiler until it is in the form of water in the hot well?
124. Name the pieces of the engine through which the pressure of the steam is transmitted from the piston to the screw propeller. Name them in the order in which they act?
125. What is an air vessel? How does it act? At what parts of an engine or of its fittings are air vessels generally applied?
126. What is the construction of a mud box? Where should mud boxes be placed? Why are they necessary? How should the space be divided by the rose plate and why?
127. What is a trunk engine? When used in a horizontal engine for a right-hand screw propeller, at which side of the vessel should cylinders be placed? Why so?
128. What is an oscillating engine? for what steamers are oscillating engines generally adopted? How is the steam conveyed to and from the slide valve casing?
129. Of what parts does the valve motion gear of an oscillating engine consists?
130. For what have geared engines sometimes been used? Of what were the cogs of the large wheel made?
131. At what part of a screw steamer is the pressure that propels it applied to the hull?
132. At what part of a paddle steamer is the pressure that propels it applied to the hull?
133. About how much fuel per indicated horse-power per hour is required modern engines, common compound and triple expansion?
134. What is the explanation of the economy of the surface condense?
135. What is the construction of a surface condenser? Of what are its tubes made? How are they fixed? How are they kept tight? What is done asplit tube?

136. Whereas do surface condensers foul? How are they cleaned?
137. What non-conducting substances are employed to prevent radiation and how are they applied?
138. In the construction of smoke box and of dry uptakes, what provision is made to lessen the amount of radiation?
139. How can the formation of block smoke be prevented? Describe smoke-preventing apparatus.
140. What is meant by "circulation" in a boiler? And what are the results of defective circulation?
141. What means are sometimes adopted to improve in the circulation in a boiler?
142. By what arrangements is the circulation promoted in a "haystac" boiler?
143. Describe a ship's side air-pump discharge valve; in what respect does it sometimes differ from a common step valve; and what attention does it require?
144. What is the construction of a feed-escape valve, to what is its discharge connected and how is its loading regulated?
145. When there is no feed-escape valve what is the arrangement of the feed valve cocks?
146. What is the measure of a horse-power? How is indicated horsepower ascertained?
147. Has nominal "horse-powers" a fixed meaning? What is the use of this expression? What is generally taken as the measure of one horsepower nominal?
148. What is "Back Pressure" in a cylinder? About how much is it in each of the cylinders in your last steamer? It excessive cushioning ever a trouble in certain condition in modern engines? Say when and why and in which cylinder this occurs?
149. What is meant by "speed of piston"? About how much is the speed of piston in modern marine engines?
150. What is "atmospheric pressure"? What is its average amount? What instrument tell this amount?
151. What is "gross pressure" or "absolute pressure"? What pressure is it that is shown by the steam-gauge?
152. What is meant by "cutting of steam"? How is it done? What part of the valve regulate the cut off?
153. What is a piston slide valve? Describe its construction. Why are such frequently employed in place of the common slide valves. What is a great drawback to the use of these valves?
154. What fixes the time of closing the exhaust? After the exhaust is closed and before the port opens for steam, what becomes of the steam that is in the cylinder?
155. What is the "load" of the valve? What is its object? About what amount is it?
156. What is the 'cover' or 'lap' of the valve? What is its object? About what amount is it?
157. What is the "exhaust cover" of a slide valve? What is its effect upon cushioning and upon exhaust?
158. What is "minus cover" or "minus lap" on the exhaust? What is its effect upon the exhaust and upon cushioning?
159. What is "ushicking" or "compression" in a steam cylinder? How is it affected by the amount of cover or of minus cover there may be upon the exhaust? How is it affected by the exhaust pressure?
160. What is mean effective pressure? How is its amount ascertained?
161. What is a dial vacuum gauge? What is its construction? For what is it used? About what amount should it show when the engine is working all right? What effect has the variation it indicates on the performance of the engine?
162. Does the vacuum gauge enable to tell what pressure that is in the condenser or must you have recourse also to the barometer to arrive at that? How would you ascertain the actual amount back pressure there is in the condenser?
163. What is a barometer? What is its construction? Is a barometer sometimes used instead of a vacuum gauge? In what respect does the weather barometer differ from the vacuum gauge barometer?
164. The common vacuum gauge and the common steam gauge, in which of them are the graduations marked from atmospheric pressure? Does either of them tell what is the true actual pressure in the boiler or in the condenser?
165. Do steam and vacuum gauges vary with the variations of the weather barometer? When the weather barometer varies from 28 to 31, how much will the vacuum gauge vary and how will that affect working of the engine? Why so?
166. Vacuum is generally stated as so many inches. What is meant by say 20 inches vacuum? What does that tell us about the absolute pressure than in the condenser?
167. From what depth will pump draw water? Is there any limit? Why?
168. What is vacuum? Can vacuum move a piston? When the temperature of the water in the condenser is  $212^{\circ}$ , what is the greatest degree of vacuum there can then be in the condenser?
169. What is a thermometer? Its construction? What is the property of matter, that is, the principle of its construction? What temperatures are regularly noted by careful engineers?

170. What is the temperature of (1) melting ice, (2) of boiling water, (3) of steam about 60 lbs. pressure by the steam gauge, (4) of steam about 100 lbs, and (5) of steam about 150 lbs also (6) of smoke in the funnel, and (7) of water in the hot well?
171. What is meant by the conduction of heat? Give examples of it in the boiler and in the engine.
172. What is meant by the "convection" of heat? Give examples of it in the boiler and in the engine.
173. What is meant "radiation" of heat? Give examples of it in the boiler and in the engine.
174. Which is convection which is radiation, and which is conduction in the following cases; (1) Heat from the glowing fuel to the furnace crown; (2) Heat passing from one side of furnace crown plate to the other (2) Heat passing from the steam pipe in the engine rooms (4) The heat of evaporation?
175. What are the effecting heating surfaces of a marine boiler? What is an objection to vertical heating surfaces?
176. What parts of a marine engine are exposed to danger when the temperature is below freezing point?
177. What precautions are necessary in cold climates when the temperature is below freezing point?
178. State as many ways as you can by which a boiler might not get its full food; that is, a boiler or one of the set of boilers gets short or water although the feed valve is open its proper amount; to what causes might this be due?
179. Of what are furnace bars generally made? About what thickness are they at top? About what space is between them? Whether are the bars put further apart for New Castle coal or for Welsh coal?
180. Which burns faster, New castle coal or Welsh coal? Which is the flaming coal? Which makes smokes?
181. About how many tons of steam coal will be burnt per day in four furnaces, each 3' 0" wide and of about the usual length? On what grounds do you say so?
182. About how many tons of steam coal will be burnt per day with good compound engines to drive an ordinary steamer of 45 ft. beam 10 knots an hour by steam alone? On what grounds do you say so? What percentage more coal would be required to propel the same steamer 1 knot faster?
183. About how many tons of steam coal will be burnt per day with a good compound engine, surface condensers, the low pressure cylinder 70 inches diameter, doing average work? On what grounds do you say so?
184. A pair of inverted cylinder direct acting engine there is a liner half an inch thick between the ahead eccentric rod and the eccentric strap, in over hauling the engine this picce is lost and forgotten; what difference will its commission make in the working of the engine on the admission, on the cut off and of the exhaust of the steam? Which will take place earlier and which latter, distinguishing between the up stroke and the down stroke?
185. A pair of inverted cylinder direct acting engines driving right hand screw; on which of the crosshead guide bars is the pressure greatest in the up stroke, and on which in the down stroke.
186. A screw propeller is getting loose, it has a little plate on the shaft, side ways on the key or feather; how will this show in the engine-room?
187. How would you prove whether the centre line of the trunnions of and oscillating cylinder be fair with the centre line of the main shaft?
188. How can the fairness of a line of screw shafting be tested without lifting the shafts?
189. Where are steel gorgings generally used in marine engines?
190. What is the composition of nickel steel? Where is it sometimes used in engines and boilers?
191. How is forced draught generated on board ship and supplied to boiler furnaces? Is the air heated before delivery? If so, how?
192. What is the "induced" draught? Compare the merits of "forced" and of "induced" draughts.
193. How is the intensity of the draught measured? What is the usual pressure employed in the merchantile marine?
194. An explosive gas is liberated from bunker coal. Usually in well ventilated bunkers this gas escapes into the atmosphere without doing harm. In ill-ventilated bunkers the gas, after mixing with a certain proportion of common air, has been known to explode when a naked light has been brought in contact with. What is the composition of the gas? Where is it found? In bunkers, between docks, pockets and coal sheets? How may it be get rid of as soon as it evolves from the coal? How many cubic feet of air to one of the gas forms a violent explosive mixture?
195. A lighted lamp or candle has sometimes been lowered into an apparently empty paraffin tank and produced an explosion resulting in injury to the person holding the light. What did the tank probably contain, and what produced the explosion?
196. In vessels carrying coal cargoes it has been observed that, generally speaking, the gas which escapes from the body of the coal is found more abundantly at the forward end of the hold than at the after end. Why should this be so?
197. In recently opened ballast tanks, double-bottoms, and boilers, a light lowered into either has sometimes been extinguished. What would, in all probability cause this?

198. In double-bottom steamers where does the bilge water lie, and where are the roses of the bilge pipes fitted?
199. What is the advantage of a large rose over a small one?
200. Why specially in vessels carrying cargoes liable to shift, should engine room bilge suction be fitted to both wings of the bilge?
201. In a heavily listed vessel, why is it difficult to keep steam?
202. If the engine bilge pumps get choked and water accumulated in the stokehold bilges, what effect does the water have upon the bilge boards and stokehold plates, when the ship is rolling violently?
203. In a triple-expansion engine, what spare gear do you consider necessary in the case of a foreign-going ship? also what stores would you provide for a voyage to New Zealand?
204. What means are sometimes provided for temporarily coupling together the broken parts of, say, a tunner-ghaft? describe the fitting.
205. Does the pressure on the trust-collars vary with the horsepower or with the speed of the ship, or how?
206. If the holding down belts of a thrust bearing should become slack, what effect would it have upon the working of the engines?
207. In an engine with three cranks, which of the three is subject to the greatest torsional stores, (1) in going ahead, (2) in going astern?
208. Is it usual to make the crank shafts of a triple or quadruple expansion engine in one piece? Is the diameter of the shaft uniform and to end? give your reasons for the practice which prevail?
209. In a "built" crank shaft how are the webs rigidly secured to the pins and to the body of shaft?
210. There are various descriptions of donkey engines in use on board ship for pumping purposes. Some pumps are fitted with escapevalves, some are not, why should this be?
211. Explain the function of an air-vessel fitted to a feed pump. Make rough hand sketch of (1) a satisfactory vessel? (2) an unsatisfactory vessel where, say the air-spring has been destroyed by carelessness, or has never been properly provided.
212. Should cocks or escape-valves be fitted to air vessels, why or why not?
213. Where, by preference, should the escape-valves of a feed pump be placed? Why?
214. Scum cocks are sometimes fitted to boiler shells at a height convenient for engineers to manuplate when standing in the stokehold; the scum pipes in such cases are led upward, inside the boiler, to a little above the combustion chamber tops, what danger may arise from this arrangement?
215. Cocks for testing the water level of boilers are sometimes fitted within reach of the engineer who is standing in the stokehold. These may have internal pipes leading upward and terminating at various levels. Under what circumstances may these become misleading?
216. Why should the pipe which leads from the bottom of the water gauge column to the bottom of the boiler front, or back, be covered with non-conducting materials? Why also should it never have lengthy horizontal bends?
217. In your own experience, how frequently is this pipe removed and cleared?
218. Why, even with the best of water-gauges, is it advisable to occasionally use the drain cock?
219. Steam hose have sometimes been inadvertently made in this length of piping leading from the top of the water-gauge column to the top of the boiler. Roughly sketch such loop and explain the danger arising from its existence.
220. Describe your method of thoroughly testing the water-gauge system to satisfy yourself that all the cocks and pipes are clear. Your answer can be written on a supplementary sheet of foolscap which the examiner will hand you. Hand sketches, more lines indicating pipes and circles indicating cocks, should be made. Identify the cocks and pipes by letters or numerals.
221. Describe the construction of a water-tube boiler mentioning the type selected?
222. In a water tube boiler, how is an economiser fitted, and what is its duty.
223. How is the water gauge fitted? Are glass-gauges used?
224. The pressure of the steam in water tube boilers is sometimes greater than at the engines. Why is this, and what percentage above the engine pressure does it amount to? How is the difference of pressure maintained?
225. Describe any automatic method of feeding water-tube boilers. Of what material are the tubes made?
226. Describe the construction of any steam turbine you are acquainted with, which is used on board ship. How is the expansion of steam effected? How many propeller shafts are employed, and how many propellers?
227. Is the same power available to go astern as to go ahead?
228. Of what material are the propellers made?
229. How many pounds of coal per indicated horsepower per hour are burnt with this type of engine? Name the type of boiler in use?

230. Describe the construction of a feed water-heater and give name of its manufacturer.
  231. Describe any well-known ash-ejector.
  232. Describe any well-known independent feed pumps?
  233. Are independent feed pumps automatic in their action? Explain the action.
  234. What advantage, if any, have independent feed pumps, over feed pumps worked by the main engines.
  235. To about what temperature is the feed water raised by passing through a feed heater?
  236. What fittings are usually placed on a feed-heater? Why are they necessary.
  237. Describe the construction of a feed fitter enumerating its valves and cocks.
  238. How can the fitter be cleaned? And ingredients are generally removed when cleaning takes place?
  239. What is the intercepting material made of? how is it fitted?
  240. Describe an evaporator; and mention the types.
  241. What fitting are necessary with evaporator?
  242. How is the brine got rid of?
  243. How may the coils be cleaned?
  244. What is a dynamo? Describe its various parts. For what is it used?
  245. In what respect does an electric motor differ from a dynamo? Where are electric motors sometimes used on board ship?
  246. Describe a system of electric lighting employed on board ship.
  247. How is the position of a fault in the circuit discovered?
  248. What is "sparking" and may it under some circumstances (naming them) be a danger?
  249. What is "short-circuiting" And to what evil may it give rise?
  250. What means are employed to prevent any part of the circuit becoming overheated?
  251. Describe the features of an arc lamp.
  252. Describe the construction of glow-lamp?
  253. What is the usual candle-power of the small glow-lamps in general use on board ship?
  254. Define the following terms: Ampers, volt, ohm, watt, what is the measure of an electrical horse power?
  255. Explain the uses of switches, brushes, commutators, cutouts, field magnets, armatures and resistance-coils?
  256. Why is it desirable to fit a dynamo in a cool place on board ship?
  257. What undesirable effect will ultimately occur to an electric wire, whose section area is constantly diminishing, say through corrosion?
  258. What danger might arise from loading electric wire through coal bunkers.
  259. Is it better to load electric wires above or below sidecuttles, why?
  260. What instruments are used on board ship to ascertain the strength of an electric current.
  261. Many ocean-going steamers are fitted with hydraulic cranes, etc. From where do they obtain their power? How is the hydraulic pressure kept at a relatively constant amount?
  262. Is any difficulty experienced in working hydraulic cranes in frosty weather? If so, why?
  263. Describe any steam steering gear you are acquainted with?
  264. When the helm is put hard over and the ship is going full speed ahead what prevents the rudder returning to the amidship position?
  265. In the case of steamship under way, does the officer, or man manipulating the steam steering wheel overcome any resistance exerted by the rudder?
  266. Explain clearly what is being done by a helmsman manipulating the wheel of a steam steering engine.
  267. Is there any difference between the amount of horse-power required to put a helm hard over in a given time when the vessel is going full speed ahead, and when she is going full speed astern? This question refers to a case of a steamer fitted with one rudder on and demands as more complete answer than merely "yes" or "no".
  268. What precautions should be taken before removing a man-hole door from a steam boiler and why are these precautions necessary. In the absence of such precautions what casualties might occur?
  269. Describe the chief features of the engine-governor fitted to a steamer you have served in. Describe its action. Give the mark's name and name of ship.
- Note:* The following six questions refer to oil motors fitted to launches which carry passengers:
270. Name the principal parts of an oil motor, and briefly state their functions. Give the name of the marks of the motor.



- 271. What kind of oil is usually employed in oil motors? What is its flashpoint? What is its specific gravity? What is its calorific value? What precautions are taken in its storage to guard the public against casualty by fire or explosion?
- 272. How many cylinders are generally used in oil motors? What kind of piston is fitted? How frequently (measured in revolutions) is explosion per cylinder effected? How is explosion in the cylinder carried out?
- 273. Describe how an oil motor is started. If starting prove difficult where would you chiefly look for defects? How is piston speed modified? How is the speed of a vessel verified? How is reversing effected?
- 274. Before examining an oil motor with a naked light, what steps should be taken for safety's sake?
- 275. How frequently should an oil motor, working 12 hours a day, be opened up for examination, cleaned and its parts re-adjusted? What difficulty arises when the internal parts become fouled with carbonized oil?

*Note:* Questions isolated from their context should be read in the light of the context. Thus the "sparking" referred to in question 248 relates to the sparking in an electric lighting circuit on board ship. See question 246.

APPENDIX 'E'

By the Government of Goa



GOVERNMENT OF GOA

Certificate of Competency as First Class Master of an  
Inland Vessel under Central Act 1 of 1917

To,

Whereas it has been reported to the Government that you have been found after examination, duly qualified to fulfil the duties of

First Class Master of an Inland Vessel, I do hereby in pursuance of Central Act 1 of 1917 grant you this Certificate of Competency as such First Class Master.

By order and in the name of the Governor of Goa.

This \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_

Secretary/Under Secretary to the Government of Goa.

Registered at the Office of the Captain of Ports, Panaji-Goa.

(On the reverse)

(Page-2)

No. of Certificate Date of passing Examination \_\_\_\_\_ Bearer: \_\_\_\_\_

Date\* and place of Birth showing Village, Taluka and District: \_\_\_\_\_ Residence, showing Village, Taluka and District: \_\_\_\_\_ Height: \_\_\_\_\_

Personal description, stating particularly any permanent marks or scars \_\_\_\_\_ Signature or L. H. T. I.

Any master who fails to deliver up a certificate which has been cancelled or suspended is liable to a penalty not exceeding Rs. 500/-.

*N. B.*— Any person other than the owner thereof, becoming possessed of this Certificate is required to transmit it forthwith to the Captain of Ports, Panaji-Goa.

Issued at Panaji on the \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_

Captain of Ports, Panaji.

\* If not known exactly shall be stated on the best information or evidence. Page 3 Photograph of the holder, renewal every ten years.

Pages 4 and 5 Endorsements.