

**MINISTRY OF SURFACE TRANSPORT
(Shipping Wing)**

**New Delhi the June, 19, 1990
NOTIFICATION**

(MERCHANT SHIPPING)

G.S.R. 606(E).—In exercise of the powers conferred by sub-section (1) read with clauses (b), (c), (d), (e) and (f) of sub-section (2) of section 87 of the Merchant Shipping Act, 1958 (44 of 1958), the Central Government hereby makes the following rules further to **amend the Merchant Shipping (Examination of Masters and Mates) Rules, 1985**, namely :-

**1. (1) These rules may be called the Merchant Shipping
(Examination of Masters and Mates) amendment Rules, 1990**

(2) They shall come into force on 30.6.1990.

2. In rule 3 of the Merchant Shipping (Examination of Masters and Mates) Rules, 1985 (hereinafter referred to as the said rules), for sub-rule (2), the following sub-rule shall be substituted, namely "(2) Every successful candidate shall, on his surrendering the lower grade certificate of competency, if any, in his possession be granted a certificate of competency for the respective grade, in accordance with the provisions of these rules in the appropriate form prescribed in the Merchant Shipping (Certificate of Competency) Rules 1989."

3. In rule 4 of the said rules,---

(a) For sub-rule (3), the following sub-rule shall be substituted namely :-

"(3) Every candidate for examination in Parts B, C, D and E shall

(a) have successfully completed a training course on Training Ship "Rajendra" for at the Lal Bahadur Shastri Nautical and Engineering College, Bombay and produce a certificate from the Principal of the college testifying to his period of attendance, good conduct and proficiency:

(b) have passed the examination in Part A; and

(c) be not less than 20 years of age."

(b) for sub-rule (6), the following sub-rules shall be substituted, namely :-

"(6) Any candidate who holds the certificates of Competency as a Navigational Watchkeeping officer shall, if he complies with the requirements of sub-rule (4), be exempted from the whole of Parts B, C, (except the paper on principles of navigation) D and E.

"(7) Any candidate who has completed training course on board training ship Rajendra or an institute recognized under rule 23, if he holds a degree of a recognized university in Physics, Mathematics or Engineering, shall be exempted from the whole of Part A and if he holds a degree of a recognized

University in Nautical Science, shall be exempted from the whole of Parts A, B, C, D and E."

4. In rule 7 of the said rules .--

(a) for sub-rule (1), the following sub-rule shall be substituted, namely :-

"(1) The examination for the Certificate of Competency as Extra Master shall be held in four parts, namely--

(i) Part A- Written

(ii) Part B-Written

(iii) Part C-Written

(iv) Part D-Dissertation."

(b) in sub-rule (3) for the words "nine months", the words "three months each for Part A, Part B and part C" shall be substituted.

(c) in sub-rule (5), for the words and letters "Parts A, B and C", the words and letters "Parts A, B, C and D shall be substituted;

(d) after sub-rule (5) the following sub-rule shall be inserted namely :

"(6) The dissertation in Part D shall be prepared by the candidate on a maritime subject assigned by the Chief Examiner and shall be submitted to the Chief Examiner for Scrutiny. If the standard of the dissertation is approved by the Chief Examiner, he shall declare that the candidate has passed Part D of the examination."

(5) In rule 8 of the said rules, for sub-rule (3) the following sub-rule shall be substituted namely:-

"(3) Every candidate for examination in Parts B,C, D and E shall.--

(a) have satisfactorily completed a training course on training ship 'Rajendra' or the Lal Bahadur Shastri Nautical and Engineering College Bombay and produce a certificate from the Principal of the College testifying to this period of attendance, good conduct and proficiency:

(b) have passed the examination in Part A, and

(c) be not less than 19 years of age."

6. In rule 12 of the said rules, after sub-rule (7) the following sub-rules shall be inserted, namely :-

"(8) Oil Tanker Safety Course. The oil tanker safety course certificate shall be granted on successful completion of an approved oil tanker safety course in accordance with the syllabus prescribed in [Appendix K](#).

(9) Chemical Tanker Safety Course—The Chemical tanker safety course certificate shall be granted on successful completion of an approved chemical tanker safety course in accordance with the syllabus prescribed in [Appendix I](#).

(10) Liquefied Gas Tanker Safety Course.—The Liquefied gas tanker safety course certificate shall be granted on successful completion of an approved liquefied gas tanker safety course in accordance with the syllabus prescribed in [Appendix M](#).

(11) Revalidation Course—The revalidation course certificate shall be granted on successful completion of an approved revalidation course in accordance with the Syllabus prescribed in [Appendix N](#)."

7. In rule 13 of the said rules, in sub-rule (3) for the word 'six' the word "twelve" shall be substituted.

8. In Chapter III of the said rules, for Part I, the following Part shall be substituted namely :-

PART I

REMISSION IN QUALIFYING SEA SERVICE

21. General.—A candidate for the examination of certificate of competency as second mate of a foreign going or as navigational watch keeping officer shall be eligible for remission in qualifying sea service as specified in rules 22, 23, and 24 but he shall not be admitted to the examination until he has completed a minimum period of 12 months service at sea.

22. Remission for undergoing training--

(1) A candidate referred to in rule 21 who has successfully completed the training course on board training ship 'Rajendra' shall be eligible for remission of qualifying sea service to the following extent, namely :-

(a) If the candidate obtains a degree of a recognized University in Nautical Science to a maximum of 24 Months.

(b) In case of other candidates to the actual period of training subject to a maximum of 12 months.

(2) Every such candidate who has undergone training, in the Lal Bahadur Shastri nautical and Engineering College, Bombay and produces a certificate from the Principal of the College testifying to his period training good conduct and proficiency, shall be eligible for remission to the extent of half the time he spent on training subject to a maximum of 3 months.

(3) Every such candidate who has obtained additional certificates referred to in sub-rules (1), (2) and (7) of rule 12 shall be eligible for remission of 2 weeks :

Provided that a candidate who has not obtained the said certificates before appearing for the examination of certificate of competency shall be provisionally allowed such remission for the purpose of appearing for the examination.

(4) Every such candidate who has successfully completed an approved pre-sea training course in an institute recognized under rule 23 and has satisfactorily completed a course of training during his sea service as an apprentice or cadet, shall submit an approved cadet's record book showing therein the details of training received during his apprenticeship and the period of service performed by him on duties associated with bridge watch keeping. If on examination of the record book the Examiner is

satisfied that the candidate has satisfactorily completed the training course during his apprenticeship, the candidate shall be eligible for remission to a maximum of 6 months in addition to the remission to which he may be eligible under this rule or rule 23.

23. Recognition of other training institutes--

(1) Any training institute other than those specified in rule 22 or rule 41 may apply to the Chief Examiner for recognition of the institute and grant of remission in qualifying sea service in lieu of time spent by a candidate in the institute.

(2) On receipt of an application under sub-rule (1), the Chief Examiner may require the syllabus, curriculum and mode of training of the institute to be inspected and investigated as he deems necessary and on being satisfied, may grant recognition to the institute and may direct the extent of remission that may be permitted in lieu of time spent by a candidate in the institute.

24. Remission for degree qualification--

(1) Every Candidate for the examination for grant of certificate of competency as navigational watch keeping officer, who has successfully completed an approved pre-sea training course at an institute recognized under rule 23 and holds a degree of a recognized University in Physics, Mathematics or Engineering shall be eligible for remission of maximum 12 months in addition to the remission to which he may be eligible under rule 22 or rule 23.

(2) Every such candidate who passes the examination of certificate of competency as Navigational Watch-keeping Officer may be permitted to appear for the remaining parts of the examination for certificate of competency as second mate of a foreign going ship :

Provided that certificates of competency shall not be issued until the candidate submits proof of sea service in compliance with sub-rule (4) of rule 4."

9. In rule 46 of the said rules, sub-rule (1) in the table under the heading (c) 'Master FG' against item 2, in column 2, for the figure '2' the figure '3' shall be substituted.

10. In rule 52 of the said rules for the words "for the examination" the words "for Part A of the examination" shall be substituted.

11. in rule 59 of the said rules, in sub-rule (1), in the table--

(a) under the heading 'Master (Foreign Going) against item 2 in column 2, for the figure '2' the figure '3' shall be substituted:

(b) for the heading 'Extra Master' and the entries thereunder, the following heading and entries shall be substituted, namely :-

	(1)	(2)	(3)
PART A			
Pure mathematics	3	200	50
Applied mathematics and statistics	3	200	50

Physics	3	200	50	
		<hr/>	<hr/>	<hr/>
		600	60	

PART B

Naval architecture	4	200	50	
Navigational aids	4	200	50	
Navigation	4	200	50	
		<hr/>	<hr/>	<hr/>
		600	60	

PART C

International maritime agreements and legal knowledge	4	200	50	
Shipping management	4	200	50	
Marine environmental studies	4	200	50	
		<hr/>	<hr/>	<hr/>
		600	60	

12. In rule 68 of the said rules,--

(a) in sub-rule (2), for clause (c) the following clause shall be substituted, namely:-

"(c) Certificate of service granted in accordance with the provision of section 80 of the Act, as it existed before the 14th day of August, 1986."

(b) after sub-rule (2), the following sub-rules shall be inserted, namely :-

"(3) A person holding a certificate of competency issued under the rule may submit an application in **Form K** along with his certificate of competency, testimonials and other certificate in support of his application, to the Principal Officer, Mercantile Marine Department, Bombay, Calcutta or Madras for issue of dangerous cargo endorsement.

(4) where the applicant

(a) holds a certificate of competency for any of the grades mentioned in clause a(i), (1)(a)(ii), (a)(iv) or (b) of sub-rule (1) of rule 3.

(b) has served at sea at least 6 months during the last 5 years, immediately preceding the date of his application, as a master or mate on board oil, chemical or liquefied gas tanker, as the case may be, on specific duties in connection with the cargo and cargo equipment, and

(c) holds the certificates granted under sub-rule (3) (8), (9) or (10) or rule 12.

He shall be issued with the dangerous cargo endorsement in **Form L**, qualifying him to serve on appropriate type of ship as a master or mate depending upon the grade of certificate of competency held by him.

(5) Where the applicant--

(a) holds a certificate of competency for any grade issued under these rules.

(b) holds a certificate granted under sub-rule (8), (9) or (10) or rule 12 or has served at sea for atleast 6 months during the last 5 years, immediately preceding the date of his application on duties associated with the cargo and cargo equipment under the supervision of a certificated officer on board oil, chemical or liquefied gas tankers as the case may be, and

(c) holds the certificate granted under sub-rule (3), of rule 12.

He shall be issued with the dangerous cargo endorsement in **Form L**, qualifying him to serve on appropriate type of ship as watchkeeping officer.

(6) The dangerous cargo endorsement shall remain valid for the period of validity of the certificate of competency as prescribed in rule 72".

13. After rule 71 of the said rules, the following rules shall be inserted, namely:-

"72 Period of validity of certificate of competency "

(1) A certificate of competency granted under sub-rule (2) of section 79 of the Act after the enactment of the Merchant Shipping (Amendment Act, 1987) (13 of 1987) shall remain valid for a period of 5 years.

(2) A certificate of competency revalidated in accordance with sub-rule (2) or sub-rule (3) of rule 73 shall remain valid for a period of 5 years from the date of completion of the revalidation course or the approved course specified in sub-rule 3(c) of rule 73, as the case may be.

(3) A certificate of competency revalidated in accordance with sub-rule (5) of rule 73 shall remain valid for such period as may be decided by the Chief Examiner provided that the period shall not exceed one year from the date of expiry of the earlier period of validity.

"73 Revalidation of Certificate of competency

(1) A person who desires to have his certificate of competency revalidated, may submit an application in **Form M** along with his certificate of competency, testimonials and other certificates in support of his application, to the Principal Officer, Mercantile Marine Department, Bombay, Calcutta or Madras.

(2) The Certificate of competency as Extra Master or Master of a foreign going ship or Master of a home trade ship shall be revalidated if the applicant holds.

(a) the certificates granted under sub-rule (11) or rule 12 and rule 19, and

(b) the additional certificate granted under rule 12, as prescribed in sub-rule (5) of rule 6 or sub-rule (4) of rule 10, as the case may be ;

(3) The certificate of competency as second mate of a foreign going ship or first mate of a foreign going ship or Navigational watchkeeping officer or Mate of a home trade ship shall be revalidated if the applicant holds :-

(a) the certificate granted under rule 19, and

(b) the additional certificates granted under rule 12, as prescribed in sub-rule (5) of rule 4 or sub-rule (4) of rule 5 or sub-rule (6) of rule 8 of sub-rule 4 of rule 9 at the case may be, and

(c) a certificate from the Principal of Lal Bahadur Shastri Nautical and Engineering College testifying to his satisfactory attendance at an approved course for the grade of certificate of competency higher than the grade of certificate of competency held by him.

(4) Where a person, whose certificate of competency has become invalid in pursuance of rule 72, does not hold the certificate granted under sub-rule (11) of rule 12 or sub-rule 3(c) of this rule, as the case may be, but complies with all other requirement of sub-rule (2) or (3), as the case may be, his application shall be forwarded, along with all testimonials to the Chief Examiner for decision.

(5) Subject to sub-rule (3) of rule 72, the date of revalidation and the period of validity of the certificate of competency forwarded under sub-rule (4), shall be decided by the Chief Examiner taking into consideration:--

(a) the nature of sea service performed by the applicant after the date of passing the examination of the certificate of competency or the date of last revalidation, whichever is later;

(b) the type of ships on which the applicant has served; and

(c) the nature and duration of service, other than sea service, performed by the applicant.

14. In Appendix H to the said rules :-

(a) in the opening portion:-

In second line, in brackets, the figures "68(3), and word "66, 69(1), 70(2) and 70(4)", the figure, brackets and words "6, 68(3), 68(4), 68(5), 69(1), 70(2), 70(4) and 73(1)" shall be substituted; (ii) after the entry relating to **Form I**, the following forms shall be inserted, namely:-

"FORM K—Form of application for issue of dangerous cargo endorsement.

FORM L—Form of dangerous cargo endorsement.

(b) after Form 1 the following Forms K, L and M shall be inserted, namely :-

"FORM K"

[See rule 68(3)]

Application for issue of Dangerous Cargo Endorsement:

1.Name: _____

2.CDC/Passport

No. _____

3.Certificate of Competency:

Grade: _____
No. _____

4.*Oil/Chemical/Liquified Gas Tanker Safety Course.

Certificate No. _____ Date _____
Duration of course from _____ to _____
Issuing authority _____

5.Fire Fighting course:

Certificate No. _____ Date _____
Duration of course from _____ to _____
Issuing authority _____

6.Sea service only on appropriate ships for the last 5 years.

Name of ship	O.No.	Port of registry	ship	Type of service	Capacity of service	Period of service from to	Laid up Net service from to	Remarks	

1		2	3	4	5	6	7	8	9

7. I hereby declare that the information given above is correct and true to the best of my knowledge and belief

Signature of applicant

Date : _____

Note:- Any person who makes any false representation or knowingly gives any false information is liable for punishment for cheating under sections 182 and 420 of Indian Penal Code.

8. The testimonials in support of proof of sea service and the certificates as mentioned above, submitted by the applicant were scrutinized and found to be in order.

The Dangerous Cargo Endorsement qualifying the applicant to work on board *oil/chemical/liquefied gas tanker in the capacity of *Master/Chief Officer/Watchkeeping Officer issued.

*Delete whichever is not applicable

Principal officer

Dated _____

Mercantile Marine Department

Note: One copy of the application duly completed to be sent to the Chief Examiner for record.

FORM L

Dangerous Cargo Endorsement

[See rule 68(4)(c)]

This is to certify that Shri _____ holder of *Certificate of Competency Letter of Authority No. _____ dated _____ is qualified to work as *Master/Chief Officer/Watch Keeping Officer on board *oil/chemical/liquefied gas tanker.

*Delete whichever is not application.

Dated _____

Principal Officer

Mercantile Marine Department

FORM M

1.Name: _____

2.CDC/Passport

No. _____

3.Certificate of Competency:

Grade: _____

No. _____

5. Date of last revalidation _____

1 2 3

Medicare
course _____

fighting _____ Fire

Radar observer_____

First
Aid _____

Name	O No	Port of	Type of	Capacity	Period	Remarks
------	------	---------	---------	----------	--------	---------

1

2

3

4

5

6

7

8. Did any of the ships mentioned in para-7 suffer any casualty during your service onboard? If so, give details of date, time, place and nature of casualty.

9. Did you undergo any inquiry by any Government other authority in connection with your service on board ships mentioned in para 7? If so, given details of date, place, name of authority and nature of inquiry:

10. Details of service performed, other than onboard ships, during the last 5 years?

11. I hereby declare that the information given above is correct and true to the best of my knowledge and belief

Date _____

Signature of applicant

Note: Any person who makes any false representation or knowingly gives any false information is liable for punishment of cheating under section 182 and 420 of Indian Penal Code.

12. The testimonials in support of proof of service and the certificates, as mentioned above, submitted by the applicant, were scrutinized and found to be in order.

The certificate of competency revalidated with effect from _____

*The application is forwarded to Chief Examiner for decision.

Date _____

Principal Officer
Mercantile Marine Deptt.

*Delete if not applicable.

13. The Certificate of Competency may be revalidated for a period _____ months with effect from _____

Dated _____
Chief Examiner of Masters &
Mates

14. The candidate of Competency revalidated for _____ months with effect from _____

Date _____

Principal Officer

Mercantile Marine Deptt.

Note:(1) One copy of the application form duly completed to be sent to the Chief Examiner for record.

(2) Date of revalidation shall be the date of completion of the revalidation course or as decided to the Chief Examiner.

15. In Appendix 1 to the said rules--

(a) for the figures "20" wherever this occur, the figures "30" shall be substituted;

(b) for the figures "30", "40" and "60" wherever they occur the figures "100" shall be substituted.

(c) for the figures "10" occurs in item (10) the figure "50" shall be substituted.

(d) after item (11) and the entries relating thereto the following items and entries shall be inserted, namely :

"(12) -for issue of dangerous cargo endorsement-Rs.100/-

(13) -for revalidation of Certificate of competency-Rs.100-

(10) -for review of results of each part of written examination—Rs .50/-

16. In Appendix J to the said rules, in Section II-

(a) para 21 for the figure and word "2 HOURS" the figures and word "3 HOURS" shall be substituted"

(b) For the heading Extra Master and paragraphs, thereunder the following heads and paragraphs shall be substituted, namely--

EXTRA MATER

PART A

27. PURE MATHEMATICS-3 hours—200 marks

Linear and quadratic functions. Theory of Equations. Partial fractions. Remainder and factor theorems.

Binomial expansion for positive integral indices. Use of fractional & negative indices. Application to summation of series.

Sequences & Series. Elementary treatment of convergence and Divergence Arithmetic, geometric, exponential & Logarithmic series.

Use of series in finding approximation & limites. Determinants & Matrices.

The general angle. Degree & radian measure. Circular functions Trigonometrical identities. General solutions of trigonometrical equations.

problems involving compound, multiple & submultiple angles. Inverse circular functions. Heights and distance. Proportion of triangle, orthocentre and pedal triangle. Centroid & Medians—Summation of Trigonometric series.

Spherical triangles. Napier's Rules. Sine & Cosine Rule for Spherical triangles.

Area of spherical triangle. Polar Triangles. Derived formula including Haversins Formula & Four Part Rule. Supplemental Theorem, Identities. Delambre's Analogies, Napier's Analogies. Legendre's Theorem.

Differentiation of algebraic, circular, exponential logarithmic & inverse circular functions, Product quotient & chain rules.

Application of differentiation to small errors, extrema and rates of change.

Successive differentiation-Maximum and Minimum Rolle's Theorem. Mean Value Theorem-Expansion of functions.

Integration as inverse of differentiation. Integration by change of variable by partial fraction & by parts.

Applications of integration to the evaluation of plane areas volumes first and second moments of areas & volumes. Mean values Numerical Integration Trapezoidal & Simpson's Rule.

Solution of simple differential equations of the first order with variables. Separable. Homogeneous equations. Integrating factor.

Conic Sections—Ellipse. Parabola and Hyperbola General Equations and Properties.

Numerical solution of equations in one unknown, Newton-Raphson method.

28. APPLIED MATHEMATICS AND STATISTICS—3 hours—200 marks.

Addition & subtractions of vector. Multiplication of scalar & vector.

Force as a vector, quantity. Resolution of coplanar forces. Resultant of system of coplanar forces acting at a point. Equilibrium.

Three Force problems, Lami's Theorem.

Stress, strain, Hooke's Law & Young's Law.

Parallel forces moments, couples, reduction of a system of coplanar forces acting on a rigid body. Equilibrium conditions, friction, center of gravity loaded frameworks.

Displacement, velocity & acceleration as vectors, Relative velocity & acceleration.

Rectilinear motion of particle with uniform acceleration. Motion of a particle under gravity. Connected particles. Projectiles.

Mass, momentum, Newton's Laws of Motion.

Impulse, work, energy, power, principles of Conservation of Linear momentum & energy, Direct & oblique impact including use of Newton's Experimental Law.

Shearing force & bending moment diagrams for point & uniformly distributed loads.

Rectilinear motion of a particle with variable acceleration where the acceleration is a function of time of displacement. Simple Harmonic Motion.

Angular Momentum & kinetic energy of rotating bodies. Newton's Law for rotation bodies.

Representation of numerical data. Frequency distributions. Mean & standard deviation of discrete and grouped distributions. Elementary probability theory, including conditional probability.

Probability distribution of random variable, Binomial, Poisson, rectangular & normal distributions. Mathematical expectation, especially mean & variance. Sampling distribution of the mean, standard error, confidence Limits Hypothesis testing, testing means and difference between means.

29. PHYSICS—3 hours—200 marks

Heat

Kinetic theory of an ideal gas including derivation of formula $P = \frac{1}{3} \rho C^2$. Use of Avogadro's number and hypothesis. Derivation of gas laws, Gas equation and kinetic interpretation of temperature on the basis of pressure formula. Degree of freedom and Maxwell's laws of equipartition of energy.

Transport Phenomenon—Viscosity and thermal conductivity of gases, Mean free path.

Behaviour of gases at high pressure, Van der Waals's equation of state.

Internal energy of a gas, quasistatic process, First law of thermodynamics. Its application to specific heat of a gas Isothermal. Adiabatic. Isochoric and Isobaric processes. Reversible and irreversible processes.

Thermal Radiation. Electromagnetic spectrum, Methods of detection. Prevost's theory of exchanges, Black body radiations and distribution of energy. Variation of Wave length of maximum energy with temperature. Emissive and Absorptive power-Kirchhoff's law of radiation. Stegaris law, Solar constant and radiation received from the sun.

Conversion of heat to work.—Thermodynamic cycles. Carnot cycle Thermal efficiency. Reversibility, Second law of thermodynamics. Entropy, Reversed cycles. Reversed carnot cycles and vapour compression cycle Co-efficient of performance for Refrigerator and heat pump.

Waves: Free, undamped, damped and forced vibrations. Resopance sharpness of resonance. Phace of resonance and qualify factor.

Differential equation of wave motion characteristics of wave motion. Particle velocity and wave velocity. Superposition of waves, stationery waves and Beats. Beats frequency.

Light: Compund microscope, Reflecting and refracting astronomical telescopes. Terrestrial telescopes and Binoculars. Magnification and exit papil. fefraction and dispersion by Prism-Dispensire power Achromation in Prisms. Dispension without deviation and deviation without dispersion. Achromatic lenses.

Aberrations-Spherical Aberrations, Coma, Astigmatism. Curvature of the field. Distortion.

Nature of light. Huygen's theory. Refraction and reflection by Huygen's principle.

Intaference of light " Young's experiment, coherent sources, Bresnel's Biprism. Intensity due to transmitted and reflected light. Colours of thin films—Newton's Ring.

Diffraction of light: Rectilinear propogation of light, zone plate, Framel's and Fraunhofer's diffraction. Single slit and N slits. Plane diffraction grating—Resolving power of telescope, prism and plane diffraction grating.

Sound—Velocity of sound, insolid, liquids and gases. Doppler effect and its uses. Reflection. Refraction and diffraction of sound.

Intensity of sound. Decible scale, Loundness, noise, airborng, structure borne. Acoustics, Reverberation Sabines reverberation Formula. Acoustics intensity and measurements.

PART b.

30.NAVAL ARCHITECUTURE-4 hourse-200 marks.

1. The derivation and application of various intergration formulae & methods used in ship calculations. Derivation of expression for metaeentric radii, fresh water allowance, free surface correction, draft corrections, angle of 1011, MCTC etc. Approximate formulate to obtain KB of ship-shapes.
2. Fluid thrust on plane and curved surfaces. Centre of pressure.
3. Stability at large angles of heel. The concept of righting moments and excitation moments. The derivation and limitations of the wall-sided Formula and Attwood's Formula. Limitations of GM as the stability criterion. Cross curves of stability-Isocline curves-GZ curves and their significance. Dynamical stability and method of

determination. Residual dynamical stability and its use in determination the ability of a ship to survive dangerous situations such as wind and wave efforts, passenger crowding, etc. The effect of trim, wind gusts and turning on dynamical stability.

4. The theory of self-righting lifeboats.

5. Longitudinal stability to a greater depth than done for Master. Change in draft due to change in density.

6. Drydocking-problems concerning block pressures, tripping of blocks, loaded ships, damaged ships, ground etc.

7. Problems of launching from a slipway; launching ways, poppets stopping a ship after launching; the launching diagram.

8. Damaged stability-flooding of ships and its effect on static & dynamical stability. Resulting heel and trim. Application to box-shaped and ship-shaped vessels. Damaged stability data.

9. Stress and strain. simple bending theory, sectional modulus, their application to beams and ships. Stresses in still water and in a seaway. Murray's method. The shear force and bending moment curves of ship shapes. Stress indicators.

10. A comprehensive knowledge of the use of stability and stress data supplied to various types of ships including container vessels, LNG/LPG carriers, fishing vessels, dredgers, offshore support vessels, etc. General stability aspects of MODUs.

11. Manoeuvring trials. The measured mile. Evaluation of steering characteristics and application to the design of hull & rudder. Angle of heel when turning, shallow water effect, Interaction.

12. Ship motions. A general concept of waves experienced in a seaway. The six degrees of freedom. The definition, cause and methods of reducing each motion of ship. The effect of ship motions on the stability and safety of a vessel. Chapsizing of a ship due to beam seas, following and quartering seas.

13. Ship vibration. A general knowledge of structural vibration in a ship. Prevention and reduction of vibration.

14. Safety in design. A general understanding of the design features contributing to the safety of the various types of ships including passenger car ferries, tankers, bulk carriers, OGS's, chemical tankers, LNG/LPG carriers, container ships, dredgers, hydrofoils, hovercraft, submersibles nuclear ships, etc. with reference to subdivision, fire protection, freeboard insulation, tank coatings containment systems, cargo handling systems etc. where applicable.

31. NAVIGATIONAL AIDS-4 hours-200 marks.

1. Hyperbolas:

Mathematical theory of hyperbolae. The hyperbolic lattice. Statistical treatment of errors in hyperbolic navigation.

2. Hyperbolic systems:

A full understanding of the principles characteristics, accuracy and errors associated with :

- (a) Decca Navigator,
- (b) Loran C
- (c) Omega

3. Velocoty, distance and depth measuring instruments:

A full understanding of the principles, characteristics, accuracy and errors, including the application of the Doppler principle, associated with the following:

- (a) Logs
- (b) Berthing aids
- (c) Echo-sounders:

4. Marine radar:

- (a) Characteristics and limitations of modern radars.
- (b) Modern developments in the field of marine radar.
- (c) Plotting methods
- (d) The effects of errors in radar plotting.
- (e) Semi-automatic & automatic radar plotting aids-their use and limitation.
- (f) Analysis of shipping accidents involving radar.

5. Radio Determination Satellite Systems (RDSS);

The principle, accuracy and limitation of the following:

- (a) Transit (b) GPS (c) other systems.

6. Special navigation systems.

The basic principle and use of :

- (a) Integrated navigation systems
- (b) Dynamic Positioning Systems.
- (c) The Intertial Navigation Systems.

7. Research and development:

An outline knowledge of systems under development such as

- (a) Laser beams
- (b) Infra-red techniques
- (c) Sub-marine acoustic transponders
- (d) Split beard channel guidance systems
- (e) Ship identification
- (f) The electronic chart, etc.

32. NAVIGATION—4 hours – 200 marks.

1. Derivation & limitations of various navigational formulae for :

- (a) Earth as a spheroid-compression, geographical and geocentric latitudes. Meridional parts.
- (b) Earth's orbit-eccentricity and applications-length of seasons.
- (c) Theory of refraction-dip and distance of sea and shore horizons, with and without refraction, and related applications.

2. Derivations, limitations and applications of formulae used for :

- (a) Diurnal parallax and augmentation of moon's semidiameter.
- (b) Rates of change of azimuth, altitude and hor angle.
- (c) Maximum and meridian altitudes.
- (d) A-B-C tables.
- (e) Ex-meridian tables.
- (f) Pole-star tables for determination of latitude & azimuth.
- (g) The equation of equal altitudes, above and below pole

3. Laws of planetary motion :

- (a) Theory and application to orbital motions.
- (b) Sidereal and synodic periods and applications.
- (c) Moon's orbit and nodes. Ecliptic limits

4. Positional errors in fixes:

- (a) Errors in terrestrial observations, position lines and in fixes. The theory of the cocked hat and the three bearing formula and their applications.
- (b) Errors in astronomical observations, position lines and in fixes.
- (c) Errors in fixes by vertical and horizontal sextant angles.
- (d) DF bearings—Curve of constant bearing. Methods of position fixing including intercept method.

5. Stellar magnitudes and distances:

Variable star & binary systems. Annual parallax. Aberration. Mean place of a star.

SECTION B

6. Co-ordinated Universal time and time signals.

7. The theory and general appreciation of projections :

- (a) Mercator (b) Transverse Mercator (c) Gnomonic
- (b) Lamberts-conical orthomorphic and (e) Stereographic.

8. Special problems in navigation including :

- (a) High latitude navigation (b) High Speed surface craft.
- (c) Sub-surface craft.

9. Collision avoidance :

- (a) Collision avoidance and manoeuvring systems.
- (b) Routing system and (c) Traffic control organization.

10. Search and rescue:

- (a) Procedures (b) Patterns (c) Plotting (d) Organisation.

PART C

33. International Maritime Agreements and Legal Knowledge—4 hours—200 marks.

1. IMO Conventions.

- (a) Application
 - (i) The functions of the IMO
 - (ii) The implementation of conventions.
 - (iii) Excepted and exempted ships.

- (ii) Non-convention ships.
 - (b) Certificates. The certificates required to be carried by vessels on international voyages.
- (c) Safety of navigation
 - (i) Arrangements for monitoring hazards.
 - (ii) Traffic separation and control.
 - (iii) Search and rescue, GMDSS, communication systems, ship reporting system.
 - (iv) The duties of masters in each case.
- (d) Cargoes
 - (i) Code of safe practice for Solid Bulk Cargoes.
 - (ii) The International Maritime Dangerous Goods Code.
 - (iii) The carriage of grain in bulk
 - (iv) The bulk chemical code.
 - (v) The Gas Carrier Code.
 - (vi) Other Codes relating to ships carrying specialized cargoes.
- (e) Pollution—MARPOL 73/78, CLC, TOVA/LOP, Funding, Dumping etc.

2. Health

- (a) The World Health Organisation
- (b) International agreements and measures to prevent the spread of diseases by shipping.
- (c) International organization for medical advice & assistance at sea.

3. Other international agreements/convention/organizations that affect shipping such as the The Law of the Sea, ILO, UNDP, UNCTAD.

4. Process of implementation of international agreement. Port state control.

5. The Merchant Shipping Act and related legislation.

6. Investigational & inquiries

- (i) Reporting of sub-standard ships.

(ii) Detention of unseaworthy ships.

(iii) Reporting of marine casualties.

(iv) Investigations and inquiries into marine casualties.

(v) Prosecution of offences.

7. Wreck and salvage. Maritime liens.

8. The Marine Insurance Act. An understanding of content and meaning of the York Antwerp Rules.

9. The Carriage of Goods by Sea Act. An understanding of the evolution of this act and its application.

10. Arbitration.

34. Shipping Management —4 hours—200 marks.

SECTION A

1. Sale and purchase of ship:

Shipbuilding contracts. Functions of sale/purchase broker. Prior-purchase inspection. Interpretation of ship's classification records. Memorandum of agreement. Vendor's and buyers responsibilities. Bill of sale. Transfer of flag & ownership and documents required. National Policy on shipbuilding & repair.

2. Chartering of ships :

The charter market. Communicating practice in chartering. Assessing market trends and interpreting fixture reports. Drafting brief reports on trends in charter markets. Drawing up a charterparty-voyage, time & demise (bareboat). Standard forms of charter parties and their peculiarities. Peculiarities of tanker charter parties, AFRA, ATRS, INFA, WORLD SCALE, etc. The Law and practice concerning voyage estimates, notice of readiness, statement of facts, time sheets, dispatch/demurrage Procedure for stores and provisions-tendering, evaluation of tenders, important aspects to be considered while awarding tenders, etc.

3. Economics of sea transport :

Theory of international trade. Balance of payments. World currency structure. Foreign exchange.

Types of shipping services—tramp, liner, conference, consortium etc.

The economics of containerization of cargo – the overall situation, advantages, disadvantages, infrastructure required. Concepts of ports like Freeport, free port (free trade zone), dryport (inland container port) etc.

Cost structure and cost control in shipping. Economics of fixing charter freight/hire.

Flags of convenience—the advantage and disadvantages to the shipowner and to the rest of the world.

SECTION B

4. Trading finance :

Types of Transactions—Letter of credit, bill of sale, etc.

Type of costs—fixed, variable, direct, indirect, etc. Disbursements, daily running costs, bunker costs, etc.

Freight and hire—calculation & collection. Foreign currency transactions, advantages & disadvantages of currency & freight hedging.

5. Financial management:

Methods of financing ship purchase and fleet renewal Valuation of ships

Negotiating working capital loans from banks. Mortgage of ships and terms of payment
Cash flow forecasting.

Discounted cash flows for investment appraisal.

6. Accounting :

Accounting procedures—evaluation of assets, liabilities, depreciation, investments, bad debts, accruals, prepayment,

capital account, profit & loss statements, the balance sheet. The banking procedure.

The elements of management accounting.

A general idea of corporate taxation.

7. Maritime frauds:

The modus operandi of maritime frauds in the past. Methods of investigation, detection and prevention of maritime frauds. The role of the International Maritime Bureau.

35. Marine Environmental Studies—4 hours—200 marks.

SECTION A

1. Meteorology :

(a) Meteorological Observing System.

Conventional and recent systems like radar and satellite. Synoptic weather observation, synoptic representation of pressure field, contour and thickness

charts, stream line and isotach analysis, stability analysis, techniques of weather forecasting including elementary ideas of numerical weather prediction.

(b) Wind effects.

Divergence, convergence, diffluence, confluence, vorticity, Coriolis and centrifugal effects, balanced motion, geostrophic and gradient wind, cyclostrophic wind, elementary ideas of general circulation and jet streams.

(c) Satellite Meteorology.

Historical development, Indian programme, remote sensing techniques, visual and infra-red channels, synoptic cloud patterns and their interpretation, application of satellite data for tropical storm analysis, quantitative estimation of sea surface temperature and vertical profiles of temperature and humidity from satellite, pictures.

(d) Cyclonic storms

Formation, intensification, movement and weakening, Methods of cyclone forecasting Cyclone warning bulletins for merchant ships.

2. Geology and Oceanography:

(a) The Earth-its status & age.

(b) Active geological processes-volcanoes, earthquakes, erosion, glaciation.

(c) Genesis of rocks, types of rocks, distribution of rocks in the continents and oceans.

(d) Plate tectonic model-Critical assessment of various views.

(e) Bathymetric studies in understanding the oceans-PDR, SOFAR, Mohole Project, Preparation of submarine atlas.

(f) Oceanic features-shelf-floor slopes, oceanic sedimentation, understanding of modern terminology.

(g) General characteristics of the seas, bottom topography, coastlines and beaches.

(h) Physical properties of sea water, light penetration and colour of the sea.

(i) Heat budget of the oceans, distribution of salinity, temperature and density, water masses.

(j) Causes of ocean currents, surface & sub-surface circulation.

(k) Ice formation and decay, distribution and movement of ice.

SECTION B

1. Marine Resources:

(a) Fishing--

(i) Types of fish, geographical location of fishing grounds, conservation of resources.

(ii) Modern demersal and pelagic fishing methods.

(iii) Factory vessels.

(iv) Marine fish farming.

(b) Minerals:

(i) Methods of extracting minerals from sea water.

(ii) Desalination processes.

(iii) Sand and gravel dredging.

(iv) Extraction of minerals from the seabed. Sub-sea mining.

(v) Seismic and sonal profiling.

(vi) Seabed sampling.

(c) Oil and Gas :

(i) Types of drilling rigs, drill ships, well heads production platforms; storage facilities; types of sea terminals.

(ii) General ideas on drilling.

(iii) Pipelaying and the use of submersibles.

(d) Power: General ideas on harnessing energy from the sea. Tidal power stations.

2. Hydrographis Surveying:

(a) Basic techniques of surveying.

(b) Control

(c) Position fixing including use of short range high accuracy radio systems.

(d) Theory of preparation of navigation charts.

3. Tidal theory:

- (a) General knowledge of tides--
 - (i) Tide raising forces.
 - (ii) The equilibrium tide.
 - (iii) Modern tidal theory
- (b) The Earth's tides--
 - (i) Classification of tides. Principal Harmonic components Methods of analysis and prediction
 - (ii) Determination of mean Sea Level.
 - (iii) Establishment of datums. Methods of transfer of datums along coasts.
 - (iv) The use of co-tidal charts.
 - (c) Seismic & Meteorological surges, seiches, bores and related phenomena. Seasonal and long term changes in Mean sea Level.
 - (d) Satellite remote sensing. Basic theory and its application to the marine environment.

4. Pollution:

A general knowledge of the effect on the environment and the method of international control.

17. After Appendix J to the said rules the following appendices shall be inserted, namely:

"APPENDIX K"

See rule 12(8)

SYLLABUS FOR OIL TANKER SAFETY COURSE

1. Characteristics of oil cargoes.—An outline treatment including practical demonstration of the physical properties of oil carried in bulk; vapour pressure/temperature relationship. Influence of pressure on boiling temperature. Explanation of saturated vapour pressure, diffusion, partial pressure flammability limit explosive limits, petroleum vapour, vapour travel, flash point auto ignition temperature. Practical significance of flashpoint and lower flammable limit. Simple explanation of types of electrostatic charge generation.

2. Toxicity-simple principles and explanations of basic concepts; toxicity limits, both acute and chronic effects of toxicity, systemic poisons and irritants.

3. Hazards:

- (a) Explosion and flammability hazards:

Flamability limits, sources of ignition and explosion. Danger from vapour cloud drift.

(b) Health hazards;

Dangers of skin contact, inhalation and ingestion.

(c) Hazards to the environment:

Effect on human and marine life from release of oil at sea. Effect of specific gravity and solubility. Effect of vapour pressure and atmospheric conditions.

(d) Corrosion hazards.

4. Hazard control-Inerting, monitoring techniques, anti-static measures, ventilation segregation and the importance of compatibility of materials.

5. Safety equipment and protection of personnel-The function and calibration of gas measuring instruments and similar equipment. Specialised fire extinguishing appliances, breathing apparatus and tank evacuating equipment. Safe use of protective clothing and equipment.

6. Regulations and codes of practice—Importance of developing ships emergency plans Familiarization with :

(a) the appropriate provisions of relevant international conventions;

(b) international and national codes;

(c) IMO Manual on oil pollution;

(d) relevant tanker safety guides**;

7. Ship design and equipment of oil tankers.—Familiarization with :

(a) piping pumping. tank and deck arrangements;

(b) types of cargo pumps and their application to various types of cargo;

(c) tank cleaning, gas freeing and inerting system;

(d) cargo tank venting and accommodation ventilation;

(e) gauging systems and alarms;

(f) cargo heating systems;

(g) safety factors of electrical systems.

8. Ship operations.—Cargo, calculations, Loading and discharging plans, Loading and discharge procedure including ship-to-ship transfers. Checks lists. use of monitoring equipment. Importance of proper supervision of personnel. Gas freeing operations and tank cleaning operations. Where appropriate, crude oil washing procedures and the operations and maintenance of inert gas systems. Control of entry into pumprooms and enclosed spaces. Use of

gas detecting and safety equipment. Load on top and proper ballasting and de-ballasting procedures. Air and water pollution prevention.

9. Repair and maintenance.—Precautions to be taken before and during repair and maintenance work including that affecting pumping, piping, electrical and control system. Safety factors necessary in the performance of hot work. Control of hot work and proper hot work procedure.

10. Emergency operations.—Emergency plan. Cargo operations emergency shutdown. Action in the event of failure of services, essential to cargo. Fire fighting on oil tankers. Action following collision, stranding or spillages. First aid procedures and the use of resuscitation equipment. Use of breathing apparatus. Rescue from enclosed spaces.

11. Training aids—As great a use as possible should be made of shipboard operations and equipment manuals, films and suitable visual aids, and opportunity should be taken to introduce discussion of the part to be played by safety organization board ship, and the role of safety officers and safety committee.

12. Pollution prevention.—Procedures to be followed to prevent air and water pollution.

Measures to be taken in the event of spillage.

APPENDIX-L

[See rule 12(9)]

SYLLABUS FOR CHEMICAL TANKER SAFETY COURSE

1. Elementary Physics.—An outline treatment including practical demonstration of the Physical properties of chemicals carried in bulk; vapour pressure temperature relationship. Influence of pressure on boiling temperature. Explanation of saturated vapour pressure, diffusion, partial pressure, flammability limit, flashpoint and autoignition temperature. Practical significance of flashpoint and lower flammable limit. simple explanation of types of electrostatic charge general.

2. Elementary chemistry.—Chemical symbols and structures, elements of the chemistry of acids and bases, structure and properties of well known chemicals carried, chemical reaction of well known groupings, sufficient to enable proper utilization of codes.

3. Toxicity—Simple principles and explanation of bases, structure and properties of well known chemical effects of toxicity, systemic poisons and irritants.

4. Hazards.(a) Explosion and flammability hazards. Dangers of skin contact, inhalation and ingestion.

(c) Hazards to the environment. Effect on human and marine life of release of chemicals at sea. Effect of specific gravity and solubility. Dangers from vapour cloud drift. Effect of vapour pressure and atmospheric conditions.

(d) Reactivity hazards. Self-reaction; polymerization, effects of temperature, impurities as catalysis. Reaction with air, water and other chemicals.

(e) Corrosion hazard. Dangers to personnel, attacks on constructional material, effects of concentration. Evolution of hydrogen.

5. Hazard control—Inerting, water padding, drying agents, monitoring techniques. Anti-static measures. Ventilation. Segregation. Cargo inhibition. The importance of compatibility of materials.
 6. Safety equipment and protection of personnel. The function and calibration of measuring instruments and similar equipment. Specilised fire exting uishing appliances, breathing and escape apparatus. Safe use of protective clothing, and equipment.
 7. Regulations and codes of prective—Familiarisation with IMO, national relevant international codes *and port regulations. The importance of developing ship's emergency plans.
 8. Ship design and equipment and chemical tankers.—A brief description of specialized piping, pumping and tank arrangements, over flow control. Types of cargo pumps and their application to various types of cargo. Tank cleaning and gas freeing systems. Cargo tank venting and accommodation ventilation, airlock. Guaging systems. Tank temperature control systems. The safety factors of electrical systems.
 9. Ship operation—Cargo calculation. Loading and discharging plans. Loading and discharging procedure Check lists. Use of monitoring equipment. Gas freeing operations and tank cleaning operations (proper use of absorpt ion and vetting agents and detergents) Use and maintenance of inert atmospheres. Control of entry into pumprooms and enclosed spaces. Use of detecting and safety equipment. Disposal of wasts and washings.
 10. Repair and maintenance—Precautions to be taken before the repair and maintenance of pumping piping, electrical and control system.
 11. Emergency operations-Emergency plan, Cargo operations emergency shut down. Action in the event of failure of services essential to cargo. Fire lighting on chemical tankers. Action following collision, standing or spillages. First aid procedure and the use of resuscitation and decontamination equipment. Use of breathing apparatus. Rescue from enclosed spaces.
 12. Training aids—As much use as possible should be made of shipboard operations and equipment manuals, films and suitable visual aid and opportunity should be taken to introduce discussion of the part to be played by safety organization on board ship, and the role of safety officers and safety committees.
 13. Pollution prevention.—Procedures to be followed to prevent air and water pollution. Measures to be taken in the event of spillage.
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APPENDIX-M

[Sea rule 12(10)]

SYLLABUS FOR LIQUEFIED GAS TANKER SAFETY COURSE

1. Chemistry and physies. An introduction to basic chemistry and physics as it relates to the safe carriage of liquefied gases in bulk in ships:
 - (a) Properties and characteristis of liquefied gases and their vapours
 - (1) definition of gas;
 - (2) simple gas laws;

- (3) gas equation;
- (4) density of gases;
- (5) diffusion and mixing in gases;
- (6) compression of gases;
- (7) liquefaction of gases;
- (8) refrigeration of gases;
- (9) critical temperature;
- (10) practical significance of flashpoint
- (11) upper and lower explosive limits;
- (12) auto-ignition temperature;
- (13) compatibility of gases;
- (14) reactivity;
- (15) polymerization.

(b) Properties of single liquids.

- (1) densities of liquids;
- (2) variation with temperature;
- (3) vapour pressure and temperature;
- (4) vaporization and boiling liquids;

(c) Nature and properties of solution.

- (1) Solubility of gases in liquids;
- (2) miscibility between liquids and effects of temperature change;
- (1) densities of solutions and dependence on temperature and concentration;
- (2) effects of dissolved substances on melting and boiling points;
- (3) hydrates, formation and dispersion;
- (4) hygroscopicity;
- (5) drying of air and other gases.

2. Health hazards.

(a) Toxicity;

- (1) modes by which liquefied gases and their vapours may be toxic;
 - (2) toxic properties of inhibitors and of products of combustion of both materials of construction and the liquefied gases carried;
 - (3) acute and chronic effects of toxicity, systemic poisons and irritants;
 - (4) Threshold Limiting Value (TLV);
- (b) Hazards of skin contact, inhalation and ingestion;
- (c) First aid and administering of antidotes.
- 3. Cargo containment.
 - (a) Principles of containment systems
 - (b) Rules
 - (c) Surveys
 - (d) Tank construction, materials, coatings, insulation.
 - (e) Compatibility.
- 4. Operational procedures.
 - (a) Regulations and codes of practice.
 - (b) Familiarisation with IMO national and relevant international codes.
 - (c) Port regulations.
 - (d) Importance of ship's emergency plan and allocation of responsibilities.
- 5. Pollution.
 - (a) Hazards to human life and to the marine environment.
 - (b) Effect of specific gravity and solubility.
 - (c) Danger from vapour cloud drift.
 - (d) Jettisoning of cryogenic liquids.
 - (e) National, international and local regulations.
- 6. Cargo Handling Systems.
 - (a) Description of main types of pumps and pumping arrangements and vapour return systems, piping systems and valves.
 - (b) Explanation of pressure, vacuum, suction, flow, head.

- (c) Fitters and strainers.
- (d) Expansion devices.
- (e) Flam Screens.
- (f) Commonly used inert gases.
- (g) Storage, general, distribution systems.
- (h) Outline of different types of systems and their safe and efficient operation and service.
- (i) Temperature and pressure monitoring systems
- (j) Cargo vent systems.
- (k) Liquid re-circulation and re-liquefaction systems.
- (l) Cargo gauging and instrumentation systems.
- (m) Gas detection and monitoring systems.
- (n) CO₂ monitoring systems.
- (o) Cargo boil-off systems
- (p) Auxiliary systems.

7. Ship operating procedures:

- (a) Loading and discharging preparations and procedures.
- (b) Check lists.
- (c) Cargo condition maintenance on passage and inharbour.
- (d) Segregation of cargoes and procedures for cargo transfer.
- (e) Changing cargoes, tank cleaning procedures.
- (f) Cargo sampling.
- (g) Ballasting and de-ballasting.
- (h) Warm up and cool down systems.
- (i) Warm up and gas freeing procedures.
- (j) Procedures for cool down of gas free system from ambient temperature and Safety precautions involved.

8. Safety practices and equipment :

- (a) Function, calibration and use of portable measuring instruments.
- (b) Fire-fighting equipment and procedures.

- (c) Breathing apparatus.
- (d) Resuscitators.
- (e) Escape sets.
- (f) Rescue equipment.
- (g) Protective clothing and equipment.
- (h) Entry into enclosed spaces.
- (i) Precautions to be observed before and during repair and maintenance of cargo and control systems.'
- (j) Supervision of personnel during potentially hazardous operations.
- (k) Types and principles of certified safe electrical equipment.
- (l) Sources of ignition.

9. Emergency procedures :

- (a) Emergency plan
- (b) Emergency shutdown of cargo operations.
- (c) Emergency cargo valve closing systems.
- (d) Action in the event of failure of systems of services essential to cargo.
- (e) Action in event of collisions or strandings, spillages, envelopment of ship in toxic or flammable vapour.

10. Cargo handling system:

- (a) Piping systems, pumps, valves, expansion devices and vapour systems.
- (b) Service requirements and operating characteristics of the cargo handling system.
- (c) Liquid re-circulation.

11. Instrumentation systems:

- (a) Cargo level indicators.
- (b) Service.
- (c) Hull and cargo temperature monitoring systems.
- (d) Various methods of transmitting a signal from a sensor to the monitoring station.
- (e) Automatic shutdown system.

12. Boil-off disposal :

(a) Use a fuel:

- (1) Compressors;
- (2) heat exchanger;
- (3) gas piping and ventilation in machinery and manned spaces.

(b) Principles of dual-fuel:

- (4) boilers,
- (5) gas turbines,
- (6) diesel engines.

(c) Emergency venting.

(d) Re-liquefaction.

13. Auxiliary systems:

(a) Ventilation, interting.

(b) Valves:

- (1) quick closing,
- (2) remote control;
- (3) pneumatic;
- (4) excess flow;
- (5) safety relief;
- (6) pressure/vacuum.

(c) Steam systems for voids, ballast tanks, condenser.

14. General principles of operating the cargo handling plant:

- (a) Inerting cargo tanks and void spaces.
- (b) Tank cool down, loading.
- (c) Operations during loaded and ballasted voyages.
- (d) Discharging and tank stripping.
- (e) Emergency procedures, including pre-planned action in the event of leaks, fires, collision, stranding, emergency cargo discharge, personnel casualty.

15. Training aids: As much use as possible should be made of shipboard operations and equipment manuals, films, visual and other suitable aids and there should be discussion on the part that is to be played by safety organization on board ship, and the role of safety officers and safety committees.

APPENDIX N

[Rule 12(11)]

SYLLLABUS FOR REVALIDATION COURSE

Safety of Navigation and anti-collision:

- (a) Errors and accuracy of modern navigational aids.
- (b) The collision regulations.
- (c) Buoyage systems
- (d) Traffic separation Schemes.
- (e) Passage planning and routing
- (f) Bridge procedures.
- (g) Distress, search and rescue.
- (h) Ship reporting systems.
- (i) Case studies of recent ship disasters.

2. Carriage and handling of cargo:

- (a) IMO codes relating to the carriage of dangerous goods, solid bulk, timber ondeck, chemicals, liquefied gases, etc.
- (b) The carriage of grain in bulk
- (c) The carriage of containers.
- (d) Prevention of operational pollution of the sea.
- (e) National and international legislation covering (a) and (d) of this paras.

3. Operation of ship :

- (a) Meteorological information and services.
- (b) Merchant Shipping rules relating to safety including LSA and FFA.
- (c) Records to be maintained on board.

- (d) The various statutory surveys and the period of validity of certificates issued.
- (e) Medical advice available to ships by radio.
- (f) Marine distress and safety communications by all methods including the International code of Signals.

4. Ship personnel matters :

- (a) The qualification, courses and documents required for each person employed on board ship.
- (b) Manning scales.
- (c) The articles of agreement.
- (d) The official log book.
- (e) Maintenance of discipline on board ship and procedure to be followed in this respect.
- (f) The management of personnel for safe operation of ships.
- (g) Welfare of seafarers ashore and on board ship.

5. Legal matters:

- (a) IMO Conventions, COLAS 74, MARPOL 73/78, STCW 78, etc.
- (b) M & MS Notices.
- (c) IMO Resolutions as applicable to ship safety.
- (d) The Merchant Shipping Act 1958 and its amendments.
- (e) Indian Regulations under the MSA and other applicable Acts.
- (f) The process of marine casualty inquiries.

MINISTRY OF SURFACE TRANSPORT
New Delhi, the 28th June, 1988

CORRIGENDA
(Merchant Shipping)

G.S.R. 744(e). In the Merchant Shipping (Examination of Masters and Mates) Rules, 1985 published in the notification of the Government of India in the former Ministry of Shipping & Transport (Shipping Wing) [G.S.R. 712\(E\), dated the 3rd September, 1985](#) at pages 63 to 132 of the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i), dated 3rd September, 1985 :-

at page 63--

- (1) in the preamble, line 5, for "1934" read "1954"
- (2) in rule 1, sub-rule (3)--
 - (a) line 2, for "7", read "(7)"
 - (b) line 5, for "be" read "by"
 - (c) line 6, for "the" read "and", where it occurs for the second time;
- (3) in rule 2--
 - (a) line 1, for "Definiations", read "Definitions";
 - (b) clause (e), line 1, for "centrificate", read "certificate";
 - (c) clause (j), line 5, for "of" read "or"
 - (d) clause (1), sub-clause (ii)--
 - (i) line 6, for "routing" read "routine"
 - (ii) line 11, for "deck" read "dock"
- (4) in rule 3, clause (a)(i), line 1, for "master" read "Master"

at page 64--

- (5) under the heading "CHAPTER II, add "PART I"
- (6) in rule 4--
 - (a) sub-rule (3), line 2, for "Part" read "Parts";
 - (b) sub-rule (6), line 1, for "helds" read "holds";
 - (c) sub-rule (6), line 7, for "Navigations" read "Navigation";
- (7) in rule 5, clause (b), line 1, for "helds" read "holds";

at page 65--

- (8) in rule 6--
 - (a) sub-rule (2) line 1, for "candidates" read "candidate";
 - (b) sub-rule (3), clause (b), line 2, for "holding" read "holder";
- (9) in rule 8, sub-rule (5)--
 - (a) line 3, for "dock" read "deck"
 - (b) line 4, for "or" read "of"
 - (c) clause (b), line 3, and "on" between "keeping" and "Navigating";
 - (d) clause (b), line 4, for "certificate" read "certificated"

at page 66--

- (10) in rule 9, sub-rule (2), line 2, leave space between "trade" and "ship" ;
- (11) in rule 10--
 - (a) lines 1 and 3, leave space between "trade" and "ship"
 - (b) sub-rule 3(b), for "certificate" read "or as mate";
 - (c) sub-rule 4(a), line 1, delete "as" after "Certificate"
 - (d) sub-rule 4(c), line 4, for "operator" read "operators's" ;
 - (e) sub-rule 4(c), line 4, for "oerator" read "operator's";
 - (f) sub-rule 4(f), line 1, for "in" read "if"
 - (g) below sub-rule 4(f), sub-para line 3 for "certificate" read "certificates" ;

(12) in rule 12--

- (a) heading, underline the words "Additional Certificate";

at page 67--

- (b) clause (1)(c), line 3, for "precrite" read "prescribed"
- (13) under rule 13, sub-rule (3) , heading, for "Part III" read "PART II"

(14) in rule 14—line 4, for "to" read "for";

at page 68--

- (15) in rule 17, sub-rule (2), line 5, for "Merchantile" read "Mercantile" ;
- (16) in rule 21.
 - (a) sub-rule (1), line 5, for "Services" read "service"
 - (b) Sub-rule (2), line 1, for "Certificate" read "Certificate"

at page 69--

- (c) sub-rule (3)--
- (i) line 2, for "Noutical" read "Nautical"
- (ii) line 6, for "colleges" read "college"
- (d) sub-rule (4).--

line 2 and 3, for "Certificate" read "Certificates"

(17) in rule 22.--

- (a) sub-rule (1), line 2, add the word "of" between "or" and "any" ;
- (b) sub-rule (2), line 1, or "remission" read "remission"

(18) in rule 22--

- (a) line 1, for "Qualifying" read "Qualifying";
- (b) line 2, for "Cades" read "Cadets"
- (c) Sub-rule (3), line 3, or "masters" read "master"

(19) in rule 25--

- (a) line 3, for "commercement" read "commencement";

at page 70--

- (b) sub-rule (2), line 5, for "competency" read "competency"

(c) sub-rule (3), line 6, for "render" read "renders";

- (d)(i) sub-rule (5), line 2, for "reckoned" read "reckoned";
- (ii) sub-rule (5), line 9, for "an" read "and"

(20) in rule 26--

- (a) sub-rule 1, line 6, for "fareign" read "foreign";
- (b) sub-rule 4, line 1, for "each" read "Each";
- (c) sub-rule 5, line 1, for "srevied" read "served";

(21) in rule 27--

- (a) sub-rule (1), item (i), for "vacants" read "yatchs";

At page 71--

- (b) sub-rule (4)--
- (i) line 1, for "previsions" read "provisions";
- (ii) line 2, for "candiadate" read "candidate";

- (22) in rule 28--
- (a) sub-rule (1), line 6, for "Mates" read "Mate"
 - (b) sub-rule (2)--
 - (i) line 3, omit the quotation mark before "required";
 - (ii) line 5, for "master" read "Master";
 - (iii) line 6, omit the quotation mark after the "ship";
- (23) in rule 30—sub-rule (3), line 2, put a fulstop after "consideration";

- (24) in rule 32--
- (a) line 2, for "training" read "Trading";
 - (b) line 3, for "part" read "chapter";
- (25) in rule 33, sub-rule (1)--
- (i) line 5, "foregn" read "foreign"
 - (ii) line 6 and 7, omit "of a ship" between "officer" and "respectively";
- (26) in rule 35--
- (a) line 2, for "compentency" read "competency";
 - (b) line 10, omit "of a ship" between the words "officer" and "subject";

At page 73--

- (26) in rule 41, item a, line 1, add "by" between "spent" and "Naval Cadets";
- (27) in rule 42, line 5, for "Form B" read "Form E"
- (28) in rule 43, sub-rule (2)--
- (a) line 2, for "Merchantile" read "Mecantile";
 - (b) line 6, put full stop after "examination";

At page 74--

- (29) in rule 45, sub-rule (3), (i), line 2, for "48" read "46";
- (30) in rule 46, sub-rule (1)--
- (a) Part A, Sl. No.2, for "Mathemetics" read "Mathematics";
 - (c) Part C, Sl. No.8, for "Navigation" read "Navigation";
 - (d) Sub-rule (1)(b), Sl. No.2, for "navigation" read "Navigation";

- (e) sub-rule (1)(c), Part A, Sl. No.2, add "400" and "60" in columns 2 and 3 respectively of the table;

At page 75--

- (31) in rule 51, sub-rule (2), line 8, for "form" read "from";
- (32) in rule 52, line 8, for "Rules" read "Rule";

At page 76--

- (33) in rule 59, sub-rule (1)--
 - (a) line 6, for "tables" read "table";
 - (b) in table Part 'A', Sl. No.1, print "50" clearly in column 4 of the table;
 - (c) in table, First Mate (Foreign Going), Sl. No. 3, for "Routing" read "Routeing";

At page 77--

- (f) in Master (Home Trade) Part 'A', Sl. No.2, insert "50" in column 4 of the table;
- (e) in Master (Home Trade) Part 'B', Sl. No.3 insert "2" in column 2 of the table;
- (f) in Extra Master, Part B, line 3, for "Marin" read "Marine";
- (34) in rule 60.--
 - (a) sub-rule (2)(b), for "Neutical"" and "Nautical"
 - (b) sub-rule (3), line 7, for "Principal" read "Prinicipal";
- (35) in rule 61--
 - (a) sub-rule (2)(a), line 4, omit "for" between "and" and "numericals";
 - (b) Sub-rule (3), line 5, for "topic" read "topics";

At page 78--

- (36) in rule 63, sub-rule (3), line 2, for "mean" read "means";
- (37) in rule 65--
 - (a) sub-rule (1), line 1, for "he" read "who";
 - (b) sub-rule (3), line 5, omit "as";
- (38) in rule 68--
 - (a) sub-rule (2), line 2, for "be" read "on";
 - (b) sub-rule (2)(c), for "to" read "with"

- (39) in rule 69,
 - (a) in line 16, insert "or" before "as"
 - (b) in line 17, for "officer" read "office";

At page 79--

- (40) in rule 70--
 - (a) item (e), Masters (HT), add "a" between "of" and "Home";
 - (b) sub-rule (3)--
 - (i) line 2, for "parts" read "part"
 - (ii) line 5 and 6, for "parts" read "part";
 - (c) sub-rule (d)--
 - (i) line 2, "parts" read "part"
 - (ii) line 4, for "orals" read "orals";
 - (iii) line 4, for "part" read "parts";
 - (d) sub-rule (6), line 4, for "part" read "parts";

At page 80--

- (41) in Appendix "A"
 - (a) in column 19, instead of sub-heading "ship Masters Certificate" read "Ship Masters Certificate in Medicare";
 - (b) in column 11, instead of sub-heading "Radio Telephone Operator (Restricted)" read "Radio Telephone Operator (Inland Maritime)";
 - (c) in column 1, line 3, add "Part A" after "Foreign Going Ship";
 - (d) in column 4, lines 2 and 3, for "for six months" read "or sea service of six months";
 - (e) in column 4, line 9, add "on duties" between "6 months" and "associated";
 - (f) in column , line 12, for "2nd Mate FC" read "2nd Mate FG";
 - (g) in column 3, line 19, add "of a" after "Master";
 - (h) in column 3, line 20, add "ship" after "Home Trade";
 - (i) Below the Grade Extra Master, line 4, for "permission" read "permissible";
 - (j) Below "Remission Permissible" Heading, in column 2, for "rates" read "rate";

At page 81--

- (k) in column 11, instead of sub-heading "Rado meelephone (Inland Maritime)" read "Radio telephone Operator (Inland Maritime)";
- (l) in column 1, line 1, and "Navigational" before "Watch-keeping";
- (m) in column 3, line 6-8, for "Second Mate Foreign Going" read "Navigational Watch keeping Officer";
- (n) in column 4, line 25, add "Navigational" between "or" and "Watchkeeping Officer";
- (o) in column 4, line 26, add "and" after "officer";
- (p) in para below Grade "Master of Home Trade Ship" line 2, "(----)" may be added between "ship" and "for";

At page 82--

(42) in Appendix "B"--

- (a) line 2, for "Radar Observer" read "Radar Observer's";
- (b) in Theory (i), the radar set, line 4, for "pulsos" read "pulses"
- (c) in line 7, omit "of"
- (d) in line 10, for "aoria" read "aerial";
- (e) in last line, for "Matine" read "Marine";
- (f) in theory (ii), The radar display, line, 4, omit "of";
- (g) in theory (iii), Effects of Siting etc., line 7, for "apares" read "spares";
- (h) in para below (iv)(h), line 4, for 'targets" read "targets";
- (i) in para below (iv)(h), line 6, for "recons" read "racons"
- (j) in para below (iv)(h), line 7, for "remarks" read "remarks";
- (k) in para below (iv)(h), line 10, for "beanwidth" read "beamwidth";

At page 83

(43) in Appendix "B"--

- (a) v. Factors influencing appreciation, sub-clause (h), line 3, insert "/" between "rate" and "accuracy";
- (b) below sub-clause (h), line 1, omit the comma between "frequent" and "regular";
- (c) in vii(b), line 1, for "distances" read "distance";

- (d) in vii(b), line 2 add, "comma" between "corssing and "meeting";
- (e) vii)(e) below (iii), line 3 for "photographis" read "photographic";
- (f) in (vii)(c) below (iii), line 6, for "conservational" read "observational";

At page 84-

- (44) In appendix 'B', item 3, Practical (iii) line 2, for "boarings" read "bearings";
- (45) In appendix "C"--
 - (a) Sl. No.s6 for "Drowing" read "Drowning";
 - (b) under heading "practical demostration-----";
 - Sl. No.5, line 1, for "Application" read "Application";
- (46) In appendix "D", 1. introduction--
 - (a) line 1, for "aboard" read "aboard";
 - (b) line 4, for "frayers" read "fryers";
 - (c) line 5, for "rage" read "rags"
 - (d) line 8, for "examples read "examples;
- (47) In appendix "D"; 3. fire Fighting—for "CO2" read "CO2";

At page 85--

- (48) In appendix "D", 9. Organised fire prevention", line 1, for "atchmen" read "watchmen";
- (49) In appendix "F",--
 - (a) para 1(iv), Plan of work, line 12, add "as possible" between "soon" and "on";
 - (b) para 1(iv), plan of work, line 16, for "own ships" read "own ship"

At page 86-

- (50) In appendix "F",--
 - (a) para 1(v), line 4, and "and" between "courts" and "the effects";
 - (b) in para 2, line 4, for "have" read "has";
 - (c) in para 2, line 26, for "radily" read "readily";

At page 87--

- (51) In appendix "F",--
 - (a) 3, Discussion, para 4, line 4, for "simulater" read "simulator";

- (b) para 5, line 2, for "illustrate" read "illustrated";
- (52) In appendix "F" Topic No. line 1, for "Trepical" read "Tropical";
- (53) In appendix "F", Topic 9, "Practical Demonstration"--
 - (a) Sl. No.1., line 2, for "of" read "and" between "method" and "use";
 - (b) Sl. No.5--
 - (i) line 1, for "as phycia" read "asyphyxia"
 - (ii) line 2, add "arrest" after "cardiac"
 - (c) in Sl. No.7, line 4, for "spongine" read "spoinging";
- (54) In appendix "G", Heading, for "SIGHT RESTS" read "SIGHT TESTS";

At page 88--

- (55) In appendix "G"--
 - (a) Topic 4, -- Method of testing--
 - (i) line 2, add "be" between "shall" and "properly";
 - (ii) item (a), line 3, for "In" read "in"
 - (iii) item (c), line s5, for "the letter test and all mistakes, if any" read "to the Chief Examiner who shall decide";
 - (c) In PART II--
 - (i) topie 7(3), line 11, for "this" read "his";
 - (ii) topic 8(2), line 1, add "or small" between "large" and "aperture"

At page 89--

- (iii) topics 8(3), line 3, for "this" read "his"
- (d) in PART III-
 - (i) topic 11(2), line 2, omit "a";
 - (ii) topic 12, line 3, for "on" read "or"
 - (iii) topic 14(1), line 5, add "the" between the words "attend" and examination";
 - (iv) topic 15(1), line 11, for "in" read "on";
 - (v) topic 15(2), line 5, for "to" read "of";
- (56) in Appendix "H"--

below FORM I and :FORM J"—"Form of Sight Test Certificate";

At page 91--

(57) in Form-A, item E(17),--Declaration to be made by the candidate.

- (a) line 2, for "papers" read "papers";**
- (b) line 2, for "ture' read "true";**
- (c) line 4, for "wholse" read "whole";**

At page 92--

(58) In F(18) Request for allotment of seat for examination—in the table under the heading "Examination parts" for sub-headings "CB" read "C" and for "DD" read "D";

At page 93—

(59) in H (21) Certificate of Examiner--

- (a) item (b), line 2, for "he" read "He" after Full Stop;**
- (b) item (c), line 2, omit "Form Exn.L";**
- (c) line 4, for "Comliance" read "Compliance";**

At page 94--

(60) in Part II of the "Certificate of Watchkeeping ; and the following as the last para :-

"Report on Conduct

Ability

Sobriety

At page 97--

(61) In C(15), item (c), line 1, for "Established" read "Estabilishment";

(62) In C(16) For Official use only, item 9, for "Radar Simulator" read "Radar Simulator"

At page 98--

(63) In E917) Declaration, line 3, for "name" read "names";

At page 99--

(64) In (22) Certificate of Examiner, item (a), line 1, for "sea" read "see";

(65) In (22) Certificate of Examiner, item 9b0, line 2, for "he" read "He" after stop;

(66) In (22), Certificate of Examiner, item (c) line 2, omit "Form Exn. L';

(67) In Form F, line 3, after "Signature of Examiner (Seal)" for 'coluy' read "colour";

(68) In Form F, Note, line 5, for "times" read "time";

(69) In letter of Authority, last line for "signature" read 'signature';

(C) I hereby certify that :-

1. The candidate has produced satisfactory testimonials proof of sea service/watch keeping service for a period of _____ years _____ months and _____ days and was accordingly admitted for the examination for the Certificate of Competency as _____

2. The result of the examination as indicated below :

3. Though the candidate has passed the examination, he has not been issued with a certificate of competency or a letter of authority for want of the following additional Certificates:

4. The candidate due to serious weakness shown is required to attend a course of instructions at an approved institute for a period of _____ months.

5. The candidate due to weakness shown in seamanship is required to serve a further period of _____ months.

Examiner of Masters & Mates Mercantile

Marine Department _____ District.

Signature of Candidate.....

*Delete the words that are not applicable.

At page 100--

(70) In FORM-G, the following may be added:-

(C)

1. Sea Service : _____ Yrs.
_____ months _____ days.

2. Additional Certificates required:

3. Required to attend a Course of _____
_____ months.

4. Additional sea-service of _____ months.

(71) In col. (B) of Application for issue of certified true copy, line 1, for "of" read "or" between "competency" and "letter";

(72) In col. (D), line 1, for "section A,B, C and" read "sections A,B and C"

(73) In Col (D), line 2, and "and belief" after "knowledge"

At page 102--

(74) In C. Examiner's Certificate, in line 3, for "were" read "was"

(75) In sight test Certificate, line before Examiners Signature, for "Date" read "Dated";

- (a) item 6, add "Navigational" before "Watch Keeping";
- (b) item 7(iv), for "Singals" read "Signals";
- (c) item 9, line 3, for "by" read "be";

At page 104--

(77) In appendix "J"--

- (a) Sl. No. 7,, line 1, for "Syllabuses" read "syllabi";
 - (b) Sl. No. 9, line 1,--
 - (i) for "ship" read "ships";
 - (ii) for "one" read "arc";
 - (c) sl. No. 12, line 2, for "aprecise" read "a precise"
 - (d) Sl. No.14, for "paper" read "improper";
 - (e) below item 14, line 2, for "More" read "Mere";
 - (f) below item 14, line 3, for "graps" read "grasps";
 - (g) below item 14, line 4, for "Through" read "Thorough";
- (78) In Section-II, Second Mate (Foreign-Going), Part-A (Written), (1) Nautical Physics--

(a) item (ii) Vectors—line 3, for "or" read "of";

At page 105--

- (b) In Motion, line 1, for "Curviliner" read "Curvilinear";
- (c) in Rotation, line 3, for "Procession" read "Precession";
 - (d) In Surface Tension, line 3, add "of" between "Superssion" and "tidal";

At page 106

(e) in Hygrometry—line 6, for "Froast" read "Frost";

- (f) in Transference of heat, line 4, for "brezes" read "breezes";
- (g) in (v) Heat Engines, for "Elementary Ide" read "(Elementary Idea)"

At page 107--

- (h) in (C) light—(ii) Refraction, line 5, for "Haloes" read "Halos";
- (i) in (d) Sound—(i) For "VALOCITY OF SOUND" read "VELOCITY OF SOUND";
- (j) in (e) Magnetism—(i) Magnetic Properties, line 3, for "Hystersis" read "Hysterisis";
- (k) in (e) Magnetism—(ii) Geomagnetism, line 3, for "Isogenic" read "Isogonic";

At page 108--

- (i) in Static Electricity, line 5, for "carging" read "charging";
- (ii) line 1, Semi-colon is required after "application";
- (iii) line 4, for "Tereid" read "Torroid";
- (iv) line 6, for "A.G. Generator" read "A.C. Generator";
- (v) line 9, for "characteristics" read "characteristics"
- (vi) line 16, add "breaker devices used in electric circuits" between "Circuits" and "their"

At page 110--

(79) Nautical Mathematics

- (a) in (e) Trigonometry—(i), line 1, for "formulas" read "formulae"
- (b) line 9, for "Cos () = Sin" read "Cos= -Sin";

At page 111-

- (c) in (f) Spherical Trigonometry,--
 - (i) in line 3, for "Formulae" read "formula"; and for "Napear's" read "Nepear's";
 - (ii) in line 4, for "quadrantel" read "quadrantal"
- (d) in Part 'B' (Written). General ship Knowledge--
 - (i) in (b), line 3, for "sheers" read "sheer";
 - (ii) in (c), line 1, add "of" between "prevention" and "corrosion";
 - (iii) in (e), line 4, for "Leadweight" read "lightweight";

At page 112--

- (iv) in (f), line 1, for "definitions" read "definitions";
- (v) in (g), line 12, add "sea" between "and" and "temperature";

(80) 5. Meteorology--

- (a) in (b), line 2, for "Barometric" read "Barometric"

At page 113---

- (b) in (d), Visibility, line 3, for "log" read "fog"
- (c) in (f), Pressure gradient and wind-line 4, for "guest" read "gust";

(81) in Part "C", Practical Navigation--

- (a) in (a), line 1, for "Mercafor" read "Mercator";

At page 114--

- (b) in (h), line 4, for "or" read "of";
- (c) in (h), line 5, for "stems" read "streams"
- (d) in (i)(iii), line 2, for "routing" read "routeing";

(82) in 8. Principles of Navigation--

- (a) item (b), line 1, for "on" read "of";
- (b) item (e), sub-para (b)--
 - (i) line 6, for "manoeuvring" read "manoeuvring";
 - (ii) line 7, for "ringing" read "bringing"
 - (iii) item (e), sub-para (c), line 2, for "loads" read "roads"
 - (iv) item (e), sub-para (g), line 3, for "lifelifths" read "liferrafts";
 - (v) item (e), sub-para (g), line 4, for "peading" read "Tending";
 - (vi) item (e), sub-para(g), line 5, for "cars" read "Oars";
 - (vii) item (e), sub-para (g), line 6, for "deaching" read "beaching";

at page 115--

- (viii) item (e), sub-para (g), line 2, "Mariner's" read "Mariners";

(84) FIRST MATE (FOREIGN-GOING) PART A, 11. Radio and Electronics--

- (a) sub-para (c) (ii), line 5, for "aeral" read "aerial";
- (b) subpara (c) (ii), line 8, for "goiniometer" read "goniometer";

- (c) sub-para © (iii), line 4, for "Centimetter" read "centimeter";
- (d) in sub-para (d), line 2, for "per" read "pen"
- (e) in sub-para (d), line 9, for "magnetic-striction" read "magneto-striction";

at page 116--

- (85) FIRST MATE (FOREIGN-GOING) PART A, 12. ELECTRICITY- sub-para (e), line 5, for "discripture" read "descriptive";

(86) FIRST MATE (FOREIGN-GOING), PART A, 13. METEOROLOGY OCEAN CURRENTS AND ROUTEING

- (a) in heading, line 2 for ""ROUTING", read "ROUTEING".
- (b) in sub-para (g), line 2, for "routing" read "routeing";
- (c) in sub-para (h), line 2, for "ST. Elms" read "St. Elmo's";

at page 117--

(87) FIRST MATE (FOREIGN-GOING), PART A, 16. SHIP CONSTRUCTION AND STABILITY, sub-para (i), line 9, for "IMCG" and "IMO";

- (a) in sub-para (e), line 2, for a "ad" read "and";
- (b) in sub-para (c), line 2, for "IMCO" read "IMO";
- (c) in sub-para (d), line 12 and 13, delete "carriage of"
- (d) in sub-para (d), line 14, for "Roll-on-rool" read "Roll-on-rell";
- (e) in sub-para (b), line 15, omit "a";
- (f) in sub-para (b), line s5, for "docks" read "decks"
- (g) in sub-para (j), line 1, for "crow" read "crew":

at page 118--

(89) FIRST MATE (FOREIGN-GOING), PART D, ORALS--

- (a) sub-para (c), line 6, for "Handling" read "Hanging"
- (b) sub-para (d), line 3, for "Bearthin" read "Bearing";
- (c) sub-para (e), line 3, for "trought" read "trough";
- (d) sub-para (i), line 1, for "Classes" read "caases"

(90) MASTER (FOREIGN-GOING) PART "A" 20. SHIP CONSTRUCTION AND STABILITY--

- (a) sub-para (d), line 2, for "rub-division" read "sub-division";
- (b) sub-para (f), line 4, for "oven peets" read "even keels";

- (c) sub-para (f), line 6, for "ships" read "ship's";
- (d) sub-para (g), line 3, for "stability to" read "stability at";
- (e) sub-para (g), line 3, for "largest" read "large";
- (f) sub-para (g), line 5, for "of" read "on"; between "curve" and "dynamical";

at page 119--

- (g) sub-para (i), line 1, for "inclining" read "inclining";
 - (h) sub-para (i), line 1, add "of" between "production" and "curves";
- (91) in 21. COMMERCIAL AND LEGAL KNOWLEDGE AND SHIP MANAGEMENT,
- (a) sub-para (d), line 5, for "Trades" read "Trade";

at page 120--

- (92) in 22. RADIO AND ELECTRONIC AIDS TO NAVIGATION--
- (a) sub-para (c), line 4, for "advanate" read "advantage";
 - (b) sub-para (c), line 14, for "D.M." read D.F.
 - (c) sub-para ©, line 18, for "quadantal" read "quadrantal";
 - (d) sub-para (d), line 5, for "characteristics" read "characteristics";
 - (e) in sub-para (c), line 3, for "navigations" read "navigation"

at page 121--

- (93) in 23. ENGINEERING KNOWLEDGE, INSTRUMENTS AND CONTROL, SYSTEM--
- (a) sub-para (d), line 2, for "including" read "including";
 - (b) sub-para k(ii), line 1, for "censor" read "sencor";

at page 122--

- (94) in 24. Magnetism. Magnetic and Gyro Compasses--
- (a) sub-para (a), line 3, for "plans" read "plane";
 - (b) sub-para (a), line 100 add "of" between the words "Methods" and "obtaining";
 - (c) sub-para (d), line 6, for "deflection" read "deflection";
- (95) in 25, Safety Carriage of Goods and Ship Maintenance--
- (a) sub-para (b), line 1, for "Carriagge" and "Carriage"
 - (b) sub-para (c), line 2, for "IMCO" read "IMO";

- (c) sub-para (D), line 1, for "Stewage" read "stowage";
- (d) sub-para (d), line 4, for "calcutation" read "calculation";
- (e) sub-para (d), line 7, for "stewage" read "stowage";
- (f) sub-para (d), line 14, for "of" read "off" between "roll" and "vessels";
- (g) sub-para (d), line 14, omit "a"
- (h) sub-para (e), line 3, for "dumping" read "pumping";
- (i) sub-para (e), line 8, for "petroteum" read "petroleum";
- (j) sub-para (h), line 4, for "woodkwork" read "wood work";
- (k) sub-para (h), line 5, for "docks" read "decks";

at page 123--

(96) in 26, Orals and Practicals--

- (a) sub-para (c), line 2, for "or" read "on"
- (b) sub-para (d), line 3, for "whether" read "weather";
- (c) sub-para (d), line 7, for "Manoeuvring" read "Manoeuvering";
- (d) sub-para (d), line 8, for "spuat" read "s"
- (e) sub-para (d), line 20, for "through" read "trough";
- (f) sub-para (d), line 21, for "manoeuvring" read "manoeuvering";
- (g) sub-para (d), line 29, add "other ships" between "and" and "caused";
- (h) sub-para (f), line 3, for "shifting" read "shafting";
- (i) sub-para 2, omit "Extra Master";
- (j) sub-para 2, omit "Extra Master";

(97) In 27, Mathematics--

- (a) line 3, for "In qualities" read "Inequalities";
- (b) sub-para "Sequences and Series", line 2, for "expenential" read "exponential";
- (c) sub-para "Applications of differentiation" for "extrema" read "extremes" and for "Charge" read "change";
- (d) in the para below "Successive differentiation" for "invce" read "inverse"

at page 124—

- (c) in para above the heading "Mechanics & Statistics" for "in one" read "with one";
- (98) (a) in the topic "MECHANICS AND STATISTICS"—line 24, the para beginning with "Shearing force", for "distributed" read "distributed";
- (b) in the topic "MECHANICS AND STATISTICS", line 24, the para beginning with "Angular Momentum", for "knetetic" read "kinetic";
- (99) in 28, Physics--
 - (a) Heat, line 2, for "knetetic" read "kinetic";
 - (b) Heat, line 4, for " $p = \mu^3 \text{ pc}^2$ " read " $p = \mu^3 \text{ pc}^2$ ";
 - (c) Heat, line 6, for "kinotic" read "kinetic";
 - (d) Heat line 12, for "atmicity" read "atomicity";
 - (e) Heat, line 14, for "adiatic" read "adiabatic";
 - (f) in waves, line 2, for "resonane" read "resonance";
 - (g) in waves, line 5, for "Superposition" read "superimposition";
 - (h) in Light, line 1, omit "of" between "knowledge" and "and";
 - (i) line 2, for "reflexion" read "reflection";
 - (j) line 5, omit "of" between "knowledge" and "and";
 - (k) line 8, for "exit" read "eye";
 - (l) line 9, for "eve" read "eye";

at page 125--

- (100) in Refraction and Dispersion of Prism, line 3, for "connecting" read "concerning";
- (101) Below Spectra and Colour, line 1, for "flus" read "flux";
- (102) Below Spectra and Colour, line 2, for "photovoltaic" read "photovoltaic";
- (103) Below "non-reflecting films, blooming, for "Diffractive" read "Diffraction";
- (104) in Natural Phenomena, etc. for "hale" read "halo";
- (105) Below Sound, line 1, for "rods" read "solids";
- (106) Below Sound, line 3, for "Reflextion" read "Reflection";
- (107) Below Sound, line 7, for "ar-borne" read "air-borne";
- (108) In Part-B, 29, INTERNATIONAL MARITIME AGREEMENTS AND LEGAL KNOWLEDGE--

- (a) line 3, for "IMCO Conventions" read "IMO Conventions" and print on next line;
- (b) sub-para (a)(i), line 1, for IMCO read "IMO";
- (109) in Part-B, topic 5, omit "SECTION B";
- (110) in Part-B, topic 6(a). Crew, Line 7, for "(iv) read "(vi)"
- (111) in 30. MARINE ENVIRONMENTAL STUDIES--
 - (a) Section A, Meteorology, sub-para (ii), line 1, for "geostrophic" read "geostrophic";

at page 126--

- (b) 2, Ocenography, sub-para (i), line 2, for "Coastilines" read "Coastlines";
- (112) in Section B, 2—Sea Surveying--
 - (a) line 3, for "Section" I, read "Section A";
 - (b) in sub-pra (iii), for "sonal" read "Sonar";
- (113) in Part C, 31. NAVAL ARCHITECTURE--
 - (a) Section A, 1, line 5, for "buyoncy" read "buoyancy";
 - (b) line 6, for "buyoncy" read "buoyancy";
 - (c) Section A-2,
 - (i) line 2, for "BMt-lt/V" read "BM=1/V"
 - (ii) ;ome 7, for "Criteron" read "Criterion";
 - (d) Section A-3, for "BM1-IV" read "BML=I/V";
 - (e) Section A-6--
 - (i) line 2, for "crack" read "track"
 - (ii) line 3, omit "of";
 - (iii) line 3, for "chans" read "chains";

at page 127--

- (f) Section A-8, line 3, for "vessel" read "vessels";
- (g) Section A-9, line 1, for "Manoeurving" read "Manoeuvering";
- (h) Section A-9, line 10, for "Capasizing" read "capsizing"
- (i) Section B, "Safety in Design", line 3, for "vessel" read "vessels"
- (114) in 32. NAVIGATIONAL AIDS—item 5, line 6, for "casultaties" read "casualties";

(115) in 33. NAVIGATION--

- (a) Section A-1, line 2, for "principlas" read "principles";
- (b) Section A-2, line 1, for "formulate" read "formulae"

at page 128--

- (c) Section A-3, item (e), for "Sterographic" read "Stereographic";

(116) in Section-V, Watch Keeping Officer,

Part-A.

1.ELEMENTARY PHYSICS

- (a) line 6, for "laminar" read "lamina";
- (b) in item b, line 4, for "flotation" read "floatation";
- (c) in item c, Heat, line 1, for "Kelvin" read "Kelvin";
- (d) in item c. Heat, line 2, for "Maharenheit" read "Fatharenheit";
- (e) in line 3, for "or" read "of";
- (f) item d, Light, line 3, for "agnles" read "angles";

at page 129--

(117) 2. Elementary Mathematics, item (c), line 3, for "parallelograms" read "parallelograms";

(118) in Part D, line 1, omit "and pilotage";

(119) in Part E, item 9, line 1--

- (i) add "Signals" before "Syllabus";
- (ii) for "is" read "shall be"

(120) in MATE (HOME TRADE)—Part A, 10. Practival Navigation—line 4, for "Goreign" read "Foreign"

(121) (a) in MATE (HOME TRADE) – Part B, item (h), line 1, omit "a" between "righting" and "couple";

at page 130--

- (b) item j, line 5, for "behavious" read "hehaviour"
- (c) in 14. Safety Carriage of Goods and Ship Maintenance line 8, for "IMCO" read "IMO";
- (d) in 14(b), line 8, for "refrigerated" read "refrigerated";
- (e) in 14(b), line 12, omit "a";

- (f) in 14(d), line 2, for "freeding" read "freeing";
- (g) in 14(e), line 1, for "ad" read "and";
- (122) in 3. Electricity, item (d), for "Magnetosiction" read "Magneto-striction";
- (123)(a) in 3, Gyro-Compass, item(a), line 3, for "earth's read "earth's";
- (b) in line 4, for "Procession" read "Precession";
- (c) in 4, Gyro-Compass, for "item (d)" read "item (b)";
- (d) in item "b", line 3, for "compass" read "compasses";

at page 131--

(124) Master (Home Trade), 19. Elementary Engineering Knowledge and Radio Navigational Aids--

- (a) item 1, Elementary Engineering Knowledge, line 3, for "stream" read "steam";
- (b) item 2, Electronic Navigational Aids,--
- (i) in (a) (ii), line 10, add "of" between "application" and "data";
- (ii) in (b)(i), line 9, for "qualify" read "quality";

at page 132--

- (iii) in (c), Direction Finding, line 2, for "diagrams" read "diagram";
- (125) in 20, Ship Construction and Stability--
- (a) after sub-para (e), for "(b) in stability and trim when dry docking read "(f)";
- (b) in line 4, for "Dock" read "Deck";
- (c) item (g), line 1, for "production" read "production";
- (d) Part B, Orals, line 1, for "syllabuses" read "syllabus";

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