

Competence (iii) : Respond to emergencies

Content of Examination	Criteria for Satisfactory Examination
<p><i>Emergency procedures</i></p> <p>Precautions for the protection and safety of passengers in emergency situations.</p> <p>Initial action to be taken following a collision or a grounding; initial damage assessment and control.</p> <p>Appreciation of the procedures to be followed for rescuing persons from the sea, assisting a ship in distress, responding to emergencies which arise in port.</p> <p>Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy.</p> <p>Action required in emergency situations such as man-overboard, engine or steering failures, stopping the ship. Knowledge of items listed in IMO/ILO "Document of Guidance, 1985", Section 12 Appendix I, as applicable to deck watchkeepers.</p> <p>Survival at sea. Knowledge required by an officer in charge of a survival craft. Procedure on abandoning ship. Survival techniques. Life-Saving signals and rescue methods.</p>	<p>The type and scale of the emergency is promptly identified, and initial action and, if appropriate, manoeuvring of the ship are in accordance with contingency plans and are appropriate to the urgency of the situations and nature of emergency.</p>

9.4 **Seagoing Class 2 Certificate**

Part A

Paper 1 Navigation (3-hour)

Function : Navigation at the management level

Competence (i) : Establish watchkeeping arrangements and procedures

Criteria : Watchkeeping arrangements and procedures are established and maintained in compliance with international regulations and guidelines so as to ensure the safety of navigation, protection of the marine environment and safety of the ship and persons on board.

- (a) Effective bridge teamwork procedures.
- (b) Bridge watchkeeping arrangements for all conditions. Standing orders. IMO requirements for navigational instruments, charts and publications.

- (c) Pilots; watchkeeping duties and bridge procedures with a pilot embarked. The Master/Pilot relationship. Exchange of information.
- (d) Practice in sending and replying to messages by voice using the principle of "Seaspeak"
- (e) Compiling distress, urgency, safety and navigational messages for transmission by telex.
- (f) Compiling messages and replies in appropriate forms to and from pilot stations, harbour control, VTS, agents, owners and charterers etc.
- (g) Knowledge of how to obtain navigational warnings and weather information.
- (h) Contents, use and updating of relevant Lists of Radio Signals.
- (i) Procedures concerning medical advice by radio.
- (j) The Master's responsibilities with regard to radio communications.

Competence (ii) : Forecast weather and oceanographic conditions

Criteria : The likely weather conditions predicted for a determined period are based on all available information and actions to be taken.

- (k) Ability to understand and interpret Synoptic and Prognostic charts and their use in forecasting area weather taking into account the local weather conditions and information provided by FAX transmissions as applicable to surface navigation. Ice reports.
- (l) Knowledge of the characteristics of various weather systems, including tropical revolving storms and avoidance of storm centres and the dangerous quadrants. Ocean currents, ice regions and areas of persistent fog.
- (m) Use all appropriate navigational publications on tides and currents. The principles and practice of climatic routeing and weather routeing.
- (n) Meteorology and maritime climatology; air masses and their typical characteristics. The significance of lapse rates. Polar and inter-tropical fronts. The principal pressure systems and associated weather. Thunderstorms and line squalls.

Competence (iii) : Determine position and the accuracy of resultant position fix by any means

Criteria : The primary method chosen for fixing the ship's position is the most appropriate to the prevailing circumstances and conditions. The accuracy of fixes is within accepted levels.

Position Determination in all conditions

- (o) Error theory as applied to navigation in practice in the appreciation of the accuracy of position fix.

- (p) Position finding by all methods in current use. Considerations underlying the choice of navigational systems for different trades and geographical regions.

Competence (iv) : Determine and allow for compass errors

Criteria : The method and frequency of checks for errors of magnetic and gyro-compasses ensures accuracy of information.

- (q) Knowledge of the principles of magnetic and gyro-compasses.
- (r) An understanding of systems under the control of the master gyro and a knowledge of the operation and care of the main types of gyro-compass.
- (s) The magnetic compass; its use, construction, care and maintenance. The Earth's magnetic field. Directive force. Forces in a ship causing deviation and usual means of compensation. An appreciation of the separate effects of "hard" and "soft" iron. The recording of deviations and means of obtaining a table or curve of deviations. Occasions on which compass adjustment is required.

Competence (v) : Manoeuvre and handle a ship in all conditions

Criteria : All decisions concerning berthing, unberthing, manoeuvring and anchoring are based on a proper assessment of the ship's manoeuvring and engine characteristics and the forces and external factors to be expected.

- (t) The principles of ship handling; ship handling and manoeuvring. Stopping distances and turning circles. The use of manoeuvring data to plan turns and determine wheel-over points. Monitoring of turns. The effects of shallow water, squat and interaction. The effects of bow and stern thrusters and stabilisers.

Competence (vi) : Co-ordinate search and rescue operations

Criteria : The plan for co-ordinating search and rescue operations is in accordance with international guidelines and standards.

- (u) A thorough knowledge of and ability to apply the procedures contained in the IMO Merchant Ship Search and Rescue Manual (MERSAR). Rendezvous navigation. The GMDSS and other shore-based SAR organisations and reporting systems.

Paper 2 Passage Planning (3-hour)

Function : Navigation at the management level

Competence : Plan a voyage and conduct navigation

Criteria : The reasons for the planned route are supported by facts and statistical data obtained from relevant sources and publications.

- (a) Voyage and passage planning and navigation for all stages; i.e. ocean, coastal, landfall, pilotage, and for all conditions and constraints such as restricted waters,

meteorological conditions, ice, restricted visibility, Traffic Separation Schemes and areas of extensive tidal effects.

- (b) Routeing in accordance with the general principles on ship's routeing.
- (c) Reporting in accordance with the Guidelines and Criteria for Ship Reporting Systems.
- (d) The proper application of all navigational precautions; procedures required for the preparation and execution of a passage plan.

PART B

Paper 1 Ship Technology (3-hour)

Function (1) : Controlling the operation of the ship and care for persons on board at the management level

Competence (i) : Control trim, stability and stress

Criteria : Stability and stress conditions are maintained within safe limits at all times.

- (a) Understanding of fundamental principles of ship construction and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability; knowledge of the principal structural members of a ship and how they function to resist stresses. Methods of compensating for discontinuity of strength. Local and special stiffening.
- (b) Specialist ship types; typical sections and layout of compartments and special structural requirements. The use of special steels, aluminium and fire-resistant materials in ship construction.
- (c) Means of closing openings including hull doors, ramps etc. General ideas of subdivision requirements.
- (d) Properties of paints and coatings. Modern methods of combating corrosion.
- (e) General ideas on welding processes in construction and repair work. Types of weld, common faults and visual examination of welding.
- (f) Testing of tanks and other watertight work. The preparation of damage reports and repair lists. A knowledge and use of on-board ship plans.
- (g) Procedures in dry docks and repair yards with regard to the ordering and checking of repairs and maintenance. Main points for attention in dry dock.

Competence (ii) : Maintain safety and security of the ship's crew and passengers and the operational conditions of life-saving and fire-fighting and other safety systems

Criteria : Procedures for monitoring fire detection and safety systems ensure that all alarms are detected promptly and acted upon in accordance with established emergency procedures.

- (h) Maintenance of operational conditions of life-saving and fire-fighting systems and emergency equipment required by SOLAS for passenger ships and cargo ships.
- (i) A thorough knowledge of life-saving appliance regulations (SOLAS)

Competence (iii): Develop emergency and damage control plans and handle emergency situations

Criteria : Emergency procedures are in accordance with the established plans for emergency situations.

- (j) Preparation of contingency plans for response to emergencies.
- (k) Ship construction, including damage control.
- (l) Methods and aids for fire prevention, detection and extinction.
- (m) Functions and use of life-saving appliances.

Function (2) : Navigation at the management level

Competence : Operate remote control of propulsion plant and engineering systems and services

Criteria : Plant, auxiliary machinery and equipment is operated in accordance with technical specifications and within safe operating limits at all times.

- (a) Operating principles and characteristics of the major types of marine power plants. General knowledge of marine engineering terms.
- (b) Ship's auxiliary machinery including pumps, winches, windlasses, hatches, derricks, cranes and other equipment.
- (c) Propulsion; main methods, bow and stern thrusters and stabilisers. Factors affecting performance, manoeuvring, power and economy.
- (d) Ship's electrical generation and distribution, the more common systems and methods. Typical emergency generators and emergency electrical supply systems.
- (e) The principles of refrigeration and its shipboard applications.
- (f) Steering gear, main and emergency. Principles of operation and control of the main types, automatic and manual. Tests and checks. Change over procedures.
- (g) Control systems; remote control and monitoring systems and methods for main and auxiliary machinery, pumps, valves etc. Simple knowledge of different types of sensors and transducers and the general electronic, hydraulic etc. principles which are employed in control systems.
- (h) General ship maintenance; planning and recording of maintenance work. Maintenance of hatches, watertight doors, ventilators and other closing arrangements, and cargo handling equipment etc. Replacement and lubrication schedules.

Paper 2 Shipboard Operations (3-hour)

Function (1) : Controlling the operation of the ship and care for persons on board at the management level

Competence : Control trim, stability and stress

<i>Criteria : Stability and stress conditions are maintained within safe limits at all times.</i>

- (a) Knowledge of IMO recommendations concerning ship stability. A full knowledge of the use of stability and hydrostatic information carried on board ships.
- (b) Knowledge of the effect on trim and stability of a ship in the event of damage to and consequent flooding of a compartment and counter measures to be taken.
- (c) Changes in trim, draught and heel due to loading, discharging and shifting weights and floating in water of different densities. The requirement for the ship to be upright with a safe trim.
- (d) The effect of list and trim on stability, including the effect of change of waterplane in heavy weather.
- (e) The angle of loll. Correction of a heavy list.
- (f) The use and measurement of Load Lines and freeboard as applied to loading calculations. The effects of hog, sag, water density and temperature. Draught surveys.
- (g) An understanding of those aspects of the conditions of assignment which affect the stability and seaworthiness of a ship.
- (h) The effects of variations in centre of gravity, righting lever and freeboard on the value and range of stability. The concept of dynamical stability. Wind and wave excitation.
- (i) Trim and stability requirements and calculations applied to dry docking.
- (j) Stability requirements for special cargoes; e.g. grain, concentrates, deck cargoes.
- (k) Shearing forces and bending moments, their nature and the significance of values and curves. How to plan cargo and ballast operations to minimise stresses.

Function (2) : Cargo handling and stowage at the management level

Competence (i) : Plan and ensure safe loading, stowage, securing, care during the voyage and unloading of cargoes

<i>Criteria : Cargo operations are planned and executed in accordance with established procedures and legislative requirements. Stowage and securing of cargoes ensures that stability and stress conditions remain within safe limits at all times during the voyage.</i>
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- (a) Knowledge of and ability to apply relevant international regulations, codes and standards and recommendations relating to the safe handling, stowage, securing and transport of cargoes.
- (b) Knowledge of the effect on trim and stability of cargoes and cargo operations.
- (c) Use of stability and trim diagrams and stress calculating equipment, including automatic data-based (ADB) equipment and knowledge of loading cargoes and ballasting in order to keep hull stress within acceptable limits.
- (d) Stowage and securing of cargoes on board ships including cargo handling gear, securing and lashing equipment.
- (e) Loading and unloading operations with special regard to the transport of cargoes identified in the Code of Safe Practice for Cargo Stowage and Securing.
- (f) General knowledge of tankers and tanker operations.
- (g) Planning, loading, discharging, stowing and securing with particular regard to heavy weights.
- (h) The correct use of cargo gear with special attention to lifting appliances. Safe working loads and associated limits. Proof loads. Calculations of approximate stresses on parts of cargo lifting gear. Equipment tests.
- (i) Certificates and records to be kept on board ship.
- (j) Preparation of holds for general and dry bulk cargoes. Loading port surveys.
- (k) Containers; their stowage and securing in holds and on deck in specialised and conventional ships. Planning and stability considerations.
- (l) Knowledge of the operational and design limitations of bulk carriers.
- (m) Ability to use all available shipboard data related to loading, care and unloading of bulk cargoes.
- (n) Ability to establish procedures for safe cargo handling in accordance with the provisions of the relevant instruments such as BC Code, IMDG Code, MARPOL 73/78 Annexes III and V and other relevant information.
- (o) Ability to explain the basic principles for establishing effective communications and improving working relationship between ship and terminal personnel.

Competence (ii): Assess reported defects and damages to cargo spaces, hatch covers and ballast tanks and take appropriate action.

Criteria : Evaluations are based on accepted principles, well-founded arguments and are correctly carried out. The decisions taken are acceptable, taking into consideration the safety of the ship and the prevailing conditions.

- (p) Knowledge of the limitations on strength of the vital constructional parts of a standard bulk carrier and ability to interpret given figures for bending moments and shear forces.

- (q) Ability to explain how to avoid the detrimental effects on bulk carriers of corrosion, fatigue and inadequate cargo handling.

Competence (iii) : Carriage of dangerous cargoes

<p><i>Criteria : Planned distribution of cargo is based on reliable information and established guidelines and legislative requirements. Information on dangers, hazards and special requirements is recorded in a format suitable for easy reference in the event of an incident.</i></p>
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- (r) International regulations, standards, codes and recommendations on the carriage of dangerous cargoes, including the International Maritime Dangerous Goods (IMDG) Code and IMO "Emergency Procedures for Ships Carrying Dangerous Goods".
- (s) Carriage of dangerous, hazardous and harmful cargoes; precautions during loading and unloading and care during the voyage.
- (t) Bulk cargoes; coal, grain, ores etc. Their tendency to shift. The influence of stowage and distribution on stress and stability. Pulsing effects with ore concentrates. Moisture content limits for safe carriage. International regulations, standard, codes and recommendation on the carriage of dangerous cargoes including the IMO "Code of Safe Practice for Bulk Cargoes (BC Code)".
- (u) Petroleum cargoes; IMO requirements as from SOLAS and MARPOL. Tanker and OBO layout and equipment. Tanker operations including safety and pollution avoidance.
- (v) Chemical and liquefied gas cargoes; operational procedures, safety and anti-pollution requirements.

Paper 3 Commerce and Law (3-hour)

Function : Controlling the operation of the ship and care for persons on board at the management level

Competence (i) : Monitor and control compliance with legislative requirements and measures to ensure safety of life at sea and the protection of the marine environment

<p><i>Criteria : Procedures for monitoring operations and maintenance comply with legislative requirements. Planned renewal and extension of certificates ensures continued validity of surveyed items and equipment.</i></p>

- (a) Knowledge of international maritime law embodied in international agreements and conventions.
- (b) Certificates and other documents required to be carried on board ships by international conventions. Their period of validity and how they may be obtained and extended. The Master's responsibility concerning damage and repair to ship's structure or equipment.

- (c) Responsibilities under the relevant requirements of International Convention on Load Lines. Load line zones and seasonal areas; their significance in planning for cargoes and voyages. The requirements for load line surveys and inspections.
- (d) Responsibilities under the requirement of the International Convention for the Safety of Life at Sea. Safety Equipment, Safety Construction, Safety Radio.
- (e) Responsibilities under the International Convention for the Prevention of Pollution from Ships and surveys and their requirements. Methods and aids to prevent pollution of the marine environment by ships.
- (f) Maritime declarations of health and the requirements of the International Health Regulations.
- (g) Responsibilities under international instruments affecting the safety of the ship, passengers, crew and cargo.
- (h) An outline knowledge of the legislation implementing International Agreements and Conventions.
- (i) The Master's responsibility with regard to:
 - i. rendering assistance to vessels in distress.
 - ii. the reporting of tropical storms, ice, derelicts and other dangers to navigation.
 - iii. the reporting of marine casualties and pollution incidents.
- (j) Registration of ships; the certificate of registry and its legal significance.
- (k) The classification of ships; Classification Societies and the requirements for surveys.
- (l) An outline knowledge of the Tonnage Rules. Tonnage measurement, tonnage certificate.
- (m) Suez and Panama Canal Tonnage Certificates and their requirements.
- (n) Certification of officers and ratings. Manning and watch-keeping requirements.
- (o) The Law of Pilotage.
- (p) Port entry and clearance; documents required by Customs, Immigration, Port Health and other authorities. The functions of ship's agents.
- (q) Carriage of goods; delineation of responsibilities for the carriage of cargo. Cargo documentation. Relationship between owners, Master, shipper and charterer.
- (r) Charter parties; terms, conditions and responsibilities. Deviation, laydays, demurrage, and despatch.
- (s) Cargo insurance. Particular average, general average.

- (t) Functions of P&I Clubs. Statements of Facts. Noting protest, Notice of Readiness, Cargo surveys.
- (u) Hull insurance. Damage reports and surveys. Certificate of Seaworthiness. Port of Refuge.
- (v) Towing and salvage agreements.
- (w) Ship's accounts; disbursements and accounts of wages.
- (x) Crew; engagement and discharge. Victualling and accommodation rules and requirements. Injured and deceased seamen, action to be taken. Engagement of substitutes and repatriation.
- (y) Fumigation of ships and cargoes with reference to the IMO "Recommendations on the Safe use of Pesticides in Ships."
- (z) Official Log Book; entries to be made therein.

Competence (ii) : organize and manage the crew

Criteria : The crew are allocated duties and informed of expected standards of work and behaviour. Training objectives are activities are based on an assessment of current competence and capabilities and operational requirements.

- (aa) A knowledge of personnel management, organisation and training aboard ships. Knowledge of related international maritime conventions, recommendation and local legislation. Disciplinary procedures. Procedures for settling grievances.

Competence (iii) : Maintain safety and security of the ship's crew and passengers and the operational condition of life-saving, fire-fighting and other safety systems

Criteria : Procedures for monitoring fire detection and safety systems ensure that all alarms are detected promptly and acted upon in accordance with established emergency procedures.

- (ab) Actions to be taken to protect and safeguard all persons on board in emergencies.
- (ac) Actions to limit damage and save the ship following a fire, explosion, collision or grounding.
- (ad) The organisation of musters, training and drills for emergencies.
- (ae) Safety Committees, Safety Officers and Representatives. Reporting of accidents and dangerous occurrences.

Part C

Oral and Practical Examination - Seamanship and Safety

Function : Navigation at the management level

Competence (i) : Manoeuvre and handle a ship in all conditions

Content of Examination	Criteria for Satisfactory Examination
Manoeuvring and handling a ship in all conditions, including : 1 manoeuvres when approaching pilot stations and embarking or disembarking pilots with due regard to weather, tide, headreach and stopping distances 2 handling ship in rivers, estuaries and restricted waters, having regard to the effects of current, wind and restricted water on helm response 3 application of constant rate of turn techniques 4 manoeuvring in shallow water, including the reduction in under-keel clearance caused by squat, rolling and pitching 5 interaction between passing ships and between own ship and nearby banks (canal effect) 6 berthing and unberthing under various conditions of wind, tide and current with and without tugs 7 ship and tug interaction 8 use of propulsion and manoeuvring systems 9 choice of anchorage; anchoring with one or two anchors in limited anchorages and factors involved in determining the length of anchor cable to be used 10 dragging anchor, clearing fouled anchors 11 dry-docking, both with and without damage 12 management and handling of ships in heavy weather, including assisting a ship	All decisions concerning berthing, unberthing, anchoring and ship's manoeuvres are based on proper assessments of ship's manoeuvring, engine characterises and the forces and external factors to be expected.

<p>or aircraft in distress, towing operations; means of keeping an unmanageable ship out of trough of the sea, lessening drift and use of oil. Preparation for heavy weather.</p> <p>13 precautions in manoeuvring to launch rescue boats or survival craft in bad weather</p> <p>14 methods of taking on board survivors from rescue boats and survival craft</p> <p>15 ability to determine the manoeuvring and propulsion characteristics of common types of ships with special reference to stopping distances and turning circles at various draughts and speeds</p> <p>16 importance of navigating at reduced speed to avoid damage caused by own ship's bow wave and stern wave</p> <p>17 practical measures to be taken when navigating in or near ice or in conditions of ice accumulation on board</p> <p>18 use of, and manoeuvring in and near, traffic separation schemes and in vessel traffic service (VTS) areas</p>	
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Competence (ii) : Establish watchkeeping arrangements and procedures

Content of Examination	Criteria for Satisfactory Examination
<p>Collision avoidance; a thorough knowledge of the International Regulations and appropriate Annexes and their application. Knowledge of the IALA buoyage systems.</p> <p>Thorough knowledge of the content, application and intent of the Basic Principles to be observed in Keeping a Navigational watch.</p>	<p>Watchkeeping arrangement and procedures are established and maintained in compliance with international regulations and guidelines so as to ensure safety of navigation, protection of marine environment and safety of ship and persons on board.</p>

Competence (iii) : Respond to navigational emergencies

Content of Examination	Criteria for Satisfactory Examination
<p>Action in an emergency, including:</p> <p>1 When grounding is imminent and after grounding</p> <p>2 Beaching and floating a grounded ship with or without assistance</p>	<p>The type and scale of any problem is promptly identified and decisions and actions maximise the safety of persons on board and minimise the effects of any malfunction of the ships systems.</p>

<p>3 Collision is imminent and after collision or impairment of the watertight integrity of the hull by any cause</p> <p>4 Limiting damage and salving the ship following a fire, explosion, collision or grounding</p> <p>5 Protection and safeguard of all persons on board in emergencies</p> <p>6 Dealing with major leaks by emergency pumping, temporary plugging or intentional beaching</p> <p>7 Man overboard</p> <p>8 Recovering persons from the water</p> <p>9 Rescue from rescue boats, survival craft, wreck etc.</p> <p>10 Emergency use of anchors</p> <p>Assessment of damage control</p> <p>Emergency steering</p> <p>Emergency towing arrangement and towing procedures</p> <p>Abandon ship</p> <p>Rescue from an enclosed space</p> <p>Oil spillage</p> <p>Emergencies in port. The use of shore services and co-operation with shore personnel</p> <p>Helicopter operations, embarking and disembarking personnel</p> <p>Emergency communications</p>	
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9.5 Seagoing Class 1 Certificate

Oral / Practical Examination

The syllabus for this examination is the same as that for the oral/practical examination at **Part C** of the Class 2 examination. For Class 1, however, the candidate will be expected to answer in depth and from the perspective that would be expected of a candidate for command.