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CHAPTER 16 - FIRST MATE, LIMITED

PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 16.1 (1) Every applicant for a certificate as First Mate, Limited, for a ship not exceeding 60 tons gross tonnage, not carrying passengers shall:
- (a) complete one month service in the area for the requested certificate on a ship of not less than five tons gross tonnage;
 - (b) obtain a medical certificate prescribed by the Crewing Regulations;
 - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
 - (d) obtain
 - (i) a certificate of completion for Basic Safety (A1) of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655;
 - (ii) at a minimum, a certificate of completion for small vessel safety (A3) course where the ship is not more than 15 GT and it is engaged in minor waters or Home Trade, class IV voyages; or
 - (iii) a pass in a practical examination using the ship's equipment for marine emergencies, and questions relating to Basic Safety (A1) of the Marine Emergency Duties Courses, set out in TP 4957; and
 - (e) pass an examination as specified in 16.7.
- 16.2 Every applicant for a certificate as First Mate, Limited, for a ship not exceeding 60 tons gross tonnage, carrying passengers shall:
- (a) complete one month service in the area for the requested certificate on a ship of not less than five tons gross tonnage;
 - (b) obtain a medical certificate prescribed by the Crewing Regulations;
 - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
 - (d) obtain:
 - (i) a certificate of completion for Small Vessel Safety (A2) of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655; or
 - (ii) at a minimum, a certificate of completion for small vessel safety (A3) course where the ship is not more than 15 GT and it is engaged in minor waters or Home Trade, class IV voyages;
 - (e) obtain a Marine First Aid Basic Certificate, set out in TP 13008; and
 - (f) pass an examination as specified in 16.7

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- 16.3 Every applicant for a certificate as First Mate, Limited, for a pleasure yacht that exceeds 20 metres in length shall:
- (a) complete the service for a period determined by the examiner and performed on vessels with tonnage and voyage equivalent to the certificate sought, all of which may have been performed on pleasure yachts exceeding 20 metres in length;
 - (b) obtain a medical certificate prescribed by the Crewing Regulations;
 - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
 - (d) obtain certificates in approved courses, as determined by the examiner; and
 - (e) pass an examination as specified in 16.7.
- 16.4 Subject to subsection 16.6.1, every applicant for a certificate as First Mate, Limited, for a ship exceeding 60 tons gross tonnage, other than a certificate referred to in 16.3, 16.5 and 16.6, shall:
- (a) complete six months service on a ship of not less than 25 tons gross tonnage making voyages within the waters to which the certificate relates or on equivalent voyages;
 - (b) obtain a medical certificate prescribed by the Crewing Regulations;
 - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
 - (d) meet the requirements of paragraph 16.1 (d) or 16.2 (d), according to whether or not passengers are carried;
 - (e) where the ship has multiple enclosed decks or boat or liferaft launching equipment, obtain a certificate of completion for each of the following courses of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655:
 - (i) Survival Craft (B1);
 - (ii) Marine Fire Fighting (B2); and
 - (iii) for Officers (C);
 - (f) where the ship carries electronic navigation equipment, obtain a certificate of completion for a Simulated Electronic Navigation Course Level I, set out in TP 4958, from a school listed in TP 10655;
 - (g) after fulfilling the requirement of (f), pass a practical examination in Simulated Electronic Navigation Level I;
 - (h) obtain a Marine First Aid Basic Certificate, set out in TP 13008 if the ship carries passengers; and
 - (i) pass an examination as specified in 16.7.
- 16.5 Every applicant for a certificate as First Mate, Limited, Short-Run Ferry Ship, shall:
- (a) complete one month service in the waters to which the certificate relates or on equivalent voyages;
 - (b) obtain a medical certificate prescribed by the Crewing Regulations;


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- (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
- (d) obtain
 - (i) a certificate of completion for Small Vessel Safety (A2) course of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655;
 - (ii) at a minimum, a certificate of completion for small vessel safety (A3) course where the ship is not more than 15 GT and it is engaged in minor waters or Home Trade, class IV voyages; or
 - (iii) a pass in a practical examination using the ship's emergency equipment for the following subjects in the Marine Emergency Duties Courses:
 - (A) Small Vessel Safety (A2);
 - (B) Survival Craft (B1);
 - (C) Marine Fire Fighting (B2); and
 - (D) for Officers (C);
- (e) obtain a Marine First Aid Basic Certificate, set out in TP 13008 if the ship carries passengers; and
- (f) pass an examination as specified in 16.7.

16.6 Every applicant for a certificate as First Mate, Limited, Intermediate-Run Ferry Ship, shall:

- (a) complete 24 months service on board a ferry ship on intermediate runs within minor waters or within harbours, ports, bays inlets or sheltered coastal waters to which the certificate relates or on equivalent voyages;
- (b) obtain a medical certificate prescribed by the Crewing Regulations;
- (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
- (d) obtain a certificate of completion for the following courses of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655:
 - (i) Small Vessel Safety (A2)
 - (ii) Survival Craft; (B1)
 - (iii) Marine Fire Fighting (B2);
 - (iv) for Officers (C); and
 - (v) for Senior Officers (D);
- (e) obtain a certificate of completion for a Simulated Electronic Navigation Course Level I, set out in TP 4958, from a school listed in TP 10655;
- (f) after fulfilling the requirements of (e), pass a practical examination in Simulated Electronic Navigation Level I;
- (g) obtain a Marine First Aid Basic certificate, set out in TP 13008 if the ship carries passengers; and
- (h) pass an examination as specified in 16.7.

16.6.1 In lieu of the requirements of Section 16.4(e), every applicant for a first mate, limited certificate for a passenger ship of more than 60 tons that is not a short-run or intermediate-run ferry and is used for a seasonal operation between March 31 and December 1 in any year in minor waters within five nautical miles of shore shall provide the examiner with a certificate of the applicant's successful completion, at a recognized institution, of a course in marine emergency duties with respect to small vessel safety (A2), survival craft (B1) and marine fire fighting (B2), or a TC approved equivalent.

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PART II - EXAMINATIONS

- 16.7 The examination is based on as much of the syllabus, as determined by the examiner and deemed appropriate to the area of operation, type of craft and equipment carried on board ship, for which the certificate is to be valid.
- Note: The examination is oral and practical and it includes written papers.

PART III - VALIDITY OF CERTIFICATE

- 16.8 The certificate is valid for a period of five years beginning on the date on which it is issued and only
- (a) within the voyage area specified on the certificate;
 - (b) on the ship or ships specified on the certificate; and
 - (c) where the ship is not a pleasure craft and is engaged on
 - (i) a voyage that does not go beyond the minor waters of Canada,
 - (ii) a voyage within a harbour, port, inlet or similar sheltered waters off the coast of Canada, or
 - (iii) in the case of a ship of not more than 60 tons, a limited voyage off the coast of Canada.

PART IV - SYLLABUSES OF EXAMINATIONS

- 16.9 (1) The questions used in the examination may be taken from the following tables.
- (2) Sections 16.10, 16.11, 16.12, 16.13 and 16.15 are considered an appropriate guide to examination for certificates as Mate, Limited, set out in sections 16.1, 16.2, 16.3 and 16.4.
 - (3) Sections 16.14, 16.15, 16.16 and 16.17 are considered an appropriate guide to examination for a certificate as Mate, Limited, Short-Run Ferry, set out in section 16.5.
 - (4) Sections 16.18, 16.19, 16.20 are considered an appropriate guide to examination for a certificate as Mate, Limited, Intermediate-Run Ferry, set out in section 16.6.
 - (5) Section 16.21 sets out the Simulated Electronic Navigation Course for the certificates of Mate, Limited, Ship Exceeding 60 Tons Gross Tonnage, and Mate, Limited, Intermediate-Run Ferry.

16.10 Ship Management
Examination number 091
Companion to Section 15.19

ITEM	COLUMN
1.	Industrial Safety Tackle Regulations, inspection and testing of gear and machinery and the maintenance of the machinery register; Safe Working Practices Regulations, emphasizing the recognition and correction of unsafe practices; precautions for vessels under fumigation; <i>Canada LabourCode</i> for Industrial Safety; Oil Pollution Prevention Regulations, MARPOL extended to include interpretations, and ship's responsibilities under them
2.	Stress on Tackle Calculation of stresses in the various parts of single boom and union rig; methods of testing.
3.	Ship Management Organization of crew for emergencies, drills, routine operations and maintenance; ship's responsibilities under Boat and Fire Drill Regulations, Ship Manning Regulations; <i>Canada Shipping Act</i> and regulations, grades and classes of certificates of competency, rights of holders of certificates, offences relating to certificates, loss and replacement of certificates, seafarers' rights concerning wages.
4.	Records Official and ship's logbooks, and entries under all conditions.

Note: An open-book examination.
The examination consists of a multiple-choice test, calculations and descriptive questions.

16.11 Ship Construction and Cargo
Examination number 122
Companion to section 12.5

ITEM	COLUMN
1.	Ship Stresses Stresses to which a ship is subject, structural strengthening to compensate for them, and where to anticipate structural failure.
2.	Reports Compile reports of defects and damage sustained by ship.
3.	Repairs and Tests Superintend minor repairs and tests of tanks and other watertight work; emergency repairs to maintain watertightness; maintenance of watertightness and fire integrity on ferries and ro-ro vessels.
4.	Construction Midship section and the basic construction of the principal ship types; bilge and ballast pumping arrangements; welding and riveting, their advantages and shortcomings; construction and members of bow and stern sections, rudders and steering gear, propeller shafts, stern tubes, thrust units, deck hatches, and side, bow and stern doors; read and interpret ships' plans; construction of masts, sampson posts, derricks, cranes and conveyors.
5.	Inspections Preparation of vessels for statutory surveys and inspections; classification societies, purposes and advantages of classification; dry-docking and dry-dock procedure.
6.	Regulations Use of Load Line Regulations; IMO Dangerous Goods Code, and Deck Cargo Safety Code.
7.	Cargo Practices in loading, carrying and discharging cargo with reference to general cargo, bulk carriers, ro-ro vessels, oil tankers, self-unloading and package freighters; ventilation and ventilation systems; preparation and care of refrigeration systems; preparation and use of cargo plans; stowage of cargo, with respect to damage, ease of discharge, space occupied, contamination and ventilation; palletization; responsibilities of cargo officer.

Note: Regulations and necessary data will be provided.
The examination consists of a section of descriptive, calculation and simple drawing exercises and a section of multiple-choice questions.

16.12 Stability

Examination number 112

Companion to Section 12.6 and 15.20

ITEM	COLUMN
1.	Ship's Draft Draft, including effect of water density and fresh water allowance; use of displacement and ton per inch/tonne per centimetre (TPI/TPC) scales to determine displacement from draft and vice versa; statutory freeboard and loadlines; general loadline rules and loadline rules for lakes and rivers.
2.	Terms Meaning of block coefficient, displacement and deadweight; buoyancy, centre of buoyancy (B) and its movement, reserve buoyancy; centre of gravity (G), including the effect of adding, removing and transferring weights; righting lever (GZ) when the vessel is heeled, metacentre (M), metacentric height (GM) as an indication of initial stability, danger of slack tanks; centre of flotation (F) and trim and existence of trimming moment created by G longitudinal (GL) and B longitudinal (BL).
3.	Stability Data Use of stability data supplied to typical bulk-oil and oil-and-ore carriers, general cargo vessels and package freighters to perform these operations: allowing for effect of water density on draft and displacement, interpreting curves of statical stability, achieving satisfactory transverse stability, achieving desired trim, loading and discharging problems, list created during loading or discharging, counteracting trim and list together, allowing for free surface effect of tanks, change of stability during voyage.
4.	Mensuration Areas and volumes of common figures, squares, rectangles, triangles, cubes, cones, wedges, cylinders, spheres; centre of gravity of common areas and volume.


Note: The examination consists of a multiple-choice questions and practical calculations based on ships' stability data booklets.
Duration is three hours.

16.13 General Seamanship

Examination number 162

Companion to section 12.10

ITEM	COLUMN
1.	Deck Machinery Practical use and care in the use of: electric, hydraulic and steam winches, ordinary and self-tensioning windlasses and capstans, main and emergency steering gears, electric control and telemotor systems, electric derrick-topping lift winches; electric and hydraulic deck cranes; elevators and hatch-opening systems; telegraphs.
2.	Ship Handling Conning ship; manoeuvring single and twin-screw ships in open and narrow waters with or without wind, tide or current; preparations for getting underway and proceeding to sea; making harbour and entering a dock, lock or canal in any type of vessel; passing another vessel closely in any circumstances; coming alongside or securing to a buoy with or without wind, tide or current, and the use of an anchor under similar conditions; turning short round twin-screw and single-screw vessels, with or without the use of an anchor; letting go bow or stern anchors in emergencies in shallow or deep water; the use of an anchor buoy; towing and being towed in ships of all types; search and rescue procedures by reference to MERSAR, CANMERSAR, and Transport Canada publications (TP).

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3.	<p>Anchor and Mooring</p> <p>Manoeuvring and cable-handling involved in the use of ground tackle and ancillary equipment including: the use of anchor buoys, anchoring to two anchors and handling two cables simultaneously, mooring by running, ordinary, standing or dropping moors, clearing a foul anchor, clearing a foul hawser (cross, elbow or round turn), hanging off an anchor, mooring to a buoy with anchor cable, weighing anchor with and without a windlass, housing a tripped anchor snubbing round, forming a lee while at anchor, securing anchor gear in preparation for sea passage, use of ground tackle when aground, use of anchors in emergency to take way off, anchor and cable stowage, fittings and cable markings.</p>
4.	<p>Mooring Lines</p> <p>Use, care and stowage of mooring lines, types of line used for mooring and their characteristics; names of the various mooring lines and orders; making fast on-shore bollards being used by another ship; use of moorings on the bight and doubling up; use, handling and securing of towing wires; use, handling and securing of insurance wires; the use of lines in securing a vessel and in warping alongside a berth, lock or along a lay-by; use of mooring wire rope reels; types of fairlead, their construction, naming and use; use of rat-guards.</p>
5.	<p>Working General Cargo</p> <p>Practical working of general cargo, mate's responsibilities when preparing the ship for work, and working general and dry bulk cargo; inspections of holds before loading; testing suction and drainage arrangements before loading; inspection of refrigerated compartments before loading; derrick riggings, types and uses for loading and/or discharging; arrangements and working of heavy lifts by ship or shore equipment, and lifts that cannot be handled by a single runner; overhaul and regular inspections of cargo-handling gear.</p>
6.	<p>Working Liquid Cargo</p> <p>Working of liquid bulk cargoes, mate's duties and responsibilities when preparing the ship for working, and when working liquid bulk cargoes; inspections and testing of tanks, valves and lines before loading, discharging or transferring liquid bulk cargoes; handling cargo hoses at shore-side or sea-line terminals; cleaning and gas-freeing tanks and lines (Butterworth and Sellers equipment); use of explosimeters; purpose and operation of pressure vacuum valves and flame traps; pressure-testing of lines, valves and heating coils; methods of and need for grounding/earthing the vessel; precautions for manifold quick-release, securing fire wires for emergency tow-off.</p>
7.	<p>Ship Routines and Organization</p> <p>Practical knowledge of shipboard routine and organization, mate's executive and organizational duties when relating to officers and the various crew members, crew watches and the direction of the crew on day work; drawing up emergency muster lists with appropriate duties for crew members; organizational duties for working of cargo, fuelling, storing or ballasting in all conditions; cleaning and maintaining the ship and its gear; mate's duties concerning the official log-book, entries in the deck log and owners' or charterers' records, duties in dry-dock or when repairs, alterations or maintenance work is being carried out; duties when preparing the vessels for sea; duties and responsibilities on joining a vessel; necessary paperwork or documentation to encompass the foregoing items where applicable.</p>
8.	<p>Emergency Duties</p> <p>Emergency duties and responsibilities for equipment, organization, frequency and routing of fire patrols under routine and exceptional conditions at sea and in port; recognition and assessment of fire hazards; organization of realistic fire drills, training of crew in use of firefighting equipment; taking charge of firefighting operations at sea and in port; inspections, testing and maintenance of portable and fixed firefighting equipment; organization of realistic boat and life-saving appliance drills, training of crew in use of life-saving appliances; stowage, inspections, testing and maintenance of lifeboats, rigid and inflatable liferafts and their equipment, lifejackets, lifebuoys, self-igniting lights and distress signals; taking charge of the launching of boats and rafts; assessing damage and flooding in cases of collision or stranding.</p>
9.	<p>Certificates</p> <p>Practical knowledge of the rights and privileges of the various certificates of competency and documentation required on board ship and issued by Transport Canada.</p>
10.	<p>For First Mate, Intermediate Voyage, Applicants Only</p> <p>Correctly make the three basic adjustments to a sextant using heavenly body or the horizon, and know the principles of position fixing by means of vertical and horizontal angles.</p>

Note: The examination is oral.
Duration as necessary.

16.14 Navigation Instruments

Examination number 020

Companion to Sections 15.16, 20.6 and 21.5

ITEM	COLUMN
1.	<p>Radar</p> <p>Use of all radar operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; recognition and correction of maladjustments of controls; periodic operator checks and determination of heading marker, bearing marker, range ring and range marker error; obtaining ranges and bearings from equipment using proper reporting procedures and recognition of targets of all types; recognition of meteorological phenomena and false, multiple, and second-trace echoes and side lobes and interference; knowledge of the limitations of radar, sufficient to ensure safe navigation; correcting range and bearing data for known errors; use of radar data (i.e. position fixing, following a track, matching radar image to chart, radar plotting restricted to ability to determine CPA and time); use of reflection plotter, radar horizon and extreme-range charts and tables, operator's manual and radar logbook.</p>
2.	<p>Decca</p> <p>Use of all Decca operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; periodic operator checks and determination of errors in the fraction, lane, and zone indicators, and in the LI lamp sequence meter; obtaining readings from equipment; limitations of Decca sufficient to ensure safe navigation; correcting readings for fixed and variable errors; use of Decca data for position fixing, use of Decca over-printed charts, minimizing effect of variable errors; use of Decca data sheets and operator's manual.</p>
3.	<p>Loran</p> <p>Use of all Loran operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; recognition and correction of maladjustment of controls; periodic operator checks and knowledge of compensation for measurement and instrument errors; obtaining readings from equipment; recognition of unwanted data, blinking and sky-waves; limitations of Loran, sufficient to ensure safe navigation; use of Loran data for position fixing, use of Loran over-printed charts, minimizing effect of variable errors; use of operator's manual.</p>
4.	<p>Echo-Sounding Machine</p> <p>Use of echo-sounder controls and interpretation of display.</p>

Note: The examination is a practical test.
Duration as necessary.

16.15 Chartwork and Pilotage

Examination number 040

Companion to Sections 15.17 and 21.6

ITEM	COLUMN
1.	<p>Charts</p> <p>The chart, its nature and function as an aid to navigation; practical effects of projection distortion, numbering and the presentation of information, factors affecting reliability of charts; ability to use Mercator and polyconic charts; chart symbols and abbreviations as published in <i>Canadian Hydrographic Service Chart No. 1</i>.</p>
2.	<p>Publications</p> <p>Light characteristics and colours and sound signals used as aids to navigation, List of Lights, Buoys and Fog Signals; Canadian Buoyage System and its use; use and purpose of Canadian Notices to Shipping and Mariners, and chart corrections.</p>
3.	<p>Chartwork</p> <p>Locating a vessel's position on the chart by simultaneous true bearings and/or true bearing and distance; locating a vessel's position by two or more simultaneous distances.</p> <p>Determining the latitude and longitude of a given position; locating a position by its latitude and longitude, and its true bearing and distance from a given point.</p> <p>Laying off a course between given positions; measuring the true direction of a course layed off on the chart; measuring distance on the chart.</p> <p>Finding the DR position, given course, speed and time elapsed from the last observed position by plotting on a chart or by other acceptable method of the applicant's choice.</p> <p>Demonstrate an appreciation that current and/or wind may affect the vessel's course and speed over the ground; determine speed over the ground between observed positions; determine the true course made good between observed positions.</p>
4.	<p>Records and Errors</p> <p>Appreciation of the need to keep an accurate record of the vessel's progress, and the keeping of this record; care of dividers and parallel rulers. Periodic operator checks and determination of compass error by comparison with true terrestrial bearings, or headings, and determining and recording compass deviation; use of the magnetic compass to determine accuracy of the gyro compass by comparison; correcting courses and bearings for compass error, magnetic variation and deviation; use of table of deviations.</p>

Note: The examination is oral and includes a practical chart paper.
Duration as necessary

16.16 Navigation Safety

Examination number 060

Companion to Section 15.18

ITEM	COLUMN
1.	<p>General Knowledge</p> <p>Knowledge of the content of the following regulations and International Maritime Organisation (IMO) documents: Collision Regulations with Canadian Modifications 1983; Operational Guidance For Officers in Charge of a Navigational Watch, STCW Code section A-VIII/2.</p>

Note: The examination is a multiple-choice test. The applicant has the option of taking the examination in either written or oral format.
Duration as necessary.


16.17 General Seamanship

Examination number 160

Companion to Sections 14.8 and 15.15

ITEM	COLUMN
1.	<p>Ship-Handling, Routine</p> <p>Fixed- or controlled-pitch propeller or propellers, transverse thrust, turning ahead or astern; vessel's pivoting point when manoeuvring with headway and with sternway; head reach and stern reach; effect of cavitation and wake current; rudder force and manoeuvring of twin screws; sail effect of vessel superstructure; berthing, unberthing and use of the water wedge in ship handling; locking and unlocking a vessel; anchoring to a single-bower anchor; anchoring to a stern anchor, mooring to two anchors; mooring to a buoy; turning a vessel short round; bank suction and cushion effect in narrow channels; the effect of shallow water resistance on ship's behaviour; use of mooring lines and ground tackle in all circumstances; the use of tugs in manoeuvring.</p>
2.	<p>Ship-Handling, Exceptional</p> <p>Practical handling and managing a ship in exceptional circumstances, loss of or damage to rudder and the use of auxiliary means of steering; steering by screws; rigging jury rudder or jury steering gear; damage control in case of collision, grounding, fire, explosion or other accident; procedure when grounded and methods of refloating; procedure when beaching a vessel; procedure in case of wreck with emphasis on preservation of life, methods of abandoning a wrecked vessel; steps to be taken when disabled and in distress; taking and being taken in tow; rescuing crew of a disabled vessel or person in the water; manoeuvring in bad weather, heaving to and running before a sea; dangers of being pooped; keeping head to sea; the use of oil in bad weather and rescue operations; keeping a disabled vessel out of trough and lessening lee drift.</p>
3.	<p>Ship-Handling, Unusual</p> <p>Practical handling and manoeuvring a ship in unusual circumstances, retrieval of man overboard; procedures in ice, alone or in convoy, and movements to be expected by an ice breaker with reference to Transport Canada publication <i>Ice Navigation in Canadian Waters</i>; search and rescue procedures, including the responsibilities of the on-scene commander, with reference to MERSAR, CANMERSAR and Transport Canada publications; precautions to be taken in bad weather.</p>
4.	<p>Dry-Docking</p> <p>Procedures and precautions observed when dry-docking, effect of distribution of weight, dry-docking with a full cargo, use of bilge blocks; dry-dock inspections and precautions to be observed in dry-dock; procedure to be followed prior to and during refloating.</p>
5.	<p>Duties and Responsibilities of the Master:</p> <p>On first joining a vessel; official documents on board a vessel; issuance and understanding of standing, general, night and special orders; berthing and unberthing under all conditions; manoeuvring a vessel and assessing risks involved; underway, in port or at anchor under all circumstances and conditions; shipboard, local and general emergencies of any nature; verifying information on the ship's manoeuvring characteristics, determining approximate manoeuvring data and recording the ship's manoeuvring peculiarities; setting and manning the watches according to regulation and during exceptional circumstances; organizing the crew and other persons for routine operation and emergencies of all kinds; maintaining equipment in good condition.</p>
6.	<p>Basics of Naval Architecture</p> <p>Volumes of ship shapes; centres of gravity (G) and buoyancy; couples; righting moment and righting arm; inertia; equilibrium; freeboard; movement of G, real and virtual; free surface effects; metacentre and metacentric height; list, loll and increase in draft due to each; factors affecting static stability; damage stability; effect of beam and freeboard on stability; dry-docking and grounding; dynamical stability.</p>
7.	<p>Regulations</p> <p>Collision Regulations with Canadian Modifications 1983; Code of Nautical Procedures and Practices; Canadian Buoyage System.</p>


Note: The examination is oral and practical.
Duration as necessary.

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16.18 Chartwork and Pilotage
Examination number 041

Companion to Sections 13.10, 19.7 and 20.7

ITEM	COLUMN
1.	Pilotage Preparations for pilotage; using available charts and publications; possession and ready for immediate use all necessary charts, including large-scale charts of the pilotage area duly corrected to date, latest sailing directions, <i>Notices to Mariners</i> , Light Lists, Traffic Zone Regulations (as applicable), tide tables, copy of Charts and Publications Regulations, Code of Navigation Procedures and Practices, and <i>Radio Aids to Marine Navigation</i> .
2.	Steering Common steering procedures, their purpose and how to put them into effect; the importance of establishing and adhering to internationally-accepted procedures in issuing helm and steering orders and having them acknowledged and complied with; the instruction of helmsmen in this matter.
3.	Symbols The chart symbols and abbreviations as published in <i>Canadian Hydrographic Service(CHS) Chart No. 1</i> .
4.	Sailing Directions The contents of preface to <i>Sailing Directions</i> , the important general navigational information contained in the preamble and opening chapter of these volumes.
5.	Lists of Lights Light characteristics, colours and sound signals used as aids to navigation; use of Lists of Lights, Buoys and Fog Signals; terms used to define the power of lights (e.g., geographical range, luminous range, charted range computed range, nominal range, computed visibility); use of a luminous-range diagram; the effect of abnormal-refraction fog signals of different types, anomalies of sound propagation in fog, notices regarding lights lighthouses and buoys etc. published in <i>Notices to Mariners</i> .
6.	Tidal Currents Find the set and rate of tidal current that may be expected at a given point from information given in tide and current tables or on the chart; ability to use tables and information on the chart of the locality with awareness of the possibly significant effect of weather on the reliability of the information so obtained.
7.	Navigation in Confined Waters Navigation in confined waters: altering course; transits; leading marks and bearings; recording the vessel's progress; making allowance for height of tide; preparatory details to be attended to paid to entering confined waters (e.g., a review of the relevant sections of the sailing directions, ready availability of large-scale charts of the area with proposed track drawn indicating distances, courses and near dangers noted); navigational aids with their characteristics to be identified, clearing lines, marks and bearings to be used during the passage to be drawn in, precalculation of tidal heights where critical depths of water may be encountered; the maintenance of a record of the vessel's progress on both charts in logbook, including times of passing successive points, course's compass error, speed, weather; fixing the vessel's position by relative and true bearings, transits; dead reckoning position, estimated position and observed position.
8.	Navigational Aids Navigational aids in pilotage situations; the necessity of continuing the customary checks and counts of the vessel's safe progress by the Officer of the Watch (OOW) and ship's personnel with record of the details of duties performed, notwithstanding that the vessel was under the conduct of a pilot; the duty of the OOW to ensure that the pilot's advice is understood and effectively carried out, the extent to which reliance is placed on buoys.
9.	Canadian System Canadian System of Buoyage in detail; differences between lateral and cardinal systems; use of <i>Sailing Directions</i> for determining other buoyage systems in use; current and new Canadian buoyage system with an understanding of the basic principles employed in the lateral and the cardinal buoyage systems, the importance of consulting the applicable volume of <i>Sailing Direction</i> for details of buoyage system in force locally prior to entering unfamiliar waters of other countries; Aids to Navigation.

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10.	<p>Bridge Practices</p> <p>Bridge practices and procedures in pilotage situations charts, various projections in common use; the requirement to continue the practice of good navigation procedures by the OOW and ship's personnel and the realization that the presence of a pilot on the bridge does not absolve the ship's personnel from their continuing responsibility for the safe navigation of the ship; the principle employed in construction charts on the Mercator, polyconic, and gnomonic projections, the limitations associated with each of these projections and the purposes of each in practical navigation.</p>
11.	<p>Charts</p> <p>Significant distortion, numbering and the presentation of information; the cause of chart distortion, need for nautical charts on board ship; the replacement of superseded editions; the mode of presentation of information on charts; metrication; chart catalogues and numbering.</p>
12.	<p>Chart Usage</p> <p>Use charts produced by the major projections in common use by the Canadian Hydrographic Service, including gnomonic charts; the use of charts in the practice of coastal navigation and on ocean passages; the plotting of bearings, position lines clearing lines, etc.; the transfer of positions from a chart of one projection to another of a different projection; the use of a gnomonic projection chart, and Mercator and polyconic charts.</p>
13.	<p>Fixing Position</p> <p>Fixing the ship's position by means at the disposal of the OOW, including electronic navigational aids; considerations to be taken into account, including errors and limitations of equipment; the correction and plotting of bearings taken visually, by radar or direction finder (DF) and the limitations of accuracy inherent in each of these methods; the ship's position, established by bearings or ranges taken simultaneously or with an interval and run intervening.</p>
14.	<p>Estimating Position</p> <p>Estimating the vessel's position, including allowing for effects of wind and/or tide; the reliability of the value in direction and force of wind, current and tidal effect used in arriving at the ship's DR position and the resulting area of doubt.</p>
15.	<p>Laying Off Courses</p> <p>Laying off courses, including allowance for effects of wind and tide; the problem of combining vectors of wind, current, tidal effect and course to steer to arrive at course made good; scrutiny of chart for off-lying dangers.</p>
16.	<p>Conversion of Course</p> <p>Conversion of true courses laid off to magnetic courses, including determination of variation at any place; conversion of true courses to gyro, magnetic and compass courses and vice versa; determining the up-to-date value of variation and interpolating for variation at a given locality from isogonic lines or compass roses; use of transit lines, azimuth and amplitude to determine compass error.</p>
17.	<p>Distance Measurement</p> <p>Distance measurement and the determination of speed made good and speed through the water; the measurement of distance on a Mercator or polyconic chart; the factors contributing to speed made good and speed through the water, how the difference between the two is expressed.</p>
18.	<p>Range of Visibility</p> <p>Factors controlling the range of visibility; terms associated with visibility of lights on navigational aids.</p>
19.	<p>Reliability of Charts</p> <p>Reliability of charts; indications by which reliability may be judged (e.g., date of original survey and possibility of subsequent surveys, adequacy of recorded soundings, with corrections having been made to date); large-scale charts show a small area in greater detail than small-scale charts; care and upkeep of charts.</p>
20.	<p>Publications</p> <p>Use of publications at the disposal of the coastal navigator, including <i>Notices to Mariners</i> for the correction of charts and publications; the various publications available to the navigator and the nature of their contents; the importance of chart corrections being kept up-to-date.</p>
21.	<p>Tidal Terms</p> <p>The meaning of tidal terms in common use in CHS and United States tide tables; general understanding of tidal phenomena necessary for the comprehension of tidal terms; tidal atlases.</p>

22.	Calculation of Tides Calculation of tides and heights of high and low water at reference and secondary ports and the calculation of depth of water at those times; use of the calculated depth of water at high and low water to determine the height of water at a given charted position.
23.	Set and Rate of Tides Estimation of set and rate of tidal currents by reference to tidal current tables and by actual observation; the tentative nature of tabulated tidal current values and the need for caution in using them; the care required in making tidal current observations and the associated details that must be recorded.
24.	Records The need for keeping an accurate record of the vessel's progress and the keeping of such a record; the duty of the OOW to maintain an accurate, detailed and continuous record of the vessel's progress from which a position may be readily determined at any time; the value of such a record being available as a measure of safe navigation and in the event of an emergency requiring immediate knowledge of the ship's position.

Note: The examination consists of:
(a) a practical chartwork paper, and
(b) a multiple-choice examination.
Duration is 3 hours.

16.19 Navigation Safety

Examination 061

Companion to Sections 13.12, 18.7, 19.8, 20.8 and 21.7

ITEM	COLUMN
1.	Navigation Safety Application of the content of Collision Regulations with Canadian Modifications 1983; STCW Code section A-VIII/2.

Note: The examination is a multiple-choice test, supplemented by oral questions as necessary.
Duration is one and a half hours.

16.20 General Seamanship

Examination number 161

Companion to section 13.14

ITEM	COLUMN
1.	Rigging Practical knowledge of the rigging of ships, comprising the names, purpose, and construction of standing and running rigging; reeving of blocks and purchases, rigging of stages and chairs; rigging of booms for single-boom and union-working; names, purposes and construction of the various parts of a boom; positioning and construction of guys and preventers; stresses on the various parts of a boom system during operation.
2.	Knots and Splicing Basic knotting, gripping and splicing with reference to current practice, seizings, rackings, frappings, and stoppers.
3.	Bridge Procedures Bridge discipline, organization and routine under all circumstances; steering orders and responses; maintenance of a proper lookout; fire drills, lifeboat drills and crew training.
4.	Duties at Sea Duties and responsibilities of the master, officer of the watch, pilot and other bridge personnel (jointly and separately); purpose, necessity and general content of standing orders, night orders, bridge or movement book, ship's logbook and similar material; anchor watch duties, responsibilities, and action to be taken when dragging anchor; ascertaining dragging anchor; arrangement and responsibilities of departments aboard ship; action and manoeuvres required of the officer of the watch in emergencies at sea, man overboard, Williamson and elliptical turns, running aground, collision, discovery of fire, sighting of derelicts, sighting or receiving distress signals; breakdown of aids or equipment, power failure, capsize of tugs when under tow or manoeuvring.
5.	Duties in Port Duties and responsibilities of the officer of the watch in port, tending of lines and gangways, routine and exceptional fire patrols and inspections, action on discovery of fire aboard or ashore, fire alarms ashore, precautions when taking on or transferring fuel, water or stores, protection of crew members and stevedores, action to be taken in event of excessive ranging, parted moorings, burst oil lines, tank overflows, striking by another vessel, collapse of crew member in tank or other confined space, accidents to any person on board, ship taking bottom.
6.	Anchors Anchors and associated equipment, construction and names of the parts of stocked and stockless anchors; chain cable and shackles; chain-cable markings and reporting; cable stowage; fittings between cable locker and hawse pipe; common terms used in anchor work; terms associated with lead of cable; anchoring in shallow or deep water; anchoring in an emergency; heaving up and securing cable; terms pertaining to vessel at anchor.
7.	Mooring Mooring and mooring lines comprising the names of various mooring lines, their purpose and terms used in handling and working them.
8.	Joining Ship Responsibilities on joining a ship.
9.	Ship Handling General manoeuvring characteristics of merchant vessels of all types; terms, including turning circle, advance, transfer, drift angle and tactical diameter; effect of propellers on steering; effect of trim, draft, list and squat on manoeuvrability; effect of current, wind, shallows, bank suction and bank cushion reactions in restricted waters; propeller and rudder effects on steering, including wake current, transverse thrust and screw race when going ahead and astern; behaviour of the ship when engines are put astern, the pivoting point.
10.	Signals Recognition and knowledge of the lifesaving signals contained in the International Code of Signals.

11.	Reports Simple oral ship damage reports.
12.	Meteorological Reports Read and record the instruments supplied by the Meteorological Service, aneroid barometer graduated in inches or millibars, barograph, thermometer graduated in degrees Celsius or Fahrenheit, psychrometer (Stevenson screen); obtain relative humidity and dew point temperature from psychrometer.
13.	Rules Collision Regulations with Canadian Modifications 1983; recommended Code of Nautical Procedures and Practices; ship's documentation, inspection certificates, loadline certificates, manning certificates, tackle book, oil book, station bill, crew list, ship's log; rights and privileges of the various certificates of competency issued by Transport Canada.
14.	Sextant (Watchkeeping Mate, Ship, only) Principles of position fixing by means of a sextant using vertical and horizontal angles.

Note: The examination consists of an oral and practical test.
Items 1 and 2 and questions relating to lifesaving, firefighting and rescue may be omitted if applicant holds an Able Seaman's Certificate or MED B1 and B2 certificates.
Duration as necessary.

16.21 Navigation Instruments

Examination number SIM 1

Companion to Sections 13.9, 15.21 and 19.6

ITEM	COLUMN
1.	The syllabus for the examination is presented in TP 4958, Simulated Electronic Navigation Courses.

Note: The examination consists of a check list approved by instructor after a practical and oral test at an approved school; a multiple-choice examination conducted by an approved school and subject to scrutiny and monitoring by Transport Canada; and an examination conducted by Marine Safety with simulated exercises.
Duration is three and a half hours.