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CHAPTER 14 - MASTER, SHIP OF NOT MORE THAN 350 TONS GROSS TONNAGE, OR TUG, LOCAL VOYAGE

PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 14.1 (1) Every applicant for a certificate as Master, Ship of Not More than 350 Tons Gross Tonnage, or Tug, Local Voyage, shall:
- (a) complete a minimum of 12 months service after obtaining a certificate as Watchkeeping Mate, Ship, or Restricted Watchkeeping Mate, Ship, as officer in charge of the watch on vessels of at least five tons gross tonnage making local or minor waters voyages beyond smooth or partially smooth waters;
 - (b) obtain a Restricted Operator Certificate with Maritime Commercial Qualifications (ROC-MC) issued by Industry Canada;
 - (c) obtain a medical certificate prescribed by the Crewing Regulations;
 - (d) obtain a certificate of completion for each of the following courses from a school or organization listed in TP 10655:
 - (i) Marine Emergency Duties Course, Senior Officer (D), set out in TP 4957;
 - (ii) Simulated Electronic Navigation Level II, set out in TP 4958; and
 - (iii) Marine First Aid Advanced Certificate, set out in TP 13008;
 - (e) pass written examinations in each of the following subjects:
 - (i) Meteorology;
 - (ii) Ship Management; and
 - (iii) Ship Stability;
 - (f) pass a practical examination in Simulated Electronic Navigation Level II; and
 - (g) pass an oral examination in General Seamanship.
- (2) Except as provided in subsection (3), an applicant for oral examination 160 shall have completed a total sea service of at least three years in vessels of not less than five tons gross tonnage, including not less than 12 month as officer in charge of the watch while holding at least a Restricted Watchkeeping Mate, Ship, Certificate.
- (3) Graduates of co-operative training schemes who qualify to be examined for First Mate, Intermediate Voyage, Certificate will also qualify for examination for the Master, Ship of Not More Than 350 Tons Gross Tonnage, or Tug, Local Voyage certificate.

PART II - EXAMINATIONS

14.2 The following table lists the examinations for the Command Certificate, qualifying service necessary before each may be attempted; and other requirements.

Examination	Qualifying Service	Other Requirements
SIM 2 Chartwork and Pilotage	Nil	Must have passed SIM 1
073 Meteorology	Nil	Must hold WKMSR certificate
090 Ship Management	Nil	Must hold WKMSR certificate
110 Ship Stability	Nil	Must hold WKMSR certificate
160 General Seamanship	Total of three years sea service.	All other exams must have been passed before attempting 160.

Note: 092 may be substituted for 090 and 113 may be substituted for 110 at the applicant's request.

14.3 Credits for other certificates of competency held will be awarded in accordance with the table in Appendix F.

PART III - VALIDITY OF CERTIFICATE

14.4 A certificate as Master, Ship Not More Than 350 Tons, Gross Tonnage or Tug, Local Voyage is valid as master of a vessel not exceeding 350 tons gross tonnage, or a tug of any size on local or minor waters voyage vessels.

PART IV - SYLLABUSES OF EXAMINATIONS

14.5 Chartwork and Pilotage
Examination number SIM 2
 Companion to Sections 11.6 and 18.5

ITEM	COLUMN
1.	The syllabus of the examination is presented in TP 4958, Simulated Electronic Navigation Courses.
2.	Preparation of Passage To be completed ahead of simulator examination.
3.	Simulator Exercise (duration two hours) Includes items 2, 3, and 4; passage about 20 nautical miles; parallel indexing, including wheel over; complex collision avoidance; course alteration for navigational purposes; all available electronic navigation.

4.	<p>Navigator Notebook</p> <p>Navigator notebook to include chart number and courses for voyage, course alteration and wheel over positions, position of danger areas in the proximity of the intended track, traffic CIPs and distance to next CIP; position where a change of machinery status will be required; parallel indexing information or information on the elements used to construct an ARPA graphic map; radar datum chosen for PI; time of HW/LW and information on tidal currents; pilotage information, if applicable; total distance and steaming time at proposed speed.</p>
5.	<p>Manoeuvre a Ship</p> <p>Manoeuvring a ship, stopping, mooring, and anchoring.</p>
6.	<p>Emergencies</p> <p>Emergencies may be introduced but not at a critical moment during the exercise.</p>

Note: The examination consists of simulated exercises conducted by Marine Safety.

Time for passage planning one and a half to three hours.

Total duration four to five hours.


14.6 Meteorology

Examination number 073

Companion to Sections 11.12, 18.8, 19.9 and 20.10

ITEM	COLUMN
1.	<p>Chemical Composition of the Atmosphere</p> <p>Water vapour, nitrogen, oxygen, argon, carbon dioxide, krypton, xenon, ozone; dust, hygroscopic particles, smoke, salt particles; micro-organisms (such as bacteria used as nuclei for artificial snow).</p>
2.	<p>Vertical Structure of the Atmosphere</p> <p>Troposphere, stratosphere, mesosphere, thermosphere and ionosphere; stratospheric clouds, nacreous and noctilucent, appearance, height limits, composition; optical phenomena, reflection, refraction, aureole, bishop's ring, corona, halo, mock sun or parheliion, rainbow, mirages, Saint Elmo's fire, northern lights, magnetic storms, phosphorescence.</p>
3.	<p>Transfer of Heat</p> <p>Radiation, conduction, convection, and turbulence.</p>
4.	<p>Temperature</p> <p>Related to the atmosphere and the earth; caloric, specific heat of water and earth; perpendicular and oblique radiation; selective absorption of radiation by the atmosphere; isotherm; temperature and distance of the sun.</p>
5.	<p>Atmospheric Moisture and Changes of State</p> <p>Heat of fusion, vaporization and sublimation; latent heat; relative and absolute humidity, saturation, supersaturation and supercooling, dew point; lapse rates, adiabatic cooling, dry and saturated lapse rates.</p>
6.	<p>Atmospheric Stability</p> <p>Stability, instability, conditional instability, potential instability; causes of inversions, radiative cooling, turbulence or convection, subsidence; effects of inversions, fog and low-lying cloud, smog, accumulation of smoke; causes of subsidence; effects of substances, compression heating, evaporation.</p>
7.	<p>Fog</p> <p>Definition, formation; season, locality and frequency of occurrence; major types, advection, radiation, frontal, sea smoke; anomalous propagation of sound in fog, mist, haze, smog.</p>

8.	<p>Clouds</p> <p>Formation, convection, turbulence, frontal, convergence, orographic; types, stratus, cumulus, stratocumulus, nimbostratus, cumulonimbus, altostratus, altocumulus, cirrus, cirrostratus, cirrocumulus.</p>
9.	<p>Precipitation</p> <p>Theories explaining the formation of precipitation; relative sizes of condensation nuclei, cloud droplets, drizzle drops and rain drops; types, convective, frontal, orographic; forms of precipitation, dew, frost, rain, snow, sleet, hail, snow pellets, snow grains, ice pellets, diamond dust, rime.</p>
10.	<p>Lightning</p> <p>Theory of formation; associated clouds, conditions within the clouds; times, seasons and localities of occurrence.</p>
11.	<p>Pressure and Pressure Systems</p> <p>Definition; Coriolis effect; convergence and divergence; highs and lows, standard atmosphere (1013.25 mbar); isobar, isobars, diurnal pressure variation, effect of diurnal pressure variation on detection of tropical revolving storms, isobaric patterns and pressure gradients, pressure gradient, terminology, deepening or filling low, weakening or filling high, shallow (weak) pressure gradients, steep (strong) pressure gradients; patterns, troughs, ridges, cols; types of depression, polar front low, thermal depression, vertical instability depression (e.g., tropical revolving storm); straight isobars, effect of straight isobars on wind, on weather.</p>
12.	<p>Winds</p> <p>Definition, speed (knots and Beaufort scale); direction, veering and backing, calculation of pressure gradient, geostrophic wind, gradient wind, centrifugal force, Buys Ballot's law, cyclostrophic wind, effect of latitude and friction on wind speed, effect of latitude on geostrophic wind scale, absence of surface friction above 2000 feet, angle of indraught (15° at sea, 30° over the land); special wind effects, land and sea breezes, anabatic and katabatic winds, Fohn effect (chinook), gusts and squalls; monsoons, theory of monsoon formation, land and sea breezes compared to monsoons, pressure and weather characteristics associated with, monsoons in the Indian Ocean and monsoons in the Chins Sea; global systems circulation, seasonal modification and permanent pressure systems; intertropical convergence zone, trade winds, horse latitudes, westerlies, roaring forties, polar front, semi-permanent highs (Atlantic and Pacific), polar highs, Icelandic and Aleutian lows, effects of land; local winds, locality, season and prevailing direction of following winds, levanter, vendevs, mistral, bora, sirocco, gregale, etessain, khamsin, simoon, shamal, kaus, elephants, brick fielder, williwaw, harmattan, norther, tehuantepecer; upper air circulation and jet stream, thermal wind, isohypses, Rossby waves, flow patterns at 500 mbar, steering rule.</p>
13.	<p>Air Masses</p> <p>Definition; source regions; identification; characteristics; modification; seasonal movement (North America and offshore); types, continental arctic, continental polar, continental tropical, maritime arctic, maritime polar, maritime tropical, equatorial.</p>
14.	<p>Fronts</p> <p>Definition; types, stationary, cold, warm, occluded; movement; sequence of weather associated with fronts, pressure, wind, temperature, cloud, weather, visibility; squall lines, definition, association with cold fronts, weather experienced with squall lines, pressure, wind, temperature, cloud, weather, visibility; areas of occurrence; local names (e.g., pampero, southerly buster).</p>
15.	<p>Families of Depressions or Extra-Tropical Cyclones</p> <p>Formation between two air masses, life cycle and movement cross section, associated weather, frontogenesis, frontolysis, secondary depressions.</p>

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16.	<p>Waves and Swells</p> <p>Difference between seas and swells, definitions of period, height, length, speed, steepness, fetch; wave groups, waves in shallow water, ground swell, breakers and surf; swells in forecasting tropical revolving storms; effects of coast, currents, tide; storm surge; effect of ice on waves, ice crystals, pack ice; tsunamis and tidal waves, description, epicentre, dangers, tsunami warning system, true tidal waves and tidal bores; seiche.</p>
17.	<p>Oceanic Currents and Effect on the Climate</p> <p>Definition of set and drift, wind-drift currents, gradient currents, complex currents (including stream currents), Coriolis effect and Ekman's spiral, upwelling, permanent currents, seasonal currents; general surface circulation and offshoots in North American waters, geographical limits, seasonal variations, direction, strength; effect of currents on climate, warm, cold; knowledge of the various currents of the world.</p>
18.	<p>Tropical Revolving Storms</p> <p>Definition of path, track, vertex or cod, vortex or eye, trough line, angle of indraught, dangerous semi-circle, dangerous quadrant, navigable semi-circle; features distinguishing it from extra-tropical cyclone, small diameter, steeper pressure gradient, winds tangent to central isobars, eye absence of fronts; warnings, radio messages, projected track, unusual swell, appearance of the sky, unusual changes in wind strength and direction, corrected drop in barometric pressure; weather associated with tropical revolving storms; sources of energy; seasonal distribution; practical rules for avoidance; hurricane and typhoon anchorages; mandatory reporting; names and season for tropical storms in the following areas: the North Atlantic, the western North Pacific, eastern North Pacific, South Pacific, Bay of Bengal, Arabian Sea, western Indian Ocean, eastern Indian Ocean.</p>
19.	<p>Ice Formation and Decay</p> <p>Freezing of fresh and salt water; formation of land ice; Greenland and Antarctic ice caps, glaciers; ice types and egg code; types of ice, new, frazil, grease, slush, shuga, nilas, pancake, young, grey, grey-white, first-year, second-year, multi-year, fast ice, pack ice, ice of land origin, forms of floating ice (floe sizes); ice fields and their movement, icebergs and drift, iceberg routes, limits, seasons, reasons for variation in numbers, difference between northern and southern hemisphere icebergs; presence of icebergs in North Pacific, North Atlantic lane routes, International Ice Patrol; icing of superstructures, causes, fog, freezing drizzle, freezing rain, freezing spray, serious accumulation above 04; avoidance, shelter, warmer water, alteration of course and speed; mandatory reporting, freezing temperatures, high winds.</p>
20.	<p>Ice Detection and Reporting</p> <p>Ice blink, absence of sea swell, problems associated with radar, limitations due to poor visibility, liaison with shore reporting stations; receipt of ice advisory broadcasts, ice advisory service, shipping support service, interpretation of ice charts; <i>Canadian Waters and Manice</i>, ice climatology and ice operations, ice navigation in Canadian waters; instrumentation, thermometers, dry bulb, wet bulb, marine screen, psychrometer, seawater temperature bucket; barometer, units, corrections, diurnal variations; barograph; wind measuring instruments; observations and weather reports, auxiliary ship, selected ship; climatology and forecasting, purpose, avoiding damage from storms, improving passage time, holding course in fine weather.</p>
21.	<p>Weather Messages and Codes</p> <p>International analysis in code, definition, interpret messages; plot pressure systems, fronts, isobars; forecast 12-24 hours, pressure, wind, sea state, visibility, clouds, weather changes; knowledge of services available; <i>Radio Aids to Marine Navigation, Atlantic and Great Lakes Pacific</i>; ability to locate marine weather forecast areas; understanding weather forecasts for the Great Lakes, ability to use MAFOR code; assorted weatherfax, weather, satellite, sea state, and ice charts; synoptic charts, surface and upper air; recognition of isobaric distribution patterns; comparison with earlier charts; knowledge of information available on weatherfax in Canada and worldwide; understanding of synoptic surface analysis charts; understanding of surface progs; understanding of wave charts, analysis, forecast; understanding of ice charts; ability to forecast the following for 12-24 hours: pressure, wind, sea state, visibility, clouds, weather changes.</p>

22.	<p>Optimum Weather Routing</p> <p>Advantages, reduce storm damage, save time, meet special requirements; methods, on board ship, through shore-based firm, through government departments; climatological routing, in areas with stable weather patterns; optimum routing, geography does not dictate track, travel time is more than three days or 1500 miles; data and long-range progs are available.</p>
23.	<p>Requirements</p> <p>Application of ship's performance curves and sea data; use of surface analysis and prog charts; use of 500 mbar constant pressure charts for estimating storm track; use of ice charts, wave charts; practical drawing of optimum tracks embracing the use of polar stereographic or gnomonic charts, ship performance curves and locus positions; factors that require a continuous updating and revision of weather routing procedures.</p>

Note: The examination consists of a written test comprising multiple-choice and descriptive questions.
Duration is three hours.

14.7 Ship Management
Examination number 090
Companion to Section 15.14

ITEM	COLUMN
1.	<p>Organization</p> <p>Knowledge of the organization of crew for emergencies, drills and routine maintenance; responsibilities under the: Boat and Fire Drill Regulations, Crewing Regulations; official and ship's logbooks, their entries under all conditions.</p>
2.	<p>Acts</p> <p>Working knowledge of the <i>Canada Shipping Act</i> in identifying grades and classes of certificates of competency; rights of holders of certificates; offences relating to certificates; loss of certificates; engagement and discharge of seafarers, in and out of Canada; rights of seafarers; maintenance of discipline; registration of ships; port wardens and steamship inspectors; wrecks, salvage and casualties; provisions, health and accommodation; distressed seafarers; limitation of liability; ship's safety inspection certificates; coasting trade of Canada; <i>Pilotage Act, Canada Labour Code, Part II.</i></p>
3.	<p>Ship's Business</p> <p>Knowledge of custom house and immigration procedures; coasting licence and regulations; de-rat certificates; tonnage certificates; charter parties and bills of lading; noting protest and right to extend; marine insurance contract and its relationship to master's responsibility to owners and underwriters.</p>
4.	<p>Regulations</p> <p>Ship's responsibilities under Shipping Casualty Reporting Regulations; Quarantine Regulations; Potable Water Regulations of Common Carriers; Ship's Crew Food and Catering Regulations; Crewing Regulations; Inspection Certificates for Non-Safety-Convention Ship's Safety Certificate Regulations; Foreign-Going, Home-Trade, Inland Waters and Minor Waters Voyages Regulations; Oil Pollution Prevention Regulations; Occupational Safety and Health Regulations.</p>
5.	<p>Ship's Master</p> <p>Knowledge of master's responsibilities in event of salvage and salvage agreements; obligations and responsibilities in event of emergencies, collision, distress, search and rescue; vessel reporting systems; legal consequences of infractions of regulations; functions of agents; business aspects of putting into port with damaged ship or cargo.</p>
6.	<p>Stability</p> <p>Knowledge and ability to read and interpret stability data particularly related to tugboats, including curves of statical stability; hydrostatic curves; dynamical stability; principle of rudders and rudder design; factors influencing steering; rudder terminology; different types of propulsion.</p>

Note: The examination is written.
Duration is three hours.

14.8 General Seamanship

Examination number 160

Companion to Sections 15.15 and 16.17

ITEM	COLUMN
1.	<p>Ship-Handling, Routine</p> <p>Fixed- or controlled -pitch 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, including precautions to avoid girding; 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 of 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.

14.9 Stability

Examination number 110

ITEM	COLUMN
1.	<p>Ship's Draft</p> <p>Draft and freeboard, 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 (sea) and loadline rules for lakes and rivers (inland).</p>
2.	<p>Terms</p> <p>Meaning of 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: angle of heel, righting lever (GZ) when the vessel is heeled, metacentre (M), metacentric height (GM) as an indication of initial stability; danger of slack tanks; effect of beam and freeboard on stability; angle of loll; heel due to turning; period of roll; centre of flotation (F) and trim, and existence of trimming moment created by G longitudinal (GL) and B longitudinal (BL); meaning and characteristics of stiff and tender ships.</p>
3.	<p>Stability Data</p> <p>Use of stability data supplied to typical vessels and towboats, allowing for the effect of water density on draft and displacement; interpreting curves of statical stability, achieving satisfactory transverse stability, achieving the desired trim; existence of transverse moment exerted on the towing hook; effect of adding, removing and transferring weights on draft, list and trim, allowing for the free surface effect of tanks and change of stability during the voyage; effects of reduction in freeboard on stability and the dangers of overloading and capsizing; dangers due to icing effects.</p>

Note: The examination consists of multiple-choice questions and practical calculations based on ship's stability data booklet.
Duration is three hours.