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### **I. INTRODUCTION**

The Republic of Liberia examination system reflects the provisions of the International Convention on Standards of Training, Certification, and Watchkeeping 1978 as amended. Under this system, the examinations consist of multiple-choice questions randomly compiled by computer from a database of some 10,000 questions appropriate for the competency being tested. The answers are graded by computer.

Certain training pre-requisites for certification apply. It is recommended that the publication RLM-118, "Requirements for Merchant Marine Personnel Certification," be consulted to determine which other examinations, certified training or sea service may be required by the Administration before an examination may be taken.

The following test centers have been designated for the administration of all **officer certificates and/or special qualifications examinations**:

ALL Exams:

LISCR Dulles, Virginia (USA)  
LISCR New York, New York (USA)  
LISCR Piraeus, Greece  
LISCR Hong Kong

Ericson & Richards: Mumbai, India  
PHILCAMSAT: Makati City, Philippines  
SECOJ: Tokyo, Japan  
Intercontinental Marine Consultants: Singapore

MODU Exams only:

Mearns Marine Agency: Stonehaven, Scotland  
Houston Marine: New Orleans, Louisiana (USA)

This booklet has been assembled to familiarize candidates for deck officers' examinations with the examination syllabus and format. It contains information on:

- a. the examination syllabus;
- b. examination procedures and passmark requirements;
- c. examination answer sheet instructions; general advice on taking multiple-choice examinations;
- d. specimen examination questions, with an answer key;
- e. a study bibliography and sources where the recommended books may be ordered;
- f. a table of SI and Imperial units and conversion factors;
- g. Morse Code Flashing Light Exam; and
- h. English Language Proficiency Exam.

## **II. SYLLABUS**

The following is a list of the main parts and the subsections of the examination syllabus. Each of the six parts of the syllabus corresponds to an examination paper (e.g., 1.0 is Applied Navigation). Candidates' knowledge of each subsection will be tested. Third mate candidates will be examined only on basic concepts in sections marked by asterisks (\*).

### **1.0 Applied Navigation, STCW Code, Sections A-II/1 & A-II/2**

#### 1.1 Chartwork

- 1.1.1 Chart Problems
- 1.1.2 Compass Error
- 1.1.3 Tidal Problems
- 1.1.4 Buoyage Systems
- 1.1.5 Navigational Publications; Passage Planning
- 1.1.6 ECDIS Systems

#### 1.2 Practical Navigation

- 1.2.1 Plane and Parallel Sailing; Traverse Tables
- 1.2.2 Mercator Sailing
- 1.2.3 Great Circle and Composite Great Circle Sailing
- 1.2.4 Correction of Altitudes
- 1.2.5 Meridian Altitudes and Time of Meridian Passage
- 1.2.6 Bodies Out of the Meridian: Intercept Method
- 1.2.7 Bodies Out of the Meridian: Longitude Method
- 1.2.8 Amplitude and Time Azimuth
- 1.2.9 Polaris; Star Identification

**2.0 Principles of Navigation, Electronic Navigation Systems, and Instruments, STCW Code, Sections A-II/1 & A-II/2**

2.1 Nautical Astronomy

2.1.1 Definitions and Coordinate Systems

2.1.2 Principles and Time

2.2 Electronic Position Fixing Systems

2.2.1 RDF

2.2.2 Loran C

2.2.3 Omega

2.2.4 Satellite Navigation Systems

2.3 Instruments

2.3.1 Magnetic and Gyro Compasses, Autopilots

2.3.2 Echo Sounders and Logs

2.3.3 Radar and ARPA

2.3.4 Other Instruments (Sextant, Meteorological)

**3.0 Regulations and Ships' Business, STCW Code, Sections A-II/1 & A-II/2**

3.1 The International Regulations for Preventing Collisions at Sea

3.2\* The Liberian Maritime Law/Regulations

3.3\* International Maritime Regulations and Ships' Operational Responsibilities

3.4\* Ship's Business

## **4.0 Stability and Cargo Operations, STCW CODE, SECTION A-II/1 & A-II/2**

### **4.1 Stability and Naval Architecture**

- 4.1.1 Hydrostatic Principles and Data
- 4.1.2 Form Coefficients and Changes of Form
- 4.1.3 Ship Construction
- 4.1.4 Immersion Factors; Density-Draft Relationship; Loadlines; Mean Draft
- 4.1.5 Trim
- 4.1.6 Stability at Small Angles of Heel, Including Effects of Turning and Wind Effect
- 4.1.7 Effects of Loading, Discharging, and Shifting Weights
- 4.1.8\* Shear Force and Bending Moment; Electronic Loading Aids
- 4.1.9\* The Inclining Experiment; The Trim and Stability Booklet
- 4.1.10\* Miscellaneous Sources of Trim and Stability Guidance, Including Supplied Methods; Trials and Maneuvering Data
- 4.1.11\* Stability at Large Angles of Heel; Metacentric Height
- 4.1.12\* Damage Stability and Damage Control; Parallel Axes, Second Moment of Area, and Dry Docking

### **4.2 Cargo Operations**

- 4.2.1 Cargo Handling Equipment, Including Derricks, Cranes and Heavy Lift Derricks
- 4.2.1 Deck Machinery, Hatches and Hatch Covers
- 4.2.3 Cargo Stowage Principles; Preparation of Cargo Plans
- 4.2.4 Hold and Tank Preparation; Dunnaging and Separation; Ventilation and Sweat (hygrometry)
- 4.2.5 Tanker Practice
- 4.2.6 Dry Bulk Cargoes, Including Grain and Coal
- 4.2.7 Refrigerated and Unitized Cargoes
- 4.2.8 Deck Cargoes, Dangerous Goods, and Pollution Prevention Requirements

## **5.0 Applied Physical Science and Engineering, STCW Code, Sections A-II/1 & A-II/2**

### **5.1 Applied Physical Science**

- 5.1.1 Systems of Units; Conversions
- 5.1.2 Heat Transfer and Liquids
- 5.1.3 Applications of the Gas Laws
- 5.1.4 Reflection and Refraction of Light; Nature and Propagation of Sound Waves
- 5.1.5 Basic Electrical Concepts and Practical Circuitry Problems
- 5.1.6\* Magnetism and Electromagnetism
- 5.1.7 Electrochemistry

### **5.2 Meteorology and Oceanography**

- 5.2.1 Tides and Currents
- 5.2.2 The Atmosphere
- 5.2.3 Winds and Waves
- 5.2.4 Clouds and Precipitation
- 5.2.5 Ice
- 5.2.6 Visibility
- 5.2.7 Weather Systems, Including Tropical Revolving Storms
- 5.2.8\* Synoptic Charts and Weather Forecasting
- 5.2.9 Oceanography and Climatology

### **5.3 Marine Engineering**

- 5.3.1\* Main Propulsion Machinery
- 5.3.2\* Auxiliary Machinery including Steering Control Systems

## **6.0 Watchstanding, STCW Code, Section A-II/1 & A-II/2**

### **6.1 Shiphandling**

- 6.1.1\* Shiphandling in Heavy Weather and Ice
- 6.1.2\* Towing
- 6.1.3\* Pilotage, Traffic Separation Schemes, and Vessel Traffic Service Areas
- 6.1.4\* Drydocking
- 6.1.5\* Anchoring and Mooring
- 6.1.6 Emergency Procedures; Search and Rescue (MERSAR)
- 6.1.7 General Seamanship

### **6.2 Safety**

- 6.2.1 Safety Legislation, Protection of the Marine Environment, and Reference Materials
- 6.2.2 Life Saving
- 6.2.3 Fire Prevention and Firefighting Appliances
- 6.2.4 Emergency Medical Care, International Medical Guide for Ships

### **6.3 Communications**

- 6.3.1 The International Code of Signals
- 6.3.2 The IMO Standard Marine Navigational Vocabulary
- 6.3.3 Radiotelephony
- 6.3.4 Ship Reporting and Safety Systems
- 6.3.5 Log and Record Keeping

## **III. EXAMINATION PROCEDURES**

Examinations are administered on dates mutually agreed upon between candidates and the test center. Candidates will receive confirmation in writing as to the date and location arranged for examination. The written examination takes three days, and a one hour flashing light examination must also be scheduled for those candidates examining for Third Mate, Second Mate and Chief Mate. The flashing light examination must also be arranged between the candidate and the examination center. Figure 1 gives the schedule of the written examinations.

The examination is closed book; that is, candidates may not use books, notes, or other reference materials. They may use non-programmable calculators and their own dictionaries if they wish. Candidates must bring their own navigation instruments (parallel rules, dividers, etc.).

Candidates may not communicate with each other during the examination. Any candidate who communicates with an unauthorized person, or uses unauthorized materials, will be dismissed from the examination and will be considered to have failed the entire examination. Candidates failing under these circumstances will not be eligible for re-examination for a period of six months.

Candidates will normally be advised of their results within one calendar month. Candidates must obtain 70% in each of the parts in order to pass the examination. Candidates failing one or more parts must arrange to be re-examined in the subject(s) failed, and obtain 70% in order to receive certification. Figure 2 summarizes the re-examination procedure.

#### **IV. THE MULTIPLE-CHOICE EXAMINATION FORMAT: GENERAL ADVICE**

The examination format is multiple-choice. Each question has four possible answers, and the candidate must blacken the space on the answer sheet which corresponds to the letter of the answer considered most appropriate. A candidate's score is determined by the number of questions answered correctly. All questions have the same value. Candidates are advised to answer each question as well as they can and not to spend too much time on any one question. Candidates not knowing the answer to a question should leave it blank and go on to the next question. If time is left after finishing the rest of the questions, the candidate can go back to the questions left blank and try to answer them.

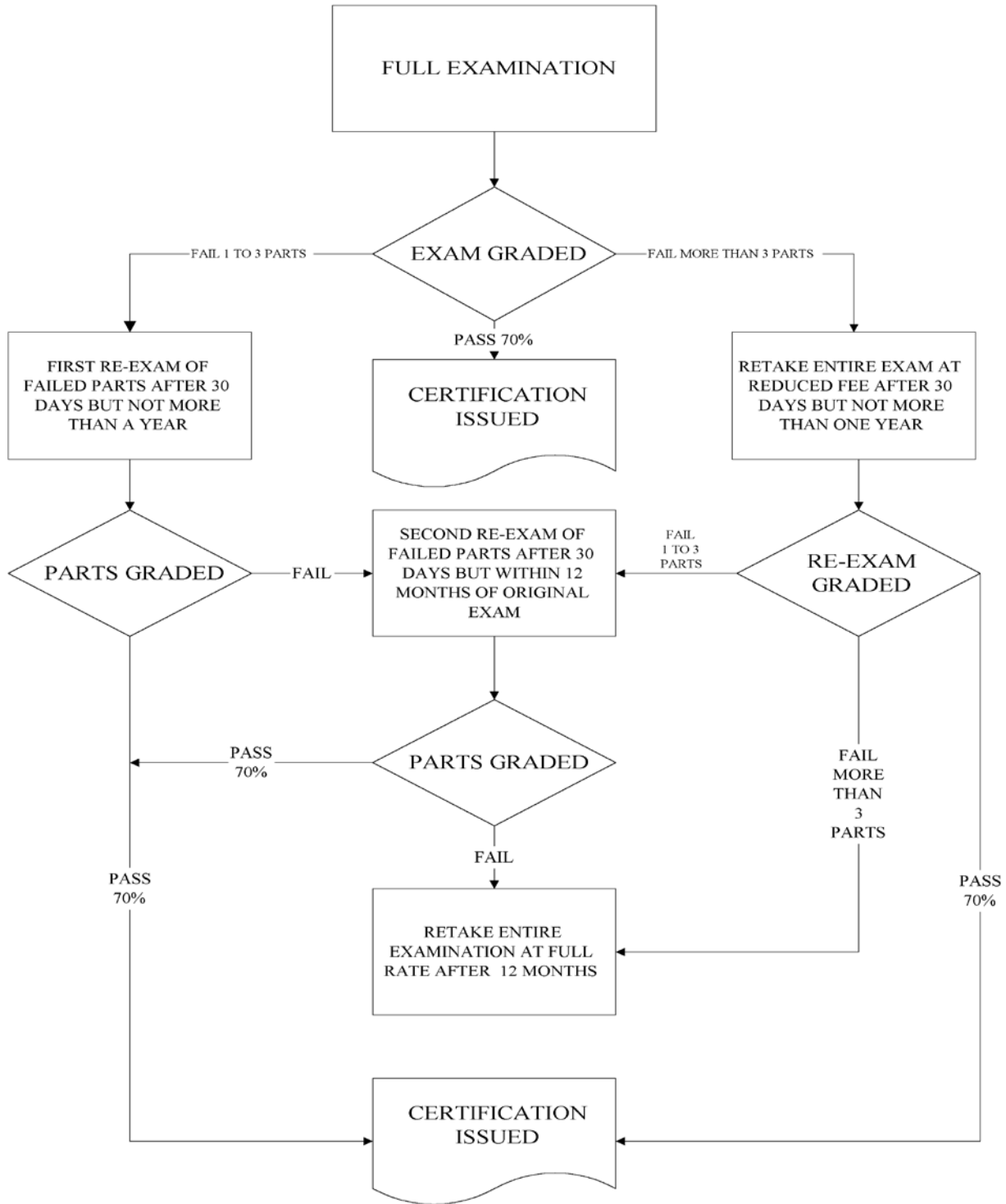


## FIGURE 1

### TIME TABLE FOR DECK OFFICERS' WRITTEN EXAMINATION PAPERS

DAY 1	DAY 2	DAY 3
Candidates promptly report at 0900		
0930 - 1200 1.0 Applied Navigation	0930 - 1200 3.0 Rules of the Road Regulations and Ship's Business	0930 - 1200 5.0 Applied Science and Engineering
Master: 25 Q Chief Mate: 25 Q Second Mate: 35Q Third Mate: 35 Q	All ranks: 60 Q	All ranks: 35 Q
Time: 2 1/2 hrs.	Time: 2 1/2hrs	Time: 2 1/2hrs.
1200 - 1330 Lunch	1200 - 1330 Lunch	1200 - 1330 Lunch
1330 - 1600 2.0 Principles of Navigation	1330 - 1600 4.0 Stability and Cargo Operations	1330 - 1600 6.0 Watchstanding
Master: 25 Q Chief Mate: 25 Q Second Mate: 35 Q Third Mate: 35 Q	Master: 50 Q Chief Mate: 55 Q Second Mate: 35 Q Third Mate: 40 Q	Master: 50 Q Chief Mate: 50 Q Second Mate: 35 Q Third Mate: 45 Q
Time: 2 1/2 hrs.	Time: 2 1/2 hrs	Time: 2 1/2 hrs.

**FIGURE 2  
RE-EXAMINATION PROCESS**



\*An applicant who fails the **Morse light** section of the examination may be reexamined in that section at any time within one year following the first attempt. If the candidate has not passed the Morse light section within that year, the entire deck officer examination will have to be retaken.

## V. USING THE ANSWER SHEET

A specimen of the examination answer sheet is shown in Figure 3. The candidate must mark all answers on a sheet like this. No credit will be given for anything marked in the examination booklet. The candidate should not make any notes, calculations, or extra marks on the answer sheet. Doing so may affect computer grading and void the examination results. The candidate must NOT fold the answer sheet.

The answer spaces are lettered a, b, c, and d, like the answers in the examination booklet. The candidate will use the No. 2 pencil provided to fill in the space marked with the letter corresponding to the letter of the answer judged best. The candidate should be sure that the answer is filled in completely. **IF THE CANDIDATE CHANGES THE ANSWER, THE FIRST CHOICE MUST BE ERASED COMPLETELY AND THE NEW ANSWER MARKED.** No credit will be given for questions with what would appear to have more than one answer marked.

# EXAMINATION ANSWER SHEET



- Make clean erasures.
- Make NO stray marks.
- Do NOT fold.

Signature James Smith

Section Number 1

Grade of Examination 3M

PRINT LAST (FAMILY) NAME									
S	M	I	T	H					

PRINT FIRST (GIVEN) NAME									
J	A	M	E	S					

EXAM CENTER	
001	
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9

EXAM NUMBER	
045678	
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9

EXAM BOOK NUMBER	
123401	
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9

DATE	
MONTH	DAY
10	23
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9
9	0
YEAR	
97	
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9

SECTION	
1	
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9

CODE (RESERVED)	
1	2
3	4
5	6
7	8
9	0
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9

1	(A)	(B)	(C)	(D)	21	(A)	(B)	(C)	(D)	41	(A)	(B)	(C)	(D)
2	(B)	(C)	(D)	(A)	22	(A)	(B)	(C)	(D)	42	(A)	(B)	(C)	(D)
3	(A)	(B)	(C)	(D)	23	(A)	(B)	(C)	(D)	43	(A)	(B)	(C)	(D)
4	(A)	(B)	(C)	(D)	24	(B)	(C)	(D)	(A)	44	(A)	(B)	(C)	(D)
5	(B)	(C)	(D)	(A)	25	(A)	(B)	(C)	(D)	45	(A)	(B)	(C)	(D)
6	(A)	(B)	(C)	(D)	26	(A)	(B)	(C)	(D)	46	(A)	(B)	(C)	(D)
7	(A)	(B)	(C)	(D)	27	(A)	(B)	(C)	(D)	47	(A)	(B)	(C)	(D)
8	(A)	(B)	(C)	(D)	28	(A)	(B)	(C)	(D)	48	(A)	(B)	(C)	(D)
9	(B)	(C)	(D)	(A)	29	(A)	(B)	(C)	(D)	49	(A)	(B)	(C)	(D)
10	(B)	(C)	(D)	(A)	30	(B)	(C)	(D)	(A)	50	(A)	(B)	(C)	(D)
11	(A)	(B)	(C)	(D)	31	(A)	(B)	(C)	(D)	51	(A)	(B)	(C)	(D)
12	(A)	(B)	(C)	(D)	32	(A)	(B)	(C)	(D)	52	(A)	(B)	(C)	(D)
13	(B)	(C)	(D)	(A)	33	(A)	(B)	(C)	(D)	53	(A)	(B)	(C)	(D)
14	(A)	(B)	(C)	(D)	34	(A)	(B)	(C)	(D)	54	(A)	(B)	(C)	(D)
15	(A)	(B)	(C)	(D)	35	(A)	(B)	(C)	(D)	55	(A)	(B)	(C)	(D)
16	(A)	(B)	(C)	(D)	36	(A)	(B)	(C)	(D)	56	(A)	(B)	(C)	(D)
17	(B)	(C)	(D)	(A)	37	(A)	(B)	(C)	(D)	57	(A)	(B)	(C)	(D)
18	(A)	(B)	(C)	(D)	38	(A)	(B)	(C)	(D)	58	(A)	(B)	(C)	(D)
19	(A)	(B)	(C)	(D)	39	(A)	(B)	(C)	(D)	59	(A)	(B)	(C)	(D)
20	(A)	(B)	(C)	(D)	40	(A)	(B)	(C)	(D)	60	(A)	(B)	(C)	(D)

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## VI. SAMPLE QUESTIONS WITH ANSWER KEY

### 1.0 Applied Navigation, STCW Code, Sections A-II/1 & A-II/2

- . 1 At what time on the rising afternoon tide on 4 January will there be a height of tide of 11 feet at Mergui?
  - a. 1728
  - b. 1837
  - c. 1802
  - d. 1901
  
- . 2 Find the true altitude of the sun's center if, on the 15th of September, the sextant altitude of the lower limb is  $35^{\circ}18'.0$ . IE is 2'.5 off the arc. Height of eye is 12.6m (41.5ft).
  - a.  $35^{\circ}23'.9$
  - b.  $35^{\circ}41'.1$
  - c.  $35^{\circ}28'.9$
  - d.  $35^{\circ}29'.1$
  
- . 3 On 5 September during morning twilight, Polaris has a true altitude of  $41^{\circ}03'.0$  for an observer in DR  $40^{\circ}30'n$ ,  $40^{\circ}15'W$ . The chronometer showed 7h02m03s(2m55s slow in GMT). Find the observer's latitude.
  - a.  $40^{\circ}16'.7n$
  - b.  $40^{\circ}16'.4n$
  - c.  $41^{\circ}16'.7n$
  - d.  $41^{\circ}16'.5n$
  
- . 4 In DR  $48^{\circ}00'N$ ,  $40^{\circ}15'W$ , an observation of the sun bearing  $110^{\circ}T$  gave an intercept of 10'.8 towards. If this observation had been computed by the longitude method, what longitude would have been obtained?
  - a.  $40^{\circ}03'.5W$
  - b.  $39^{\circ}57'.8W$
  - c.  $40^{\circ}04'.2W$
  - d.  $39^{\circ}58'.9W$
  
- . 5 What is the initial great circle course from  $41^{\circ}07'N$ ,  $125^{\circ}10'W$  to  $21^{\circ}20'N$ ,  $157^{\circ}15'W$ ?

- a. 304°
- b. 236°
- c. 272°
- d. 226°

## 2.0 Principles of Navigation, STCW Code, Sections A-II/1 & A-II/2

- . 1 The altitude of a heavenly body is measured in which system of coordinates?
  - a. The terrestrial system.
  - b. The equatorial system.
  - c. The celestial system.
  - d. The horizon system.
  
- . 2 The effect of atmospheric refraction on the observed height of a body at a very low (normally less than 10°) altitude is such that additional corrections for temperature need to be applied to
  - a. sun.
  - b. sun and moon.
  - c. sun, moon, and planets.
  - d. all bodies.
  
- . 3 An RDF bearing may be obtained by listening to the loudness of the signal. The "aural null" (no sound) is normally used. Why?
  - a. IMO/government specifications require manufacturers to use this convention.
  - b. The human ear is more sensitive to change in low intensity sound.
  - c. The rate of signal change is greater near the aural null.
  - d. Use of the "aural null" resolves the ambiguity of the reciprocal bearing.
  
- . 4 Your vessel is heading east by compass. If the vertical component of the ship's magnetism is not fully compensated for by the heeling error magnets, and there exists a residual blue pole below the compass, what would be the effect at the compass position when the vessel is heeled to starboard?
  - a. Reduced directive force.
  - b. Easterly deviation.
  - c. Increased directive force.
  - d. Westerly deviation.
  
- . 5 Omega error tables compiled for each transmitting station in the system, allow for
  - a. The shape of the earth.
  - b. The height of the ionospheric reflection layer.
  - c. The height of the receiving aerial.
  - d. Polar cap absorptions.

### **3.0 Regulations and Ship's Business, STCW Code, Sections A-II/1 & A-II/2**

- . 1 A minesweeper engaged in sweeping, in addition to the lights prescribed for a power-driven vessel, exhibits
  - a. three all-round green lights - one on the foremast head and one on each end of the foreyard.
  - b. three all-round yellow lights - one on the foremast head and one on each end of the foreyard.
  - c. three all-round lights in a vertical line, the top and bottom white and the middle one red, displayed in place of the masthead lights.
  - d. one green all-round light, placed well forward in the vessel.
  
- . 2 You see the masthead light and both sidelights of a small power driven vessel 45° on your starboard bow, 4 miles distant. You should
  - a. slow down.
  - b. alter course to port.
  - c. alter course to starboard.
  - d. keep your course and speed.
  
- . 3 The operation of Liberian-registered vessels is governed at all times and places by
  - a. the national law of the master and crew.
  - b. the General Maritime Law of the Republic of Liberia.
  - c. the American General Maritime Law.
  - d. the law of the port country, if the ship is in port, and the General Maritime Law of the Republic of Liberia when the ship is in international waters.
  
- . 4 The term "height above the hull" means the height above
  - a. the uppermost continuous deck.
  - b. the main deck.
  - c. the summer load line.
  - d. the highest water-tight deck.
  
- . 5 How often should the line throwing equipment be demonstrated to the crew on a Liberian ship?
  - a. Every three months.
  - b. Every voyage.
  - c. Monthly.
  - d. Weekly.

#### 4.0 Stability and Cargo Operations, STCW CODE, SECTION A-II/1 & A-II/2

- . 1 Your vessel's deadweight capacity at load displacement is 12,500 tons (12,500 tonnes). Fuel, water and stores total 2,000 tons (2,000 tonnes). If the vessel has a usable cubic capacity of 500,000 cu ft (60,000m<sup>3</sup>), what is the stowage factor that will bring her down to her marks?
- 34.5ft<sup>3</sup> (41.4m<sup>3</sup>)
  - 40.0ft<sup>3</sup> (48m<sup>3</sup>)
  - 47.6ft<sup>3</sup> (57.1m<sup>3</sup>)
  - 42.8ft<sup>3</sup> (51.4m<sup>3</sup>)
- . 2 If a liquid chemical cargo is liable to polymerise during carriage, what treatment does it normally receive?
- It is continuously recirculated during the voyage.
  - It is kept at a temperature above 38°C (100°F).
  - An inhibitor is added to it.
  - It is loaded at 10° - 15°C (55°-65°F) and carried in insulated tanks.
- . 3 In the cross curve of stability shown, what number indicates the maximum righting arm?
- 4
  - 1
  - 2
  - 3
- . 4 You are loading a full cargo of packaged timber. What stability calculations must you make?
- The GZ for sailing and arrival conditions.
  - The GM for the sailing and arrival conditions.
  - The GM for the arrival condition, allowing for possible water absorption by the cargo.
  - A full stability condition, showing the minimum stability criteria which will be maintained throughout the voyage.
- . 5 You are planning the loading of a ro-ro. Where should you locate vehicles containing hanging loads (such as chilled meat)?
- Along the sides of the vehicle decks.



- b. Amidships and inboard, on the lower vehicle deck.
- c. On the upper vehicle deck, at the ends of the ship.
- d. Distributed evenly among the other vehicles.

**5.0 Applied Physical Science and Engineering, STCW Code, Sections A-II/1 & A-II/2**

- . 1 An anemometer on board a vessel steering 360°T at 20kts records a 20kt wind from the direction of the port beam. What is the approximate true wind speed and direction?
  - a. 28kts, SW
  - b. 28kts, NW
  - c. 20kts, W
  - d. 14kts, NW
  
- . 2 You are in 35°S. A cyclonic storm is nearby. The wind is NNW. What is the direction of the storm center?
  - a. SW
  - b. SSE
  - c. E
  - d. W
  
- . 3 How long can a main propulsion diesel engine be kept on instant "stand by" condition?
  - a. 12 hours, depending on the total power.
  - b. 3 hours, maximum.
  - c. indefinitely.
  - d. 24 hours, depending on the total power.
  
- . 4 When a tide in a channel is described as behaving like a progressive wave, the maximum flood velocity will occur about the time of
  - a. mean level on the falling tide.
  - b. low water.
  - c. mean level on the rising tide.
  - d. high water.
  
- . 5 What metal is often found aboard ship in the form of a thin coating, designed to protect metal fittings from corrosion?
  - a. Muntz metal.
  - b. Tin.
  - c. Chrome.
  - d. Zinc.

## 6.0 Watchstanding, STCW Code, Section A-II/1 & A-II/2

- . 1 What type of light is attached to the life ring buoys on a tanker?
  - a. A light powered by two D cells.
  - b. A chemically-powered light, such as a cyalume stick.
  - c. A light powered by a nife battery.
  - d. A light powered by a seawater-activated battery.
  
- . 2 How would the time 1850 GMT be expressed, using international code flags?
  - a. 1850Z
  - b. T1850
  - c. 1850T
  - d. Z1850
  
- . 3 What knots would you use to secure a bosun's chair?
  - a. A stage hitch and a lowering hitch.
  - b. A double sheet bend and a lowering hitch.
  - c. A clove hitch and two round turns.
  - d. A sheet bend and two half-hitches.
  
  
  
  
  
  
  
  
  
  
- . 4 What is the best search pattern for a single ship to employ if the datum of the target is not known within close limits?
  - a. Expanding square.
  - b. Sector.
  - c. Parallel track.
  - d. Spiral.
  
  
  
  
  
  
  
  
  
  
- . 5 What are the general effects of hydrodynamic interaction between vessels?
  - a. Increased squat.
  - b. Sinkage and change of trim.
  - c. Increased drag.
  - d. Decreased rudder effectiveness.

## Answer Key

### Section 1 - Applied Navigation, STCW Code, Sections A-II/1 & A-II/2

1. b
2. c
3. a
4. b
5. b

### Section 2 - Principles of Navigation, Electronic Navigation Systems, and Instruments, STCW Code, Sections A-II/1 & A-II/2

1. c
2. d
3. c
4. c
5. b

### Section 3 - Regulations and Ship's Business, STCW Code, Sections A-II/1 & A-II/2

1. a
2. d
3. b
4. a
5. a

### Section 4 - Stability and Cargo Operations, STCW Code, Sections A-II/1 & A-II/2

1. c
2. c
3. a
4. d
5. b

**Section 5 - Applied Physical Science and Engineering, STCW Code, Sections A-II/1 & A-II/2**

1. a
2. a
3. b
4. d
5. d

**Section 6 - Watchstanding, STCW Code, Sections A-II/1 & A-II/2**

1. d
2. d
3. c
4. a
5. b

## VII. BIBLIOGRAPHY AND SUPPLIERS

When purchasing books, candidates are advised to buy only the latest printings and editions. Books marked with an asterisk are additional texts, more suitable for chief mate and master candidates.

**Able Seaman and Lifeboatman Preparation Course.** Maritime Education Textbooks.

**Accident Prevention on Board Ship at Sea and In Port.** Geneva: International Labor Office, CH-1211, Geneva 22, Switzerland.

Blank, John S. **Modern Towing.** Centreville, MD: Cornell Maritime Press.

\*Bole, A.G., and Jones, K.D. **Automatic Radar Plotting Aids Manual. A Mariner's Guide to the Use of ARPA.** Centreville, MD: Cornell Maritime Press, Inc., P.O. Box 456, 306 East Water Street, Centreville, MD 21617, USA.

Bowditch, Nathaniel. **American Practical Navigator.** 2 vols. Washington, DC: Defense Mapping Agency Hydrographic Center. Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, USA.

Brown, Ernest B. **Radar Navigation Manual Pub. 1310.** Washington, DC: Defense Mapping Agency Hydrographic Center.

Bowditch, Nathaniel. **American Practical Navigator.** Defense Mapping Agency.

Burger, W. **Radar Observer's Handbook for Merchant Navy Officers.** Glasgow: Brown, Son & Ferguson, Ltd., 4-10 Darnley Street, Glasgow G41 2SD, Scotland.

Cockcroft, A.N., and Lameijer, J.N.F. **A Guide to the Collision Avoidance Rules.** London: Stanford Maritime Press, 12-14 Acre, London WC2E 9LP, UK.

**Collision Rules & Regulations.** U.S.C.G.

Danton, G.L. **The Theory and Practice of Seamanship.** London: Routledge, Kegan Paul, Broadway House, 68-74 Carter Lane, London EC4, UK.

Derrett, D.R. **Ship Stability for Masters and Mates.** London: Stanford Maritime Press.

George, W.E. (ed.) **Stability and Trim for the Ship's Officer.** Centreville, MD: Cornell Maritime Press, Inc.

**GMDSS Handbook.** IMO.

Hayler, W. **Merchant Marine Officers Handbook.** Centreville, MD: Cornell Maritime Press.

Hayler, William B. (ed.) **American Merchant Seaman's Manual.** Centreville, MD: Cornell

Maritime Press, Inc.

**Heavy Weather Guide, 2nd Edition.** Naval Institute Press.

**International Code of Signals.**

**International Safety Guide for Tankers and Terminals.** London: International Chamber of Shipping/OCIMF, 30-32 St. Mary Axe, London, EC3A 8ET, UK

**International Convention for the Safety of Life at Sea, 1974, and its Protocol of 1978, incorporating all amendments in effect from 1 July 1997.** London: International Maritime Organization, 4 Albert Embankment, London SE1 7SR, UK.

**International Conference on the Safety of Life at Sea, 1974. 1981 Amendments. 1983 Amendments.** London: International Maritime Organization.

Kemp, J.F., and Young, P. **Electricity and General Magnetism.** Brighton, UK: Kandy Publications, 50 Crescent Drive South, Brighton, Sussex, UK.

Kemp, J.F., and Young, P. **Notes on Cargo Work.** Brighton, UK: Kandy Publications.

Kemp, J.F., and Young, P. **Notes on Compass Work.** Brighton, UK: Kandy Publications.

Kemp, J.F., and Young, P. **Ship Stability: Notes and Examples.** Brighton, UK: Kandy Publications.

MacErevey. **Shiphandling for the Mariner.** Centreville, MD: Cornell Maritime Press.

Marine Training Advisory Board. **Marine Fire Prevention, Firefighting, and Fire Safety.** Bowie, MD: Robert J. Brady Co., Rtes. 197 & 450, Bowie, MD 20715, USA.

**MARPOL 73/78.**

Marton, C.S. **Tanker Operations. A Handbook for the Ship's Officer.** Centreville, MD: Cornell Maritime Press, Inc.

**\*Medical First Aid Guide for Use in Accidents Involving Dangerous Goods.** London: International Maritime Organization.

**Meteorology for Mariners. Meteorological Office.** London: HMSO.

Moore, D.A. **Basic Principles of Marine Navigation.** Brighton, UK: Kandy Publications.

Moore, D.A. **Marine Chartwork.** Brighton, UK: Kandy Publications.

Noel, Captain J. **Knights Modern Seamanship.** Van Nostrand Reinhold.

Plant, Richard M. **Formulae for the Mariner.** Centreville, MD: Cornell Maritime Press, Inc.

**Recommendations on Basic Principles and Operational Guidance Relating to Navigational Watchkeeping.** London: International Maritime Organization.

Republic of Liberia, Maritime Law Regulations, Notices and Requirements.

Self Study Course in Ship's Stability. New York: National Cargo Bureau, Inc., 30 Vesey Street, New York, NY 1007-2914, USA.

Sonneberg, G.J. **Radar and Electronic Navigation.** Borough Green: Butterworth & Co. (Publishers) Ltd., Borough Green, Sevenoaks, Kent TN15 8PH, UK.

Sonneberg, G.J. and Douglas, R.G. **Radio Telephony.** Borough Green: Butterworth & Co. (Publishers) Ltd.

**The Ships Medicine Chest and Medical Aid at Sea.** U.S. Department of Health and Human Service.

Van Wyck, Samuel M. and Carpenter, Max H. **The Radar Book.** Centreville, MD: Cornell Maritime Press, Inc.

Wallerton, P.F. **Basic Shiphandling for Masters, Mates & Pilots.** London: Stanford Maritime Press.

Wiley, J & Sons. **General Chemistry - Principals & Structure.**

**NOTE:** These books may be obtained directly or by mail order from good nautical bookstores and many chart agents. There are some additional sources which candidates may wish to use:

- IMO publications are seldom stocked abroad, and should be obtained directly from the International Maritime Organization, Publication Section, 4 Albert Embankment, London SE1 7SR, UK.
- ILO publications may be obtained through Unipub, P.O.Box 433, Murray Hill Station, New York, NY 10157, USA.
- British government publications may be obtained from the Government Bookshop, Her Majesty's Stationery Office, P.O. Box 569, London SE1 9NH, UK.
- American government publications may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, USA.

Missions to seamen, coast guard schools, and similar institutions frequently supply up-to-date, well-illustrated notes and booklets on all facets of the nautical profession. Candidates are encouraged to use all these resources to obtain books which they personally find easy to read and understand. They should use only **CURRENT EDITIONS** and up-to-date materials.

Liberian Services, Inc. does not distribute books or recommend suppliers.



## VII. TABLE OF SI AND IMPERIAL UNITS AND CONVERSION FACTORS

PHYSICAL QUALITY	SI METRIC UNITS	IMPERIAL UNITS FT - LB - S	CONVERSION FACTORS
Length	meter (m)	foot (ft)	1 m = 3.281 ft
Mass	kilogramme(kg)	pound (lb)	1 kg = 2.205 lb
Time	second(s)	second(s)	N/A
Temperature (interval)*	°C	°F	N/A
Specific Volume	m <sup>3</sup> /kg	ft <sup>3</sup> /lb	1m <sup>3</sup> /kg = 16.02ft <sup>3</sup> /lb
Force	newton(N)	poundle (pdl)	1 N = 7.233 pdl = .2248 lbf
Pressure	N/m <sup>2</sup> or bar	poundle per square foot (pdl/ft <sup>2</sup> )	1 bar = 10 <sup>5</sup> N/m <sup>2</sup> = 14.5 lbf/in <sup>2</sup>
Energy	joule (J) or kJ	foot poundle (ft pdl)	1 J = 1 Nm = 0.738 ft lbf
Rate of Energy Flow	watt (W) or kW	foot poundle per second (ft pdl/s)	1W = 1 J/s = 0.738 ft lbf/s

\*Note: Degrees Celsius (°C) and Fahrenheit (°F) will be used for examination purposes, rather than degrees Kelvin (°K) and Rankin (°R) which are the respective standards for the two systems.

## VIII. MORSE CODE FLASHING LIGHT EXAM

All candidates sitting for the chief mate, second mate, or third mate examination must pass a Morse light exam.

The following instructions concerning the exam should prove useful:

### A. The Morse Code

A . -	N - .	1 . - - -	DE - . . .
B - . . .	O - - -	2 . . - - -	AR . - . . .
C - . . . .	P . - - .	3 . . . - -	YU - . - - . . .
D - . .	Q - - . . -	4 . . . . -	CQ - - . - - - -
E .	R . - .	5 . . . . .	BT - . . . -
F . . - .	S . . .	6 - . . . .	
G - - .	T -	7 - - . . .	
H . . . .	U . . -	8 - - - . . .	
I . .	V . . . -	9 - - - - . . .	
J . - - - -	W . - -	0 - - - - -	
K - . . -	X - . . . -		
L . - . .	Y - - - -		
M - -	Z - - . .		

CQ means "General Call"

DE means "From"

YU means "I am going to communicate with your station by means of the INTERNATIONAL CODE OF SIGNALS."

BT means "Break or Pause"

AR means "End of the message"

Study the Morse Code symbols above. Just prior to the exam you might find it helpful to write out all the letters and numerals with their Morse symbols. The exam will be sent via blinker light at six words per minute (6wpm).

Practice equipment for the Morse light exam, similar to that which will be used by the exam proctor, may be purchased from:

Maritime Institute Ship's Store  
5700 Hammonds Ferry Road  
Linthicum, MD 21090, USA

### B. Content of the Exam

The exam is made up of two sections. The first section is made of five groups of five letters. Each group of letters will be sent twice. The letters are random and do not necessarily spell out any word.

The second section is made up of five coded messages that are listed in the book, "International Code of Signals". Each group in this second section may be made up of letters and numbers depending upon the meaning of the coded message. Each group of coded letters/numbers will be sent twice. One coded message will not necessarily make sense with all other messages. You will be given ample time to look up the meaning of the coded messages in the "International Code of Signals" (to be provided by the proctor).

Each exam is preceded by a long dash which allows the instructor to adjust the volume of the tape recorder so that a fixed or steady light appears on the blinker light. Five seconds after the steady light, the exam will commence with DE etc.

### C. Sample Exam

#### Section 1

DE KRMP (KRMP a fictitious originating station)

ABCDE	ABCDE
FGHIJ	FGHIJ
KLMNO	KLMNO
PQRTU	PQRTU
VWXYZ	VWXYZ

AR

#### Section 2

DE KRMP

YU To be looked up in the International Code of Signals.

PZ3	PZ3	The drift of the tide is 3 knots.
MBA44	MBA44	Patient has suffered from hepatitis.
KS	KS	You should send a line over.
HP1	HP1	Have the survivors been picked up?
CV4	CV4	Can you assist?

#### **D. Grading the Exam**

Each of the letters in the five letter group of Section 1 is worth 3 points each, totaling 75 points.

Each of the five codes (properly looked up in the International Code of Signals) in Section 2 is worth 5 points, totaling 25 points.

No points are given for the call letters of the originating station, and YU, DE or AR.

**A PASSING GRADE OF 70 MUST BE ACHIEVED!!!**

#### **E. Reexamination**

A candidate who fails the Morse light exam may be re-examined at any time within one year following the candidate's first attempt. Candidates retaking the exam must make their own arrangements with the test center. If the candidate has not passed the Morse light exam within that year, the candidate will be required to retake the entire deck officer examination.

