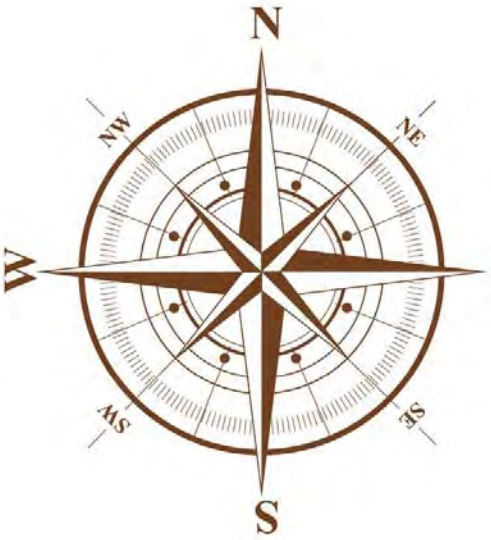

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CERTIFICATES OF COMPETENCY IN THE MERCHANT NAVY – DECK OFFICER

EXAMINATIONS ADMINISTERED BY THE
SCOTTISH QUALIFICATIONS AUTHORITY
ON BEHALF OF THE
MARITIME AND COASTGUARD AGENCY

STCW 95 OFFICER IN CHARGE OF NAVIGATIONAL WATCH REG. II/1 (UNLIMITED)

034-84 – STABILITY AND OPERATIONS

0915 - 1145 hrs

Examination paper inserts:

Datasheet Q2 - *Hydrostatic Particulars 'A'*

Notes for the guidance of candidates:

1. Candidates should note that 100 marks are allocated to this paper. To pass candidates must achieve 50% of the total marks available. In addition, candidates must achieve a minimum of 40% from Section A and a minimum of 40% from Section B.
2. Non-programmable calculators may be used.
3. All formulae used must be stated and the method of working and all intermediate steps must be made clear in the answer.

Materials to be supplied by examination centres:

Candidate's examination workbook
Stability Formulae Datasheets

INSTRUCTIONS TO CANDIDATE

General Information

Before the examination begins you should ensure that you have been provided with any ancillary material required for the examination. "*Materials to be supplied by examination centre*" are listed on the front sheet of the examination paper.

All mobile phones **MUST** be surrendered to the Invigilator during the period of the examination.

Completion of Examination Workbook

CANDIDATES SHOULD READ THE MARITIME AND COASTGUARD AGENCY POLICY REGARDING CHEATING IN EXAMINATIONS, THEN SIGN AND COMPLETE THE DECLARATION ON THE INSIDE FRONT COVER.

YOUR EXAMINATION SCRIPT WILL NOT BE MARKED UNLESS YOU COMPLETE AND SIGN THIS FORM.

Please write in **BLOCK CAPITALS** on the cover of your workbook your name, date of birth, Candidate Number, subject number and title, course of study, centre attended, centre of examination, if different, and date of examination. You should be in possession of a candidate examination card giving your candidate number. If you are not in possession of this card the information can be provided by the Invigilator. **(Note: examination cards are not supplied to CEC and Yacht candidates)**

If an additional workbook/graph paper/worksheet is used these must be included inside the original workbook. An 'X' should be inserted in the appropriate box under Note 3 on the workbook cover in such circumstances.

In the space provided in the section 'Questions Attempted' on the workbook cover you must ***circle the numbers*** of the questions you have attempted. Do not make any entries in the boxes indicated 'For Markers Use Only'.

Use **BOTH** sides of each sheet. The answers to **EACH NEW QUESTION** must start at the top of a fresh page and the number of the question should be inserted at the top of each page. Use **ink** for all essential written matter, which should be contained within the feint ruled vertical lines. (While pencil may be used for diagrams and sketches, annotations to these should be in ink.). Please **DO NOT** use red ink.

YOUR EXAMINATION SCRIPT WILL NOT BE MARKED IF IT IS COMPLETED IN PENCIL AND/OR RED INK.

Show all necessary working in calculations, etc. (Rough work, not intended to be read by the marker, should be scored out.)

No part of this book is to be torn out. No writing is allowed on any other paper other than ancillary material/examination inserts. Please ensure you write your name and centre on all examination paper inserts.

Examination Room Conduct

All queries should be addressed to the Invigilator.

No candidate may enter the examination room later than **30 minutes** after the examination begins and no candidate may leave the examination room, except in the case of illness, during the first hour of an examination. Candidates may not leave an examination room during the last **fifteen minutes** of an examination.

Any candidate who leaves the examination room before the end of the examination must leave his or her examination paper with the Invigilator. Examination papers must not be removed from the examination room during the period of the examination.

All candidates must hand their workbook(s) to the Invigilator before leaving. Workbooks must not be removed from the examination room even if they have not been used.

OOW SQA STAB MARCH 0

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain the reasons for loadlines. (5)

   (b) A vessel is loading in port in a Tropical Zone.

   Summer load draught 10.62m; FWA 280mm; Dock water density 1.009tm^{-3}.
   Calculated TPC (Dock Water) 26 (constant).

   The water line is 205mm below the Summer load line.

   Calculate EACH of the following:

   (i) the sinkage required in port in order that the vessel will be on her Tropical marks in the open sea; (12)

   (ii) the quantity of cargo to load to be on her Tropical marks at sea. (3)

2. (a) Explain the difference between an *angle of list* and an *angle of loll*. (5)

   (b) Describe a safe procedure for correcting an *angle of loll*. (6)

   (c) A box shaped vessel is presently at a mean draught of 6.24m and is listed 4° to port.

   KG 8.2m; KM 9.0m (constant); TPC 32; Displacement 10 400t

   Calculate the quantity of cargo to be loaded in the tween deck, 13.5m off the centreline in order to finish upright. (5)

   (d) The vessel in Q2(c) now loads 700t of cargo. Calculate the draught on completion of loading this parcel. (4)

OOW SQA OPS MARCH 05

Section B

3. With reference to a vessel moored alongside having completed all cargo operations:

   (a) produce a checklist to indicate the deck duties of the Officer of the Watch (OOW) whilst waiting for the next sailing tide; (12)

   (b) explain the initial emergency procedures the OOW should take in the event of discovering a fire. (8)

4. (a) Describe the precautions and equipment required when using a gangway as a means of access to a vessel. (7)

   (b) Explain the procedures and precautions to be observed before entering an enclosed space. (13)

5. (a) Outline the objectives and purpose of the International Safety Management (ISM) Code. (11)

   (b) Describe the legal status and purpose of EACH of the following:

   (i) the Code of Safe Working Practices for Merchant Seamen (COSWP); (5)

   (ii) Merchant Shipping Notices (MSNs). (4)

JUN 05

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define EACH of the following terms:

   (i) centre of gravity; (1)

   (ii) centre of buoyancy; (1)

   (iii) metacentric height. (1)

   (b) Sketch a transverse labelled diagram illustrating a heeled vessel in stable equilibrium. (2)

   (c) A vessel is initially displacing 8 300t.
   KG 7.64m; KM 8.92m (constant)

   A 110t weight is to be shifted from a position on the centreline Kg 2.4m to a position Kg 11.2m on the centreline using the vessel's own derrick. The derrick head is 37m above the keel.

   Calculate the vessel's GM for EACH of the following:

   (i) when the weight is lifted clear of its initial position; (5)

   (ii) when the weight has been shifted; (5)

   (iii) when the weight has been discharged ashore. (5)

2. (a) (i) State Archimedes principle. (3)

   (ii) Define TPC. (2)

   (b) A vessel is loading in SW of RD 1.025.
   Waterline Length 89m; Breadth 22m; C_W 0.83.

   Calculate the TPC. (4)

   (c) Datasheet Q2 refers to a vessel with initial draughts of forward 4.6m, aft 4.8m in FW. The vessel then loads 3 830t of cargo.

   Find EACH of the following:

   (i) the initial displacement; (3)

   (ii) the final displacement; (1)

   (iii) the final mean draught in FW. (7)

[OVER

JUN 05

Section B

3. (a) Describe the preparations and precautions that should be taken to ensure both the vessel's watertight integrity and the security of the cargo. (13)

   (b) Outline the methods contained within the Code of Safe Working Practices for Merchant Seaman (COSWP) to ensure *safe movement* onboard a vessel. (7)

4. (a) Describe the preparations required when using a pilot ladder/hoist as a means of access to a vessel. (7)

   (b) A general cargo vessel is at anchor discharging into barges. Explain the duties of the Officer of the Watch (OOW) during the operation. (13)

5. (a) Describe the precautions and preparations to be taken by the Officer of the Watch (OOW) before, during and after bunkering operations. (17)

   (b) Define a *special area* under the IMO MARPOL 73/78 Convention. (3)

OCT 05

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define EACH of the following:

(i) trim; (2)

(ii) LCF. (3)

(b) A vessel floating in SW is initially displacing 11 300t. LCG 68.8m foap. LBP 135m.

The vessel then loads the following cargo:

110t at a position 120m foap
118t at a position 82m foap
77t at a position 42m foap
20t at a position 125m foap

Using Datasheet Q1 *Hydrostatic Particulars 'A'* and by taking moments about the After Perpendicular, calculate the final draughts forward and aft. (15)

2. (a) A vessel is initially displacing 10 200t

KG = 5.75m. KM = 6.72m (constant).

Cargo operations are conducted as follows:

2 200t of cargo at Kg of 5.8m – Loaded
650t of cargo at Kg of 1.9m – Loaded
1 900t of cargo at Kg of 7.6m – Discharged.

Allow Free Surface Moments (FSM's) of 1 320tm.

Calculate the final GM of the vessel. (16)

(b) A double bottom tank when partially filled has an FSE of 0.326m.

Calculate the new FSE if the same double bottom was fitted with a centreline longitudinal watertight subdivision. (4)

OCT 05

Section B

3. (a) Describe the precautions and equipment required for EACH of the following means of access:

   (i) a vessel's gangway; (7)

   (ii) a pilot ladder. (7)

   (b) List SIX items of safety equipment required for enclosed space entry. (6)

4. (a) An oil tanker is loading alongside. Explain the duties of the Officer of the Watch (OOW) during the operation. (15)

   (b) List the Personal Protective Equipment (PPE) that an OOW should wear during mooring operations. (5)

5. (a) State FIVE annexes that are listed under the IMO MARPOL 73/78 Convention. (5)

   (b) State the liability resulting from an offence connected with discharge of oil from cargo tanks or machinery space bilges under UK regulations. (2)

   (c) Outline the entries that must be made in the *Garbage Record Book.* (10)

   (d) Describe the purpose of a MGN published by the Maritime and Coastguard Agency (MCA). (3)

SO 270

Nov. 05

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define EACH of the following:

(i) DWA; (2)

(ii) TPC. (2)

(b) A vessel is loading in port in a Winter Zone:

Summer load draught 11.22m;
FWA 310mm;
Calculated TPC (Dock Water) 33 (constant);
Dock water density $1.012tm^{-3}$;
The water line is 510mm below the Summer load line.

Calculate EACH of the following:

(i) the sinkage required in port in order that the vessel will be on her Winter marks in the open sea; (12)

(ii) the quantity of cargo to load to be on her Winter marks at sea. (4)

2. (a) Define EACH of the following:

(i) LCF; (2)

(ii) LBP. (2)

(b) A vessel floating in SW is initially displacing 10 820t. LCG 68.6m foap. LBP 138m.

The vessel then loads the following cargo:

280t	at a position	110m	foap
1150t	at a position	77m	foap
428t	at a position	46m	foap
70t	at a position	121m	foap

Using Datasheet Q2 - *Hydrostatic Particulars A,* and by taking moments about the After Perpendicular, calculate the final draughts forward and aft. (16)

NOV 05.

Section B

3. With reference to a general cargo vessel which is alongside loading:

   (a) explain a system of *garbage management* that can be utilised by the Officer of the Watch (OOW) to prevent pollution; (7)

   (b) explain other duties that the OOW may execute during loading of the cargo, in addition to garbage management. (13)

4. (a) Outline the entries that must be made in an Oil Record book, parts 1 and 2. (9)

   (b) State the conditions that must be applied under Annex I, MARPOL 73/78 with respect to the discharge of oil or oily mixture residue from cargo, into any part of the sea from an oil tanker. (6)

   (c) Outline the functions of approved Oil Discharge Monitoring and Control System Equipment (ODMCS) as required by Annex I, MARPOL 73/78. (5)

5. Explain the precautions and procedures that must be taken when entering an enclosed or confined space on a merchant vessel such as an empty cargo or ballast tank. (20)

MARCH 06.

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) With reference to a vessel's transverse stability, define EACH of the following terms:

   (i) GM; (2)

   (ii) M. (2)

   (b) A vessel is initially upright and displacing 15 340t.

   KG. 9.62m; KM. 10.00m.

   A Port and Starboard Double Bottom tank EACH have the following dimensions:

   L = 28m; B = 7.3m; D = 2.4m.

   The tanks are then partially filled with water RD 1.015 to an ullage of 0.3m.

   Calculate the vessel's final GM allowing for a total Free Surface Effect of 0.22m. 61 (16)

2. (a) Describe, with the aid of a sketch, EACH of the following:

   (i) centre of gravity; (2)

   (ii) centre of buoyancy. (2)

   (b) Sketch an inclined vessel in neutral equilibrium, indicating the position of G, M, K, B and B_1. (3)

   (c) A vessel has a displacement of 38 900t.

   KG = 8.54m; KM 9.98m.

   Calculate the quantity of deck cargo which must be loaded at Kg 15.02m so that the vessel can sail with a GM of 0.82m. 4116 t (13)

MARCH 06.

Section B

3. (a) Describe the precautions and preparations required for EACH of the following means of access:

   (i) a vessel's gangway; (7)

   (ii) a pilot ladder. (7)

   (b) List SIX items of safety equipment required for enclosed space entry. (6)

4. (a) State FIVE pollution prevention measures itemised on a tanker's *Ship Shore Safety Checklist*. (5)

   (b) An oil tanker is alongside. Explain the duties of the Officer of the Watch (OOW) before, during and after loading operations. (15)

5. (a) Describe the purpose of an MSN published by the Maritime and Coastguard Agency (MCA). (3)

   (b) State FIVE annexes that are listed under the IMO MARPOL 73/78 Convention. (5)

   (c) Define a *special area* under the IMO MARPOL 73/78 Convention. (3)

   (d) Outline the entries that must be made in the Garbage Record Book. (9)

JULY 06

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define EACH of the following:

   (i) density; (2)

   (ii) DWA. (3)

   (b) A vessel is floating in Salt Water.

   L 110m; B 41.3m; d 5.22m; C_w 0.87; C_b 0.91.

   Summer Load draught 8.96m. Light displacement 18520t

   Calculate EACH of the following:

   (i) present displacement; (3)

   (ii) TPC; (3)

   (iii) Summer Load displacement; (3)

   (iv) FWA; (3)

   (v) Summer Load deadweight. (3)

2. (a) Define the term *trimming moment*. (2)

   (b) A vessel floating in SW is initially displacing 10 050t.

   LCG 69.2m foap. LBP 140m.

   The vessel then carries out the following cargo operations:

Loads	862t	at a position	112m	foap
	1200t	at a position	68m	foap
	1006t	at a position	45m	foap
Discharges	93t	at a position	126m	foap
	50t	at a position	30m	foap

(18)

Using Datasheet Q2 - *Hydrostatic Particulars A* and by taking moments about the After Perpendicular, calculate the final draughts forward and aft.

[OVER

JULY 06.

Section B

3. With reference to a vessel loading general cargo, explain the duties of the Officer of the Watch (OOW) with respect to EACH of the following:

   (a) the security of the vessel and cargo; (10)

   (b) the safety of personnel. (10)

4. (a) Describe the purpose of EACH of the following MCA publications:

   (i) MGN; (3)

   (ii) MIN; (3)

   (iii) MSN. (3)

   (b) Outline the objectives and purpose of the International Safety Management (ISM) Code. (11)

5. (a) Describe the precautions and equipment required for EACH of the following means of access:

   (i) a vessel's gangway; (7)

   (ii) a pilot ladder. (7)

   (b) Explain the initial emergency procedures the OOW should take in the event of discovering a fire. (6)

OCTOBER 96.

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define EACH of the following:

   (i) trim; (1)

   (ii) MCTC; (1)

   (iii) LCB; (2)

   (iv) LCF. (2)

   (b) A vessel is displacing 12 748t in SW.

   LCG 69.2m foap; LBP 142m.

   The vessel then shifts 300t of cargo from a position 132m foap, to a position 35m foap.

   Calculate using Datasheet Q1 - *Hydrostatic Particulars A* and by taking moments about the After Perpendicular, the final draughts forward and aft. (14)

2. (a) Define EACH of the following:

   (i) metacentric height; (2)

   (ii) centre of buoyancy. (2)

   (b) Using Worksheet Q2 - *GZ Curve*, determine EACH of the following:

   (i) range of stability; (1)

   (ii) maximum GZ; (2)

   (iii) angle of maximum GZ; (2)

   (iv) angle of vanishing stability; (2)

   (v) initial GM. (3)

   (vi) angle of deck edge immersion. (2)

   (c) A vessel is initially upright.

   KM 10.77m (constant); KG 9.78m; Displacement 12 456t.

   Calculate the Moment of Statical Stability (Righting Moment) when the vessel is heeled to an angle of 7°. (4)

OCT 06.

Section B

3. With reference to a vessel engaged in mooring operations:

   (a) outline the Personal Protective Equipment (PPE) that must be worn when on stand-by forward or aft; (3)

   (b) explain the duties of the Officer in Charge at the after mooring station. (17)

4. (a) With reference to the Code of Safe Working Practices for Merchant Seamen (COSWP):

      (i) state the minimum information that should be included on a *Permit to Work*; (6)

      (ii) outline the methods to ensure *safe movement* whilst on board. (8)

   (b) List the equipment that should be available at the entrance of an enclosed space in the event of an emergency. (6)

5. (a) State the annexes that are listed under the IMO MARPOL 73/78 Convention. (6)

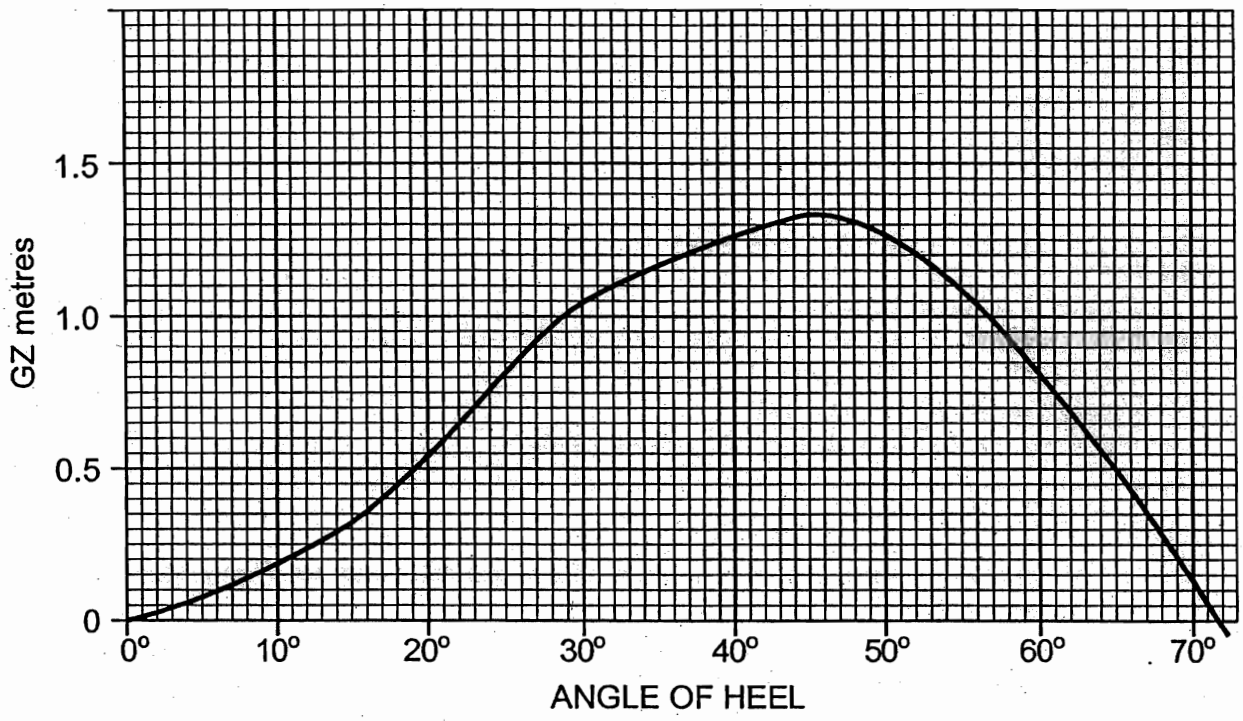
   (b) State the liability resulting from an offence connected with discharge of oil from cargo tanks or machinery space bilges under UK regulations. (3)

   (c) State the conditions that must be complied with under Annex I, MARPOL 73/78, with respect to the discharge of oil or oily mixture residue from machinery spaces, into any part of the sea. (6)

   (d) Outline the functions of approved Oil Discharging Monitoring and Control System (ODMCS) as required by Annex I, MARPOL 73/78. (5)

(This Worksheet must be returned with your answer book)

OCT 06.



Candidate's Name ..... Examination Centre .....

Dec 06.

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define EACH of the following:

(i) DWA; (2)

(ii) TPC. (2)

(b) A vessel is loading in port in a Winter Zone.

Summer load draught 10.6m.
FWA 290mm.
Calculated TPC (Dock Water) 33 (constant).
Dock water density 1018kg/m^3
The water line is 490mm below the Summer Loadline.

Calculate EACH of the following:

(i) the sinkage required in port in order that the vessel will be on her Winter Marks in the open sea; (12)

(ii) the quantity of cargo to load to be on her Winter marks at sea. (4)

2. (a) A vessel is initially displacing 10000t

KG= 5.50m. KM= 6.45m (constant)

Cargo operations are conducted as follows:

1800t of cargo at Kg of 5.8m – Loaded
800t of cargo at Kg of 2.1m – Loaded
1850t of cargo at Kg of 7.1m – Discharged

Allow Free surface moments (FSM'S) of 1460tm.

Calculate the final GM of the vessel. (16)

(b) A double bottom tank when partially filled has an FSE of 0.410m.

Calculate the new FSE if the same double bottom was fitted with a centreline longitudinal watertight subdivision. (4)

DEC 16.

Section B

3. (a) Describe the precautions that should be taken and the equipment required for EACH of the following means of access:

   (i) a vessel's gangway; (7)

   (ii) a pilot ladder. (7)

   (b) List the equipment that should be available at the entrance of an enclosed space prior to entry. (6)

4. With reference to a General Cargo Vessel which is loading alongside:

   (a) explain a system of *garbage management* that can be utilised by the Officer of the Watch (OOW); (7)

   (b) explain the other duties of the Officer of the Watch (OOW), in addition to *garbage management*, during loading of the cargo. (13)

5. (a) Outline the objectives and purpose of the *International Safety Management (ISM) Code.* (11)

   (b) Describe the legal status and purpose of EACH of the following:

   (i) the *Code of Safe Working Practices for Merchant Seamen (COSWP)*; (5)

   (ii) Merchant Shipping Notices (MSN). (4)

MARCH 07

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain the reasons for loadlines. (5)

(b) A vessel is loading in port in a Tropical Zone.

Summer load draught 11.50m FWA 290mm Dock Water density 1012tm^{-3}
Calculated TPC (Dock Water) 26 (constant).

The water line is 210mm below the summer loadline.

Calculate EACH of the following:

(i) the sinkage required in port in order that the vessel will be on her Tropical marks in the open sea; (12)

(ii) the quantity of cargo to load to be on her Tropical marks at sea. (3)

2. (a) (i) State Archimedes principle. (3)

(ii) Define TPC. (2)

(b) A vessel is loading in SW of RD 1.025.
Waterline length 104m; Breadth 31m; C_w 0.83.

Calculate the TPC. (4)

(c) Datasheet Q2 – *Hydrostatic Particulars A* refers to a vessel with initial draughts of forward 4.6m, aft 6.00m in SW.
The vessel then loads 2300t of cargo.

Find EACH of the following:

(i) the initial displacement; (3)

(ii) the final displacement; (1)

(iii) the final mean draught in SW. (7)

MARCH 07

Section B

3. (a) Outline the entries which must be made in an *Oil Record Book*, parts 1 and 2. (9)

   (b) State the conditions that must be applied under Annex 1, MARPOL 73/78 with respect to the discharge of oil, oily mixture residue from the cargo tanks, or pumproom into any part of the sea from an oil tanker. (6)

   (c) Outline the function of an approved Oil Discharge Monitoring and Control System (ODMCS) as required by Annex 1, MARPOL 73/78. (5)

4. (a) State FIVE Pollution Prevention measures itemised on a tankers Ship/Shore Safety Checklist. (5)

   (b) (i) Explain the duties of the Officer of the Watch (OOW) before, during and after loading operations on an oil tanker. 12)

   (ii) State the additional considerations that should be taken when the tanker is loading at a single point mooring (SPM). (3)

5. Explain the precautions and procedures that must be taken when entering an enclosed or confined space on a Merchant Vessel. (20)

JULY 07.

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Describe, with the aid of a sketch, EACH of the following:

   (i) centre of gravity; (2)

   (ii) centre of buoyancy. (2)

   (b) Sketch an inclined vessel in neutral equilibrium, indicating the position of G, M, K, B and B_1. (3)

   (c) A vessel has a displacement of 40050t.

   KG= 8.90m; KM 10.48m.

   Calculate the quantity of deck cargo which must be loaded at Kg 16.4m so that the vessel can sail with a GM of 0.90m. (13)

2. (a) Describe what is meant by the term *Free Surface Effect (FSE).* (4)

   (b) A vessel is initially upright and displacing 16415t.

   KG=8.72m; KM= 9.90m.

   Both Port and Starboard Double Bottom Tanks have the following dimensions:

   L = 31m; B = 8.4m; D = 2.7m.

   The tanks are then partially filled with water RD 1019 to an ullage of 0.4m.

   Calculate the vessel's final GM allowing for a total Free Surface Effect of 0.31m. (16)

Section B

3. (a) A general cargo vessel is preparing for sea. Describe the preparations and precautions that should be taken to ensure both the vessel's watertight integrity and security of the cargo. (13)

   (b) Outline the methods contained within the *Code of Safe Working Practices for Merchant Seamen(COSWP)* to ensure *safe movement* aboard a vessel. (7)

4. (a) Describe the precautions that should be taken and the preparations required for EACH of the following means of access:

   (i) a vessel's gangway; (7)

   (ii) a pilot ladder. (7)

   (b) List SIX items of *safety equipment* required for enclosed space entry. (6)

5. (a) Describe the purpose of EACH of the following MCA publications:

   (i) MGN; (3)

   (ii) MIN; (3)

   (iii) MSN. (3)

   (b) State the conditions that must be applied under Annex 1, MARPOL 73/78 with respect to the discharge of oil, oily mixture residue from cargo tanks or pumproom into any part of the sea from an oil tanker. (11)

OCTOBER 07.

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) With reference to a vessel's transverse stability, define EACH of the following terms:

   (i) GM; (2)

   (ii) M. (3)

   (b) A vessel floating in SW is initially displacing 10095t. LCG 65.4m foap. LBP 130m.

   The vessel then loads the following cargo:

144t	at a position	112m foap
138t	at a position	91m foap
98t	at a position	30m foap
41t	at a position	121m foap

   Using Datasheet Q1 - *Hydrostatic Particulars 'A'* and by taking moments about the After Perpendicular, calculate the final draughts forward and aft. (15)

2. A vessel is loading in SW of RD 1025 and is 0.38m light of her marks.

   KM 9.85m (constant); KG 8.60m; TPC 26 Present displacement 10675t

   The vessel partially fills TWO Double Bottom(DB) tanks, each to an ullage of 0.25m with fuel oil at RD 0.961. The DB tanks EACH have the following dimensions:

   Length 10m; Breadth 12.5m; Depth 2.6m

   (a) Calculate the tonnage of fuel oil loaded. (5)

   (b) The vessel then loads a parcel of deck cargo at Kg 12m in order to bring the vessel down to her marks.

   Calculate EACH of the following:

   (i) the amount of deck cargo to load; (3)

   (ii) the final GM on sailing allowing for a free surface moment(FSM) of 3890tm. (8)

   (c) Explain TWO methods whereby Free Surface Effect (FSE) may be reduced or eliminated in a compartment. (4)

Section B

3. (a) With reference to the *Code of Safe Working Practices for Merchant Seamen (COSWP):*

   (i) state the minimum information that should be included on a *Permit to Work*; (6)

   (ii) outline the methods to ensure *safe movement* whilst on board. (8)

   (b) List the equipment that should be available at the entrance of an enclosed space, prior to entry. (6)

4. (a) An oil tanker is discharging alongside. Explain the duties of the Officer of the Watch (OOW) during this operation. (15)

   (b) List Personal Protective Equipment (PPE) that an Officer of the Watch (OOW) should wear during mooring operations. (5)

5. (a) Define *Garbage* as described in MARPOL 73/78. (3)

   (b) Describe the precautions and preparations to be taken by the Officer of the Watch (OOW) to prevent pollution for EACH of the following:

   (i) taking bunkers; (7)

   (ii) management of *garbage*, in port. (5)

   (c) State TEN items which may be found on an oil Tanker's *Ship/Shore Safety Checklist.* (5)

Nov. 07.

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define EACH of the following:

(i) trim; (2)

(ii) LCF. (3)

(b) A vessel floating in SW is initially displacing 12030t. LCG 65.2m foap LBP 145m

The vessel then loads the following cargo:

96t	at a position	104m foap
105t	at a position	67m foap
56t	at a position	40m foap
10t	at a position	117m foap

Using Datasheet Q1 – *Hydrostatic Particulars 'A'*, and by taking moments about the After Perpendicular, calculate the final draughts forward and aft. (15)

2. (a) Explain the difference between an *angle of list* and an *angle of loll*. (5)

(b) Describe a safe procedure for correcting an *angle of loll*. (6)

(c) A vessel is presently at a mean draught of 5.3m and is listed 3° to port.

KG = 7.8m; KM = 8.5m(constant); TPC 28 (constant) ; Displacement 9900t

Calculate the quantity of cargo to be loaded in the tween deck, 11.4m off the centreline in order to finish upright. (5)

(d) The vessel in Q2(c) now loads 560t of cargo. Calculate the draught on completion of loading. (4)

Section B

3. (a) Name the Annexes that are listed under the IMO MARPOL 73/78 Convention. (6)

   (b) State the liability resulting from an offence connected with discharge of oil from cargo tanks or machinery space bilges under UK regulations. (3)

   (c) State the conditions that must be complied with under Annex 1, MARPOL 73/78, with respect to the discharge of oil, or oily mixture residue from machinery spaces into any part of the sea. (6)

   (d) Outline the functions of an approved Oil Discharge Monitoring and Control System (ODMCS) as required by Annex 1, MARPOL 73/78. (5)

4. (a) Describe the procedure, precautions and equipment used when rigging a *gangway* as a means of access to a vessel. (7)

   (b) Explain the procedures and precautions to be observed prior to entering a ballast tank. (13)

5. (a) Describe the precautions and preparations to be taken by the Officer of the Watch (OOW), before, during and after bunkering operations. (17)

   (b) Define a *special area* under IMO MARPOL 73/78 Convention. (3)

Mar - 08

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Describe, with the aid of sketches , EACH of the following:

(i) centre of gravity; (2)

(ii) metacentric height; (2)

(iii) initial transverse metacentre. (2)

(b) A vessel has a displacement of 35 000t.

KG = 8.22m; KM = 9.56m (constant).

(i) Calculate the quantity of deck cargo which must be loaded at Kg 15.80m so that the vessel can sail with a GM of 0.80m. (10)

(ii) Calculate the righting moment if the vessel is heeled to an angle of 5° upon completion of loading. (4)

2. (a) A vessel on an even keel, at a summer Load draught of 11.60m, is at anchor outside a port in SW of RD 1.025.

TPC 19 Summer Load Displacement 14 200t.

Depth of water available at the bar = 8.80m.

Calculate the quantity of cargo to discharge into barges in order that the vessel can pass over a bar at the river entrance (RD 1.025) with an under keel clearance of 1.20m. (10)

(b) Calculate the FWA of the vessel. (5)

(c) Explain why it is necessary to know the Dock Water density when loading a vessel to her Summer Marks. (5)

Section B

3. (a) Describe the precautions and equipment required for EACH of the following means of access:

   (i) a vessel's gangway; (7)

   (ii) a pilot ladder. (7)

   (b) List the equipment that should be available at the entrance of an enclosed space in the event of an emergency. (6)

4. (a) Describe the purpose of EACH of the following MCA publications:

   (i) MGN; (3)

   (ii) MIN; (3)

   (iii) MSN. (3)

   (b) State the conditions that must be applied under Annex 1, MARPOL 73/78 with respect to the discharge of oil or oily mixture residue from cargo, into any part of the sea from an oil tanker. (11)

5. With reference to a vessel moored alongside having completed all cargo operations:

   (a) outline the deck duties of the Officer of the Watch (OOW) whilst waiting for the next sailing tide; (12)

   (b) explain the initial emergency procedures the Officer of the Watch (OOW) should take in the event of discovering a fire on board. (8)

Jul - 08

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) A vessel on an Even Keel, at a summer load draught of 13.65m, is at anchor outside a port in SW of RD 1.025.

TPC 22 Summer Load displacement 17400t.

Calculate the quantity of cargo to discharge into barges in order that the vessel can pass over a bar at the river entrance (RD 1.025) with an underkeel clearance of 1.5m. Depth of water available at the bar is 13.80m. (10)

(b) Calculate the FWA of the vessel in Q1(a). (5)

(c) Explain why it is important to know the Dock Water Density, whilst loading a deadweight cargo. (5)

2. A vessel is floating in SW at an Even Keel draught of 6.80m.

LCG 69.50m LBP 132m.

The OOW then carries out the following operations:

Transfers 100t bunkers from fwd deep tank (LCG 115m foap) to an after bunker tank (LCG 25m foap), and 50t ballast water from the after peak tank (LCG 15m foap) to the fore peak tank (LCG 126m foap).

Using Datasheet Q2 - *Hydrostatic Particulars 'A'*, calculate the final draught forward and aft. (20)

Section B

3. (a) List the precautions to be observed before entering cargo tanks, ballast tanks or void spaces on a Merchant Vessel. (15)

   (b) State the precautions and limitations when using a combustible gas indicator (explosimeter). (5)

4. With reference to a vessel engaged in mooring operations:

   (a) outline the Personal Protective Equipment (PPE) that must be worn when on standby at forward or aft; (5)

   (b) explain the duties of the Officer in Charge at the after mooring station, (15)

5. (a) Define a *Particularly Sensitive Sea Area (PSSA).* (3)

   (b) Describe the precautions and preparations to be taken by the Officer of the Watch during cargo operations, to prevent pollution for EACH of the following:

      (i) taking bunkers on a passenger vessel; (7)

      (ii) management of garbage on any vessel. (5)

   (c) State TEN items that may be found on a tanker's *Ship-Shore Check List.* (5)

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define EACH of the following:

(i) trim; (2)
(ii) LCF; (2)
(iii) MCTC. (2)

(b) A vessel is floating in SW with an initial displacement of 10200t.
LCG 69.60m foap; LBP 136m.

The vessel then carries out the following operations

Loads 108t at a position 125m foap
Loads 208t at a position 30m foap

Using Datasheet – *Hydrostatic Particulars A*, calculate the final draughts forward and aft. (14)

2. (a) Define *TPC*. (2)

(b) State what EACH of the following represent on a vessel's Loadline mark:

(i) F; (1)
(ii) W; (1)
(iii) T; (1)
(iv) LS; (1)
(v) WNA; (1)
(vi) S. (1)

(c) A vessel is floating in Dock Water (RD 1.000) with an even keel draught of 4.65m. The vessel is 2m light of her final completion draught in the Dock Water (DW).

Using Datasheet – *Hydrostatic Particulars 'A'*, find EACH of the following:

(i) the initial displacement; (2)
(ii) the final displacement; (2)
(iii) the quantity of cargo to load to reach her final completion draught. (3)

(d) The vessel then proceeds to sea (RD 1.025), find the new mean draught. (5)

Section B

3. With reference to a General Cargo Vessel alongside loading cargo:

   (a) list the information to be included on the cargo plan; (10)

   (b) outline the main duties of a Cargo Watchkeeping Officer. (10)

4. (a) List the principal sources of information available to a ship's officer regarding the carriage of any form of dangerous cargo. (10)

   (b) List the documentation and information a shipper is required to supply to a vessel loading dangerous goods in packaged form. (10)

5. (a) Describe precautions to be taken prior to loading fuel oil bunkers. (7)

   (b) State the actions that should be taken by the OOW, in the event of a bunker fuel spill. (10)

   (c) Describe the action to be taken regarding the disposal of plastics on board a vessel. (3)

November - 08

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain, with the aid of a sketch, why the LCF of a ship shaped vessel may change with draught. (5)

   (b) A vessel floating in SW with an initial displacement of 9888t. LCG 68.80m foap; LBP 140m.

   The vessel then carries out the following operations:

Loads	444t	at a position	126m	foap
Loads	500t	at a position	80m	foap
Loads	600t	at a position	38m	foap
Disch	30t	at a position	110m	foap

   Using Datasheet Q1 – *Hydrostatic Particulars 'A'*, calculate the final draughts forward and aft. (15)

2. (a) Sketch typical GZ curves which illustrate EACH of the following conditions:

   (i) a stiff vessel; (2)
   (ii) a tender vessel; (2)
   (iii) a vessel with an angle of loll of 20° and a range of stability of 45°. (2)

   (b) A vessel is initially upright.

   KM 12.00m; KG 9.90m; Displacement 15200t.

   Calculate the Moment of Statical Stability (MSS) when heeled to an angle of 9°. (4)

   (c) Worksheet Q2 relates to the Curve of Statical Stability (GZ Curve) of a vessel.

   From the GZ curve, extract EACH of the following information:

   (i) range of stability; (1)
   (ii) the angle of maximum GZ; (1)
   (iii) the maximum GZ; (2)
   (iv) the angle of vanishing stability; (2)
   (v) approximate initial GM; (2)
   (vi) approximate angle of deck edge immersion. (2)

Section B

3. A general cargo vessel is to load a heavy transformer on deck using ship's gear.

   Explain the precautions and checks which should be taken before and during loading. (20)

4. List the precautions to be observed before entering any enclosed or confined space on a Merchant Vessel, such as an empty cargo or ballast tank. (20)

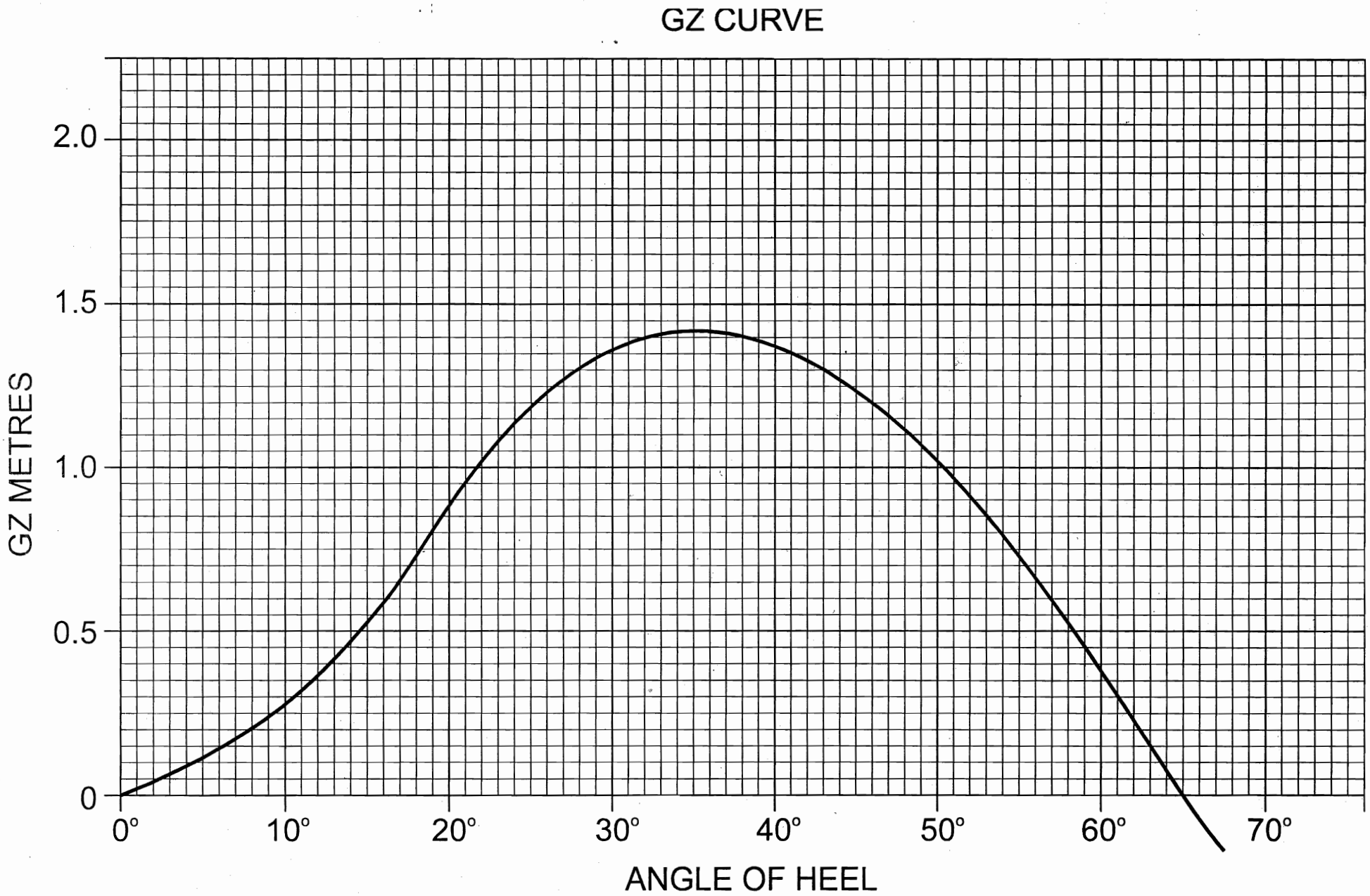
5. (a) State the annexes that are listed under the IMO MARPOL 73/78 Convention. (6)

   (b) State the liability resulting from an offence connected with discharge of oil from cargo tanks or machinery space bilges under UK Regulations. (3)

   (c) State the conditions that must be complied with under Annex 1, MARPOL 73/78, with respect to the discharge of oil or oily mixture residue from machinery spaces, into any part of the sea. (7)

   (d) Outline the functions of approved Oil Discharging Monitoring and Control System (ODMCS) as required by Annex 1, MARPOL 73/78. (4)

(This Worksheet must be returned with your answer book)



Candidate's Name .....

Examination Centre .....

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define angle of list. (2)

(b) A vessel is initially upright.
KG 8.20m; KM 9.10m (constant); present displacement 11200t

The following cargo operations are carried out:

Loads	80t	at KG 9.20m,	4.20m to port of centreline
Loads	76t	at KG 3.00m,	5.00m to stbd of centreline
Discharges	160t	at KG 4.10m,	4.60m to stbd of centreline
Discharges	34t	at KG 6.10m,	2.00m to port of centreline

Calculate final angle and direction of list after completion of these operations. (18)

2. (a) A vessel is inclined by an external force and has positive stability. Sketch the forces acting upon the vessel and the points through which they are assumed to act. (6)

(b) Define EACH of the following terms:

(i) Moment of statical stability; (2)

(ii) Righting lever; (2)

(iii) Centre of buoyancy; (2)

(iv) Centre of gravity (2)

(c) A vessel is inclined by an external force to an angle of heel of 6½°.

Displacement 125 000t; KM 17.90m; KG 16.00m.

Calculate the moment of statical stability. (6)

Section B

3. (a) Describe the precautions and equipment required when using a *gangway* as a means of access to a vessel. (9)

   (b) Explain the procedures and precautions to be observed before entering an enclosed space. (11)

4. (a) Define *garbage* as described in MARPOL 73/78. (2)

   (b) State the SIX annexes that are listed under IMO MARPOL 73/78 Convention. (6)

   (c) Define a *special area* under IMO MARPOL 73/78. (3)

   (d) Outline the entries which must be made in the garbage record book. (9)

5. An oil tanker is alongside. Explain the duties of the Officer of the Watch (OOW) before, during and after loading operations. (20)

JULY 2009

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define *Free Surface Effect (FSE).* (2)

   (b) A vessel is initially upright and displacing 14 250t.

   KG 8.66m; KM 10.01m.

   A Port and Starboard Double Bottom tank EACH have the following dimensions:

   L = 22m; B = 7.84m; D = 1.80m

   The tanks are then partially filled with water RD 1.018 to an ullage of 0.30m.

   Calculate the vessel's final GM allowing for a total Free Surface Effect of 0.15m. (18)

2. A vessel floating in SW is initially trimmed and displacing 12 523t, LCG 68.90m foap, LBP 140m.

   50t of bunkers are transferred from the forward bunker tank (131m foap), to an after bunker tank (25m foap).

   With reference to Datasheet Q2 - *Hydrostatic Particulars 'A'*, calculate the final draughts fwd and aft. (20)

Section B

3. (a) With reference to pollution prevention, describe precautions to be taken prior to loading bunker fuel. (7)

   (b) In the event of an oil spill, during cargo operations, state the actions which should be taken by the Officer of the Watch (OOW). (10)

   (c) Describe the action to be taken regarding the disposal of plastics on board a vessel. (3)

4. (a) Describe the precautions that should be taken, prior to sailing, to ensure EACH of the following:

      (i) the vessel's watertight integrity; (8)

      (ii) the securing of cargo. (5)

   (b) Outline the methods contained within the Code of Safe Working Practices for Merchant Seamen (COSWP) to ensure *safe movement* aboard a vessel. (7)

5. (a) Outline the entries that must be made in an Oil Record Book, parts 1 and 2. (9)

   (b) State the conditions that must be applied under Annex I, MAROL 73/78 with respect to the discharge of oil or oily mixture residue from cargo, into any part of the sea from an oil tanker. (6)

   (c) Outline the functions of approved Oil Discharge Monitoring and Control System Equipment (ODMCS) as required by Annex 1, MARPOL 73/78. (5)

October-09

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. A vessel is floating in SW with an initial displacement of 9888t; LCG 68.80m foap LBP 140.00m.

   The vessel carries out the following operations:

Loads	444t	at a position	126m	foap
Loads	500t	at a position	80m	foap
Loads	600t	at a position	38m	foap
Discharges	30t	at a position	110m	foap

   With reference to Datasheet Q1 - *Hydrostatic Particulars 'A'*, calculate the final draughts forward and aft. (20)

2. (a) With reference to a vessel's transverse stability, define EACH of the following terms:

   (i) GM; (2)

   (ii) KM. (2)

   (b) A vessel is initially upright and displacing 16 800t

   KG = 9.68m, KM = 10.04m

   A Port and Starboard Double Bottom tank EACH have the following dimensions:

   L = 30.00m, B = 8.20m, D = 2.00m

   The tanks are then partially filled with water RD 1.015 to an ullage of 0.20m.

   Calculate the vessel's final GM allowing for a total Free Surface Effect of 0.25m. (16)

Section B

3. With reference to a vessel engaged in mooring operations:

   (a) outline the Personal Protective Equipment (PPE) that must be worn when on stand-by forward or aft; (5)

   (b) explain the duties of the Officer in Charge at the Forward Mooring Station. (15)

4. (a) Describe the procedures and preçautions to be taken whilst loading a heavy lift on board a cargo vessel, alongside in port. (13)

   (b) Describe the rigging of a vessel's *gangway* in port with due regard to safety. (7)

5. (a) State the FIVE hazards associated with the carriage of Chemicals in bulk, describing the associated precaution for EACH. (15)

   (b) List the protective equipment which must be provided aboard a chemical tanker in order to satisfy the requirements of the IBC code for ships carrying dangerous chemicals in bulk. (5)

December - 09

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. A vessel is initially upright.

   KG 7.00m; KM 8.60m (constant); Present displacement 12500t.

   The following operations are now carried out:

Loaded	30t at Kg 8.00m,	5.00m	to port of centreline
	88t at Kg 10.80m,	3.50m	to port of centreline
Discharged	80t at Kg 5.00m,	11.00m	to starboard of centreline

   Calculate the final angle and direction of list after completion of operations. (20)

2. A vessel floating in SW is initially displacing 8 900t, LCG 70m foap. LBP 120m.

   The following cargo operations are carried out:

Loads	182t at a position	80m foap
Loads	120t at a position	35m foap

   With reference to Datasheet Q2 - *Hydrostatic Particulars 'A'*, calculate the final draughts fwd and aft. (20)

[OVER

Section B

3. (a) Describe the precautions and preparations required for EACH of the following means of access:

   (i) a vessel's gangway; (7)

   (ii) a pilot ladder. (7)

   (b) List SIX items of safety equipment required for enclosed space entry. (6)

4. (a) State FIVE pollution prevention measures itemised on a tanker's *Ship Shore Safety Checklist.* (5)

   (b) Outline the objectives and purpose of the *International Safety Management (ISM) Code.* (11)

   (c) Describe the purpose of an MSN published by the Maritime and Coastguard Agency (MCA). (4)

5. With reference to a tanker which is loading alongside:

   (a) explain a system of *garbage management* that can be utilised by the Officer of the Watch (OOW); (7)

   (b) explain the other duties of the Officer of the Watch (OOW), in addition to *garbage management,* during loading of the cargo. (13)

HYDROSTATIC PARTICULARS 'A'

Draught m	Displacement t		TPC t		MCTC tm		KMt M	KB m	LCB foap m	LCF foap m
	SW RD 1.025	FW RD 1.000	SW RD 1.025	FW RD 1.000	SW RD 1.025	FW RD 1.000				
7.00	14576	14220	23.13	22.57	184.6	180.1	8.34	3.64	70.03	67.35
6.90	14345	13996	23.06	22.50	183.0	178.5	8.35	3.58	70.08	67.46
6.80	14115	13771	22.99	22.43	181.4	177.0	8.36	3.53	70.12	67.57
6.70	13886	13548	22.92	22.36	179.9	175.5	8.37	3.48	70.16	67.68
6.60	13657	13324	22.85	22.29	178.3	174.0	8.38	3.43	70.20	67.79
6.50	13429	13102	22.78	22.23	176.8	172.5	8.39	3.38	70.24	67.90
6.40	13201	12879	22.72	22.17	175.3	171.0	8.41	3.33	70.28	68.00
6.30	12975	12658	22.66	22.11	173.9	169.6	8.43	3.28	70.32	68.10
6.20	12748	12437	22.60	22.05	172.5	168.3	8.46	3.22	70.35	68.20
6.10	12523	12217	22.54	21.99	171.1	167.0	8.49	3.17	70.38	68.30
6.00	12297	11997	22.48	21.93	169.8	165.7	8.52	3.11	70.42	68.39
5.90	12073	11778	22.43	21.87	168.5	164.4	8.55	3.06	70.46	68.43
5.80	11848	11559	22.37	21.82	167.3	163.2	8.59	3.01	70.50	68.57
5.70	11625	11342	22.32	21.77	166.1	162.1	8.63	2.95	70.53	68.65
5.60	11402	11124	22.26	21.72	165.0	161.0	8.67	2.90	70.57	68.73
5.50	11180	10908	22.21	21.66	163.9	160.0	8.71	2.85	70.60	68.80
5.40	10958	10691	22.15	21.61	162.9	158.9	8.76	2.80	70.64	68.88
5.30	10737	10476	22.10	21.56	161.8	157.9	8.81	2.74	70.68	68.95
5.20	10516	10260	22.05	21.51	160.8	156.9	8.86	2.69	70.72	69.02
5.10	10296	10045	22.00	21.46	159.8	155.9	8.92	2.63	70.75	69.09
5.00	10076	9830	21.95	21.41	158.8	154.9	8.98	2.58	70.79	69.16
4.90	9857	9616	21.90	21.36	157.9	154.0	9.06	2.53	70.82	69.23
4.80	9638	9403	21.85	21.32	156.9	153.1	9.13	2.48	70.86	69.29
4.70	9420	9190	21.80	21.27	156.0	152.2	9.22	2.43	70.90	69.35
4.60	9202	8978	21.75	21.22	155.1	151.3	9.30	2.38	70.93	69.42
4.50	8985	8766	21.70	21.17	154.2	150.5	9.40	2.32	70.96	69.48
4.40	8768	8554	21.65	21.12	153.3	149.6	9.49	2.27	71.00	69.55
4.30	8552	8344	21.60	21.07	152.4	148.7	9.60	2.22	71.04	69.62
4.20	8336	8133	21.55	21.02	151.5	147.8	9.71	2.17	71.08	69.68
4.10	8121	7923	21.50	20.97	150.6	146.9	9.83	2.12	71.12	69.74
4.00	7906	7713	21.45	20.93	149.7	146.0	9.96	2.07	71.15	69.81
3.90	7692	7505	21.40	20.88	148.7	145.1	10.11	2.01	71.18	69.88
3.80	7478	7296	21.35	20.83	147.8	144.2	10.25	1.96	71.22	69.94
3.70	7265	7088	21.30	20.78	146.8	143.3	10.41	1.91	71.25	70.00
3.60	7052	6880	21.24	20.72	145.9	142.3	10.57	1.86	71.29	70.07
3.50	6840	6673	21.19	20.67	144.9	141.3	10.76	1.81	71.33	70.14

THESE HYDROSTATIC PARTICULARS HAVE BEEN DEVELOPED WITH THE VESSEL FLOATING ON EVEN KEEL

OOW – Stability

SCOTVEC - SQA Answers

March 2005

1 (b) (i) 0.605 m (ii) 1573 t

2 (c) 43.1 t (d) 6.47 m

June 2005

1 (c) (i) 0.82 m (ii) 1.16 m (iii) 1.21 m

2 (b) 16.66 t/cm

2 (c) (i) 9190 t (ii) 13020 t (iii) 6.46 m

October 2005

1 (b) A 6.12 m F 5.29 m

2 (a) GM_{fluid} - 1.38 m (b) 0.081 m

November 2005

1 (b) (i) 43.7 cm (ii) 1442 mt

2 (b) A 6.40 m F 5.99 m

March 2006

1 (b) 0.625 m

2 (c) 4115.7 mt

July 2006

1 (b) (i) Δ - 22119.7 mt (ii) 40.51 t/cm (iii) 37967.8 mt

(iv) 234 mm (v) 19447.8 mt

2 (b) A 6.49 m F 6.10 m

October 2006

1 (b) A 7.42 m F 4.88 m

2 (c) 1503 mt

December 2006

1 (b) (i) 0.351 m (ii) 1156.21 mt

2 (a) 1.29 m (b) 0.1025 m

March 2007

1 (b) (i) 0.60 m (ii) 1561.52 mt or 1560 mt

2 (b) 27.43 t/cm

2 (c) (i) 10737 (ii) 13037 (iii) 6.33 m

July 2007

1 (c) 3993 mt

2 (b) 1.394 m

October 2007

1 (b) A 6.75 m F 3.83 m

2 (a) 564.6 t (b) (i) 423.4 t (ii) 1.15 m

November 2007

1 (b) A 7.70 m F 4.10 m

2 (c) 31.8 t (d) 5.51 m

March 2008

1 (b) (i) 2684.65 t (ii) 2627.547 tm

2 (a) 7600 mt (b) 187 mm

July 2008

1 (a) 2970 t (b) 198 mm

2. A 7.14 m F 6.47 m

October 2008

1 (b) A 5.64 m F 4.77 m

2 (c) (i) 9084 t (ii) 13436 t (iii) 4352 t

(d) 6.50 m

November 2008

1 (b) A 5.87 m F 5.33 m

2 (b) 4993.388

(c) (i) 0° ~ 65° (ii) 35° (iii) 1.42 m (iv) 65° (v) 1.26m

(vi) 20°

March 2009

1 (b) 3.7° Port

2 (c) 26885.763 tm

July 2009

1 (b) 1.482 m

2 A 6.778 m F 5.387 m

July 2009

1 (b) 1.482m 2. A 6.778m, F 5.387m

October 2009

F 5.325m A 5.865m GM 0.556m

December 2009

3.92 port, F 4.303m, A 5.008m

CERTIFICATES OF COMPETENCY IN THE MERCHANT NAVY – DECK OFFICER

EXAMINATIONS ADMINISTERED BY THE
SCOTTISH QUALIFICATIONS AUTHORITY
ON BEHALF OF THE
MARITIME AND COASTGUARD AGENCY

STCW 95 OFFICER IN CHARGE OF NAVIGATIONAL WATCH REG. II/1 (UNLIMITED)

034-84 – STABILITY AND OPERATIONS

0915 - 1145 hrs

Examination paper inserts:

Datasheet Q2 - *Hydrostatic Particulars 'A'*

Notes for the guidance of candidates:

1. Candidates should note that 100 marks are allocated to this paper. To pass candidates must achieve 50% of the total marks available. In addition, candidates must achieve a minimum of 40% from Section A and a minimum of 40% from Section B.

2. Non-programmable calculators may be used.

3. All formulae used must be stated and the method of working and all intermediate steps must be made clear in the answer.

Materials to be supplied by examination centres:

Candidate's examination workbook
Stability Formulae Datasheets

INSTRUCTIONS TO CANDIDATE

General Information

Before the examination begins you should ensure that you have been provided with any ancillary material required for the examination. "*Materials to be supplied by examination centre*" are listed on the front sheet of the examination paper.

All mobile phones **MUST** be surrendered to the Invigilator during the period of the examination.

Completion of Examination Workbook

CANDIDATES SHOULD READ THE MARITIME AND COASTGUARD AGENCY POLICY REGARDING CHEATING IN EXAMINATIONS, THEN SIGN AND COMPLETE THE DECLARATION ON THE INSIDE FRONT COVER.

YOUR EXAMINATION SCRIPT WILL NOT BE MARKED UNLESS YOU COMPLETE AND SIGN THIS FORM.

Please write in **BLOCK CAPITALS** on the cover of your workbook your name, date of birth, Candidate Number, subject number and title, course of study, centre attended, centre of examination, if different, and date of examination. You should be in possession of a candidate examination card giving your candidate number. If you are not in possession of this card the information can be provided by the Invigilator. **(Note: examination cards are not supplied to CEC and Yacht candidates)**

If an additional workbook/graph paper/worksheet is used these must be included inside the original workbook. An 'X' should be inserted in the appropriate box under Note 3 on the workbook cover in such circumstances.

In the space provided in the section 'Questions Attempted' on the workbook cover you must ***circle the numbers*** of the questions you have attempted. Do not make any entries in the boxes indicated 'For Markers Use Only'.

Use **BOTH** sides of each sheet. The answers to **EACH NEW QUESTION** must start at the top of a fresh page and the number of the question should be inserted at the top of each page. Use **ink** for all essential written matter, which should be contained within the feint ruled vertical lines. (While pencil may be used for diagrams and sketches, annotations to these should be in ink.). Please **DO NOT** use red ink.

YOUR EXAMINATION SCRIPT WILL NOT BE MARKED IF IT IS COMPLETED IN PENCIL AND/OR RED INK.

Show all necessary working in calculations, etc. (Rough work, not intended to be read by the marker, should be scored out.)

No part of this book is to be torn out. No writing is allowed on any other paper other than ancillary material/examination inserts. Please ensure you write your name and centre on all examination paper inserts.

Examination Room Conduct

All queries should be addressed to the Invigilator.

No candidate may enter the examination room later than **30 minutes** after the examination begins and no candidate may leave the examination room, except in the case of illness, during the first hour of an examination. Candidates may not leave an examination room during the last **fifteen minutes** of an examination.

Any candidate who leaves the examination room before the end of the examination must leave his or her examination paper with the Invigilator. Examination papers must not be removed from the examination room during the period of the examination.

All candidates must hand their workbook(s) to the Invigilator before leaving. Workbooks must not be removed from the examination room even if they have not been used.

March 2010

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) With reference to a vessel's transverse stability, explain EACH of the following terms:

   (i) GM; (3)

   (ii) KM. (3)

   (b) A vessel is initially upright and displacing 16800t.

   KG = 9.68m KM = 10.04m

   A Port and Starboard Double bottom tank EACH have the following dimensions:

   L = 30.0m B = 8.2m D = 2.0m

   The tanks are then partially filled with water RD 1.015 to an ullage of 0.2m.

   Calculate the vessel's final GM allowing for a total Free Surface Effect (FSE) on the vessel of 0.25m. (14)

2. (a) Sketch a typical curve of Statical Stability for EACH of the following:

   (i) a stiff vessel; (2)

   (ii) a tender vessel; (2)

   (iii) vessel lolled to an angle of 20° with a range of positive stability of 40°. (2)

   (b) State the effect of and dangers associated with EACH of the following:

   (i) a stiff vessel; (4)

   (ii) a tender vessel. (4)

   (c) List the information obtained from Statical Stability Curves. (6)

Section B

3. A dry cargo vessel is at anchor discharging into barges. Explain the deck duties of the OOW during this operation. (20)

4. (a) With reference to the Code of Safe Working Practices (COSWP):

   (i) state the minimum information to be included on a Entry Permit for an enclosed space; (7)

   (ii) outline the safety precautions required when a shore gangway is used as a means of access to a vessel. (7)

   (b) List the equipment that should be available at the entrance of an enclosed space in the event of an emergency. (6)

5. (a) Explain what is meant by a Particularly Sensitive Sea Area (PSSA) according to MARPOL 73/78. (3)

   (b) State the SIX annexes according to MARPOL 73/78. (6)

   (c) State the conditions that must be complied with under Annex 1, MARPOL 73/78 with respect to the discharge of oil or oily mixture residue from machinery spaces, into any part of the sea. (7)

   (d) With reference to MARPOL 73/78 Annex 5, state the documents that must be in use to satisfy compliance with the requirements of this annex. (4)

July 2010

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. A vessel is initially displacing 6440t.

   KG 9.40m; KM 10.56m (constant)

   A 70t transformer is to be discharged from a position on the centreline, Kg 7.4m using the vessel's own heavy lift crane. The crane head is 42m above the keel. The transformer will be landed ashore to a position 12m off the vessel's centreline.

   (a) Calculate the vessel's GM for EACH of the following:

   (i) when the weight is lifted just clear of it's initial stowage position; (7)

   (ii) when the weight is finally discharged ashore. (7)

   (b) Calculate maximum angle of list during the operation. (6)

2. A vessel is floating in SW at an Even Keel (EK) draught of 6.50m.

   LCG 69.50m; LBP 135m foap

   The OOW then carries out the following operations:

   Transfers 120t from fore deep bunker tank (115m foap) to aft settling tank (25m foap). Additionally transfers 60t of ballast from the AP (15m foap) to the FP (126m foap).

   (a) Using Datasheet Q2 - *Hydrostatic Particulars 'A'*, calculate the final draught fore and aft. (15)

   (b) The vessel is now required to proceed to sea with an Even Keel (EK) draught.

   Calculate the amount of ballast to transfer from the aft peak to the fore peak to bring vessel to EK. (5)

Section B

3. Explain the precautions necessary to be taken on board a *tanker* before loading a cargo with reference to EACH of the following:

   (a) safety; (10)

   (b) the avoidance of pollution. (10)

4. (a) With reference to the IMDG Code, explain what is meant by EACH of the following, stating what they are used for:

      (i) MFAG; (3)

      (ii) Ems. (3)

   (b) List the principal sources of information available to a ship's officer regarding the carriage of any form of dangerous cargo. (7)

   (c) List the information a shipper is required to supply to a vessel loading dangerous goods in packaged form. (7)

5. (a) List the duties of the OOW when at mooring stations with reference to safety. (5)

   (b) Outline the methods contained within the Code of Safe Working practices for Merchant Seamen (COSWP) to ensure *safe movement* onboard a vessel. (7)

   (c) Explain initial emergency procedures the OOW should take in the event of discovering a fire in port. (5)

   (d) Explain what is meant by a *Special Area* with reference to IMO Marpol 73/78 Convention. (3)

OCT 2010

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. A vessel is initially upright.

   KG 8.50m; KM 9.10m(constant) Present displacement 14 000t.

   The following operations are now carried out:

Load	55.0t at Kg 6.7m,	7.20m to port of centreline,
	100.0t at Kg 10.8m,	3.50m to port of centreline,
	150.0t at Kg 9.0m,	on the centreline,
Discharge	120.0t at Kg 5.0m,	11.0m to port of centreline

   Calculate the final angle and direction of list after completion of operations. (20)

2. (a) Define EACH of the following:

   (i) TPC; (2)

   (ii) MCTC. (2)

   (b) Explain the function of EACH of the following:

   (i) Loadline; (3)

   (ii) Loadline zones. (3)

   (c) A vessel is floating in fresh water with an Even Keel draught 4.55m. The vessel is 1.8m light of her final completion draught in the fresh water.

   Using Datasheet Q2 - *Hydrostatic Particulars 'A'*, find EACH of the following:

   (i) the initial displacement; (2)

   (ii) the final displacement; (2)

   (iii) the quantity of cargo to load to reach her completion draught. (2)

   (d) The vessel then proceeds to sea (RD 1.025), find the new mean draught. (4)

Section B

3. Explain the procedures for entering an enclosed space. (20)

4. (a) Outline the main considerations to be taken into account by the OOW with regard to the use and operation of any form of lifting plant. (6)

   (b) Describe the precautions and equipment required for rigging a pilot ladder means of access. (7)

   (c) Describe the preparations that should be made prior to encountering Heavy Weather. (7)

5. (a) State the objectives of the International Safety Management (ISM) Code, describing how these are achieved. (10)

   (b) State the conditions which must be applied under Annex 1, MARPOL 73/78 Convention with respect to the discharge of oil or oily mixture residue from a cargo tank into any part of the sea from an *oil tanker*. (7)

   (c) Explain what is meant by a *Special Area* with reference to the MARPOL 73/78 Convention. (3)

DEC 2010

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Define EACH of the following:

   (i) righting lever; (3)

   (ii) initial metacentric height. (3)

   (b) Describe, with the aid of a sketch, how free surface can cause a virtual rise of a vessel's centre of gravity. (10)

   (c) State the methods whereby Free Surface effect (FSE) may be reduced or eliminated in a compartment. (4)

2. A vessel floating in SW is initially displacing 8900t, LCG 70m foap. LBP 120m

   The following cargo operations are then carried out:

   Loads 182t at a position 80m foap,
   Loads 120t at a position 35m foap.

   (a) Using Datasheet Q2 *Hydrostatic Particulars 'A'*, calculate the final draughts forward and aft. (14)

   (b) Prior to sailing, the vessel's after draught is to be reduced to 4.800m.

   Calculate the amount of ballast to transfer from the after peak (LCG 5m foap) to the fore peak (LCG 115m foap). (6)

Section B

3. (a) Define EACH of the following terms:

   (i) flashpoint; (2)

   (ii) flammable range, (also known as the explosive range); (2)

   (iii) volatile petroleum. (2)

   (b) List 14 items found on an oil tanker's ship/shore check list. (14)

4. With reference to a general cargo vessel:

   (a) list the information to be included on a cargo plan; (10)

   (b) explain the main duties of the OOW whilst loading alongside. (10)

5. (a) Describe EACH of the following MCA documents:

   (i) MGN; (3)

   (ii) MIN; (3)

   (iii) MSN. (3)

   (b) Outline the entries which have to be made in the Oil Record Book Part 2. (6)

   (c) Outline the functions of the approved Oil Discharge Monitoring and Control System Equipment (ODMCS) as required by Annex 1, MARPOL 73/78. (5)

FEB 2018

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Sketch an unstable vessel heeled to a small angle. The sketch should clearly indicate the positions of G, B, M and Z and should also show the action of different forces. (8)

   (b) Explain the difference between an *angle of list* and an *angle of loll.* (6)

   (c) Sketch a GZ curve for an unstable ship at an angle of loll of 11° with a range of stability of 56°. (6)

2. A vessel is initially floating upright in salt water at a displacement of 9857 t, port side alongside.

   KG (fluid) 7.80 m KM 9.06 m (constant)

   A 71t wind turbine tower is to be loaded using the ships own crane, the head of which is 38 m above the keel. At present the tower is on the quay waiting to be loaded, 11.0 m from the centreline.

   The tower is to be loaded at a Kg of 2.3 m, 4 m to port of the centreline.

   Calculate EACH of the following:

   (a) the maximum angle and direction of list during the loading operation; (10)

   (b) the final angle and direction of list after loading is complete. (10)

Section B

3. With reference to the *Code of Safe Working Practices for Merchant Seamen:*

   (a) list the general considerations that must be made prior to entering an enclosed space; (7)

   (b) list the procedures and arrangements that must be made prior to entering an enclosed space; (11)

   (c) explain what is meant by a *competent person.* (2)

4. With reference to MARPOL 73/78, Annex V:

   (a) explain what is meant by the term *garbage;* (4)

   (b) state the occasions when entries must be made in the *Garbage Record Book*; (8)

   (c) state the maximum UK penalty on the Master for breach of garbage discharge requirements; (3)

   (d) (i) state how expired distress pyrotechnics may be disposed; (3)

   (ii) state how expired pyrotechnics may NOT be disposed. (2)

5. (a) State the objectives of the *ISM Code.* (3)

   (b) State the functional requirements of a *Safety Management System.* (12)

   (c) Explain what is meant by a non-conformity, stating one example. (5)

MARCH 2017

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Sketch a curve of statical stability for a vessel listed 7° with a range of positive stability of 66°. (6)

(b) Using Datasheet Q1 – GZ Curve, determine EACH of the following:

(i) the condition of stability of the vessel; (1)

(ii) range of positive stability; (1)

(iii) angle of vanishing stability; (1)

(iv) approximate angle of deck edge immersion; (1)

(v) maximum GZ; (1)

(vi) angle at which maximum GZ occurs; (1)

(vii) approximate initial GM. (1)

(c) (i) A ship has a displacement of 7263 t

KM 10.25 m KG 9.3 m

Calculate the righting moment at an angle of heel of 7°. (3)

(ii) Explain the difference between a *righting lever* and a *righting moment*. (4)

2. A vessel is initially upright in salt water at an even keel draught of 5.9 m. Two weights are to be loaded as follows:

70 t at a Kg of 2.5 m, 9 m to port of the centreline
25 t at a Kg of 10.5 m, 5.5 m to starboard of the centreline

The initial KG (solid) prior to loading is 7.3 m. A total Free Surface Moment of 2523 t-m exists on the vessel at this time.

Using Datasheet Q2 – *Hydrostatic Particulars 'A'*, determine EACH of the following:

(a) the final angle and direction of list after the two weights have been loaded; (14)

(b) the amount of ballast to be transferred, and in which direction, between No 3 Port and Starboard Ballast tanks so that the vessel will complete upright. (6)

Note: EACH ballast tank is rectangular, has a breadth of 10 m and is already slack.

Section B

3. (a) Outline the duties of the Officer of the Watch with respect to safety during cargo operations on a Ro-Ro passenger ferry. (18)

   (b) State the MCA code that should be consulted for advice on the securing of Ro-Ro cargo. (2)

4. (a) Produce a table or chart, for display on board, showing the permitted and/or prohibited discharge at sea of different categories of garbage regulated by MARPOL 73/78 Annex V, as amended. (14)

   (b) List the entries that should be made in the various columns of the *Garbage Record Book.* (6)

5. (a) Explain the legal status of the *Code of Safe Working Practices for Merchant Seamen.* (4)

   (b) Define and explain the purpose of EACH of the following:

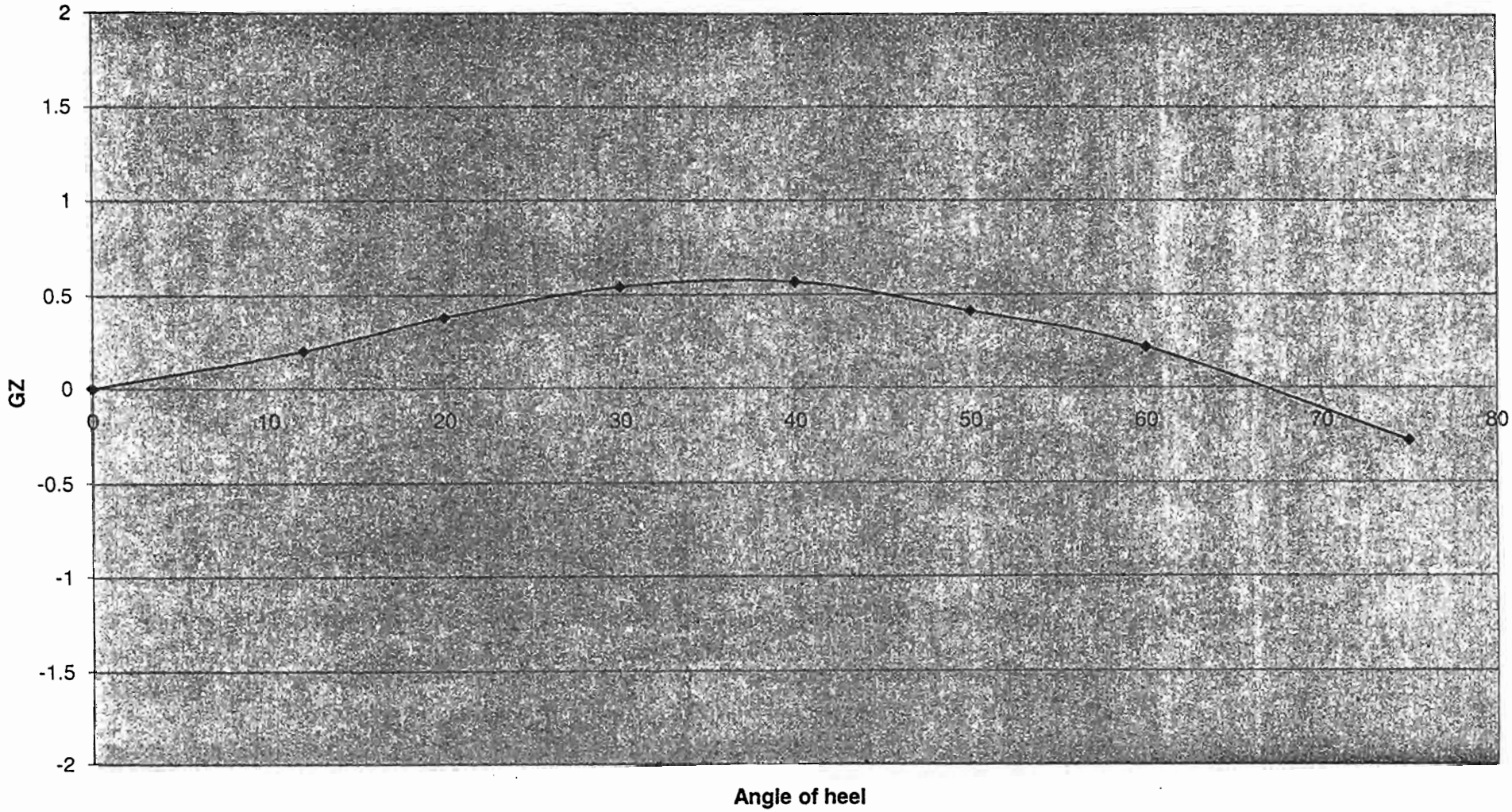
   (i) MSN; (5)

   (ii) MGN; (5)

   (iii) MIN. (3)

   (c) Explain the requirement for the carriage of current M Notices on board a UK ship. (3)

Datasheet Q 1 - Curve of Statical Stability



June 2011

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain EACH of the following terms:

(i) TPC; (3)

(ii) FWA. (4)

(b) A vessel is loading in port in dock water RD 1.015.

Initial draught (even keel) 5.62 m TPC_{SW} 20

The ship has a summer displacement of 22400 t which corresponds to a summer load draught of 6.10 m.

Calculate the maximum weight of cargo that can be loaded if the ship is to sail at her summer draught in salt water, given that 50 t of bunkers are still to be taken before the vessel sails. (13)

2. (a) Explain why the LCF of a vessel might change with draught. (3)

(b) A vessel LBP 135 m is floating in salt water at an even keel draught of 5.20 m.

The following cargo operations are then carried out:

Discharge 1560 t from lcg 81 m foap
Load 1700 t at lcg 90 m foap
Load 2100 t at lcg 35 m foap

Using Datasheet Q2 – *Hydrostatic Particulars 'A'*, calculate the final draughts fore and aft. (12)

(c) A ship has completed loading with the following draughts:

For'd 7.35 m Aft 8.90 m

MCTC 170 t-m

Calculate the weight of ballast to transfer between the fore peak tank (lcg 129 m foap) and the aft peak tank (lcg at the aft perpendicular) so that the ship sails with a trim of 1.00 m by the stern. (5)

Section B

3. (a) A general cargo vessel is in port and is to load a general cargo which includes palletized units, drums, timber and bagged cargo.

With reference to cargo operations, list EACH of the following:

(i) the duties of the Officer of the Watch prior to loading; (7)

(ii) the duties of the Officer of the Watch during loading operations. (7)

(b) List the basic information that should be detailed on a *Cargo Damage Report.* (6)

4. A container vessel is in port for loading operations. The cargo to be loaded includes a number of containers with packaged dangerous goods.

(a) State which publications and documents must be consulted when deciding on the stowage location and securing of dangerous goods. (5)

(b) Explain what the Officer of the Watch must ensure when the containers with dangerous goods are being loaded. (12)

(c) Describe what the Officer of the Watch must ensure with respect to the dangerous goods paperwork, after loading operations are completed. (3)

5. A ship of more than 400GT is to discharge *machinery space bilge water* inside a special area. With reference to MARPOL 73/78 Annex I:

(a) list the discharge criteria that must be complied with; (7)

(b) state the document in which this discharge should be recorded; (2)

(c) list the operations that must be recorded in this particular document; (9)

(d) state who should sign the entries and who should sign the pages of this document. (2)

OCT2011

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Sketch a stable vessel listed to a small angle. The sketch should clearly indicate the positions of G, B and M and should also show the action of the different forces. (6)

   (b) Explain the difference between an angle of list and an angle of loll. (6)

   (c) Outline the methods of correcting both an angle of list AND an angle of loll using ballast on a typical bulk carrier which has double bottom tanks with a single centreline division. (8)

2. (a) Explain the term LCF. (3)

   (b) A vessel LBP 125 m is floating in salt water at the following draughts:

   For'd 6.14 m Aft 7.76

   The vessel is required to cross a shoal where the depth at high water is 7.60 m with an underkeel clearance of 0.40 m.

   If LCF is 57 m foap and MCTC is 102.5 t-m, calculate EACH of the following:

   (i) the quantity of ballast to be transferred, and in which direction, between the fore peak tank (lcg 120.20 m foap) and the aft peak tank (lcg 5.30 m foap) so that the vessel will pass over the shoal at the correct draught; (12)

   (ii) the final draught for'd. (5)

Section B

3. A dry bulk carrier (LBP greater than 150 m) is in port loading a full cargo.

   (a) With reference to the *Ship/Shore safety checklist for the loading and unloading of dry bulk carriers*, list TEN items that must be checked prior to commencing cargo operations. (10)

   (b) List the duties of the officer of the watch during the loading of this ship. (10)

4. With reference to the *Code of Safe Working Practices for Merchant Seamen*, describe the requirements for safe access that must be complied with where a pilot is to board from a boat and the freeboard exceeds nine metres. (20)

5. With reference to MARPOL 73/78 Annex II:

   (a) list the operational discharge standards for vessels carrying noxious liquid substances of categories X, Y or Z when the vessel is at sea; (8)

   (b) state which record book is required to be kept by a vessel carrying noxious liquid substances in bulk; (2)

   (c) list FIVE operations that must be recorded in this record book. (10)

DEC 2011

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain EACH of the following:

   (i) Relative Density; (2)

   (ii) Archimedes Principle. (3)

   (b) A bulk carrier is loading in a dock water port (RD 1.008) and is initially at an even keel draft of 6.83 m.

   The ship has a summer displacement of 14576 t which corresponds to a summer load draft of 7.00 m.

   Assuming a constant TPC of 23.13, calculate the maximum weight of cargo that can be loaded if the vessel is to complete at her Tropical marks, given that 120 t of bunkers are still to be loaded prior to departure. (15)

   (NB - USE TPC SW = 23.13 - NOT CONSTANT) - NOT POSSIBLE TO BE CONSTANT IN THIS QUESTION

2. A vessel is initially lying in salt water at a displacement of 12073 t and has a starboard list of three degrees. KG is 7.89 m. Cargo is to be worked as follows:

Load	124 t at kg 5.6 m, 3.4 m to port of centreline
Discharge	256 t from kg 4.5 m, 3.6 m to starboard of centreline

   Using Datasheet Q2 – *Hydrostatic Particulars 'A'*:

   (a) calculate the final angle of list after completion of cargo operations; (15)

   (b) calculate the weight of ballast that must be transferred, and in which direction, between No 2 port and starboard double bottom ballast tanks so that the vessel finishes upright. (5)

   Note: EACH double bottom tank is rectangular with a breadth of 9.5 m and is already slack

Section B

3. A product tanker with an Inert Gas System is preparing for loading operations.

   (a) With reference to the Ship/Shore Safety Check-list, list FIFTEEN of the physical checks that must be made prior to commencement of cargo operations. (15)

   (b) If the vessel was moored to a Single Point Mooring (SPM), state the checks the officer of the watch should make in addition to the standard routine deck duties during cargo watch. (5)

4. A general cargo ship is loading pallets of drums using the ship's own cranes. The drums contain liquid classified as 'Dangerous Goods' and 'Marine Pollutants'.

   During loading the ship's crane fails causing a pallet of drums to be dropped on to the tank-top where some of the liquid subsequently spills.

   (a) List the immediate action that the officer of the watch should take. (14)

   (b) State the publications that should be consulted for advice on how to deal with this emergency. (4)

   (c) With reference to the damaged cargo, state the report that should subsequently be made. (2)

5. With reference to *MGN 298 – Measures to Counter Piracy, Armed Robbery and Other Acts of Violence against Merchant Shipping:*

   (a) outline the general precautions that should be observed when entering an area of risk; (10)

   (b) list FOUR items that should be covered in the ship's 'Anti-Attack Plan'; (8)

   (c) state the action to be taken by crew in the event that pirates gain access to the accommodation of the vessel. (2)

FEB 2012

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) State the condition of stability for EACH of the curves on Worksheet Q1(1) – *GZ Curve* and Worksheet Q1(2) – *GZ Curve*. (4)

   (b) Explain the differences between the two GZ curves. (8)

   (c) Describe the dangers associated with each condition of stability. (6)

   (d) Using Worksheet Q1(1) – GZ Curve, calculate the Righting Moment at an angle of heel of 15 degrees if the displacement is 14520 t. (2)

2. (a) A vessel is initially floating upright in salt water at a displacement of 10076 t, starboard side alongside.

   KG (solid) 7.45 m FSM 1712.9 t-m

   There are two 80 t weights on board which are to be discharged from the ship and landed on the quay at a position 12 m from the centreline using the ship's own derrick, the head of which is 26 m above the keel.

   At present each of the weights is on deck at kg 10.5 m. One weight is 4.0 m to port of the centreline and the other is 4.0 m to starboard of the centreline.

   Using Datasheet Q2 – *Hydrostatic Particulars 'A'*, calculate the maximum angle and direction of list that will occur during the discharge operation if the outboard weight is to be discharged first. (17)

   (b) Explain why free surfaces must be eliminated or minimised during heavy lift operations. (3)

Section B

3. With reference to a Ro-Ro cargo vessel:

   (a) state the information that should appear on the vessel's Cargo Loading Plan; (5)

   (b) explain the checks that should be made on the cargo before it is loaded; (5)

   (c) list the deck pre-sailing checks the officer of the watch should make prior to sailing. (10)

4. A vessel is in port loading cargo. She is to take bunkers from a barge which will tie up on the outboard side.

   (a) List the precautions that should be observed by the officer of the watch prior to the commencement of bunkering. (10)

   (b) State the immediate action that must be taken in the event of a spill of bunkers. (8)

   (c) State the document in which the spill should be recorded. (2)

5. With reference to MARPOL 73/78 Annex VI:

   (a) list the emissions which are regulated by the revised convention; (5)

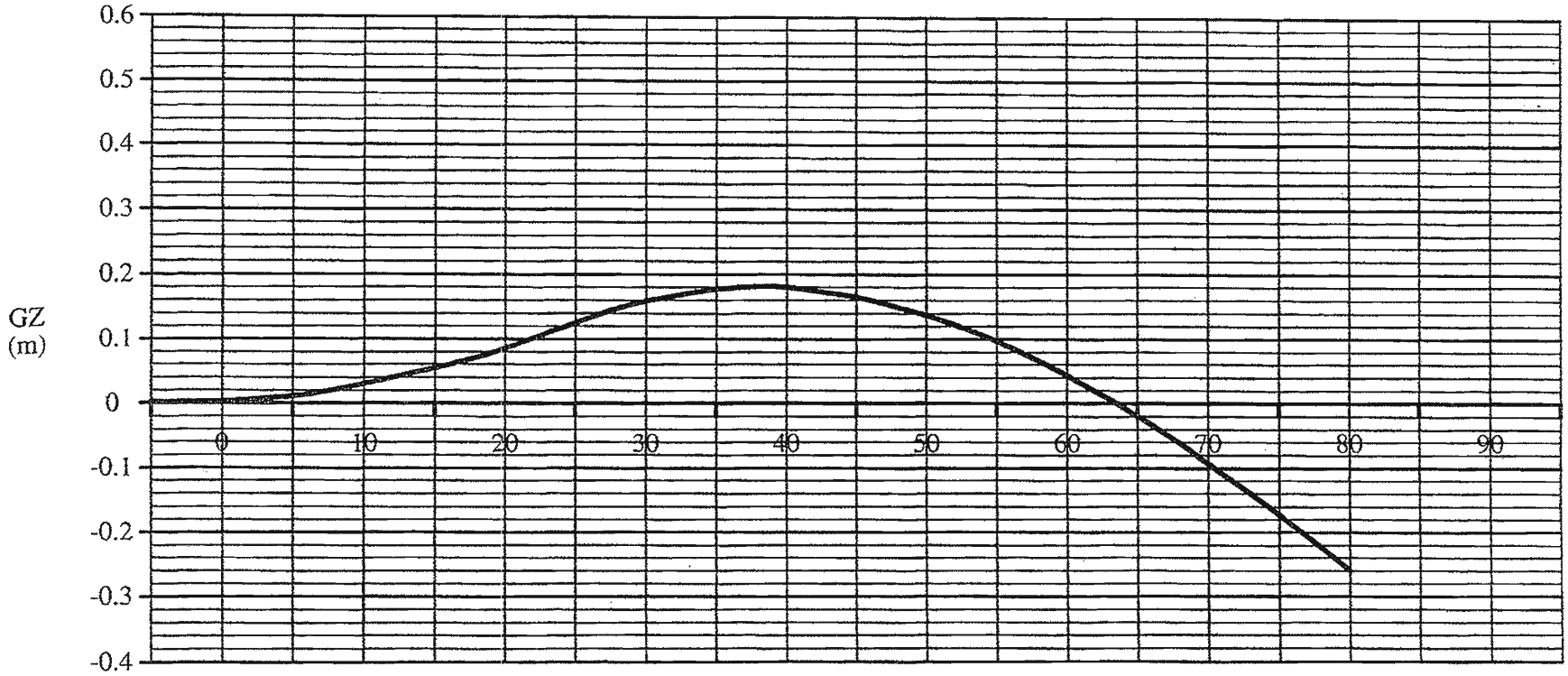
   (b) explain the term *Emission Control Area*; (3)

   (c) state which Emission Control Areas (ECAs) have been adopted under the revised convention; (6)

   (d) list THREE substances which may not be incinerated on board ship. (6)

WORKSHEET Q1(2) – GZ CURVE

(This Worksheet must be returned with your answer book)



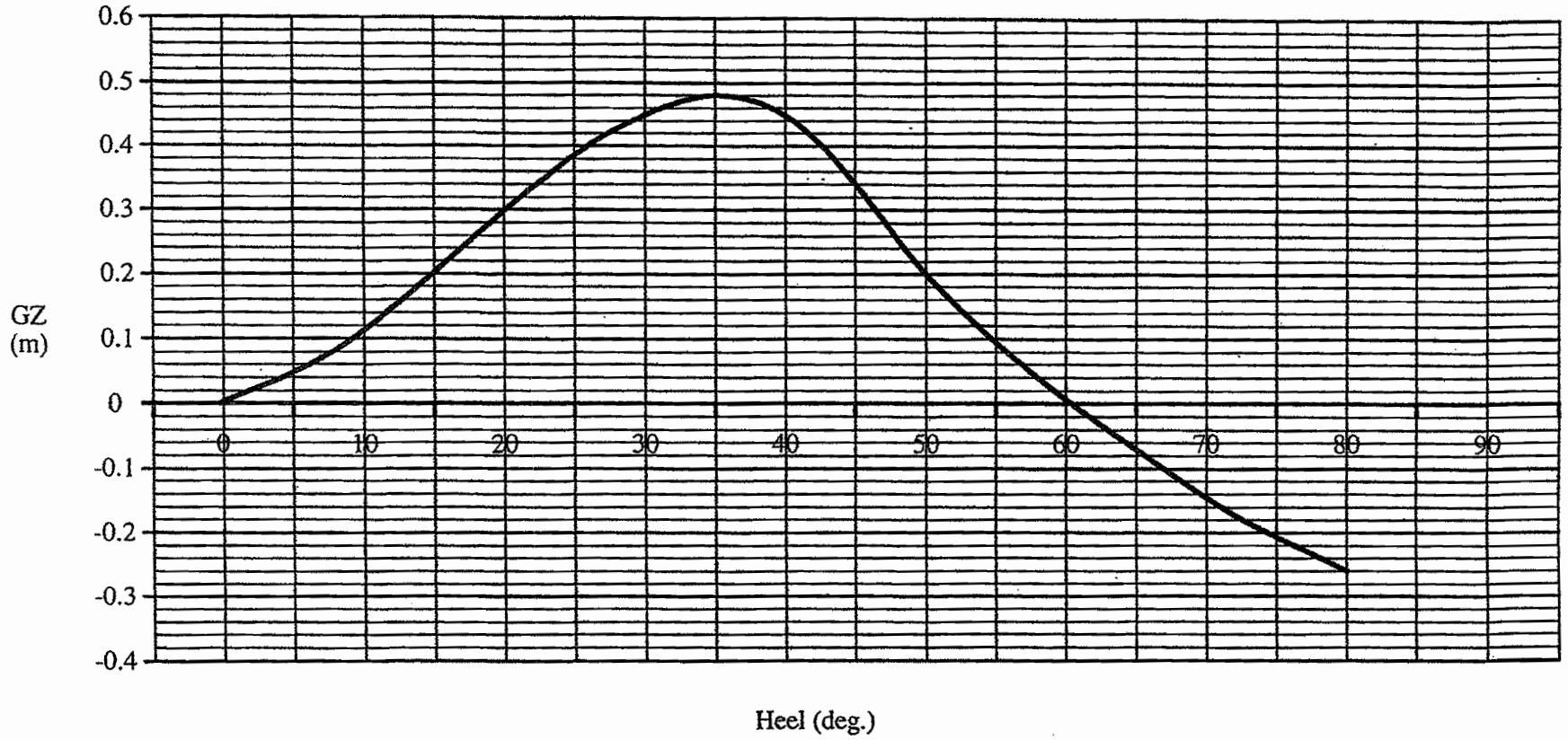
Feb 2012
Canada

Candidate's Name .....

Examination Centre .....

WORKSHEET Q1(1) – GZ CURVE

(This Worksheet must be returned with your answer book)



Candidate's Name .....

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STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Sketch a stable ship which is heeled to a small angle. The sketch should clearly indicate the positions of G, B, M and Z and should also show the action of forces. (6)

   (b) Explain EACH of the following terms:

   (i) neutral stability; (4)

   (ii) initial metacentric height. (3)

   (c) Describe, with the aid of a sketch, the relationship between equilibrium and angle of loll. (7)

2. (a) A vessel is initially floating upright in salt water at an even keel draft of 5.00 m, starboard side alongside. The initial KG (solid) is 7.95 m and the total Free Surface Moments at the time of loading are 5335 t-m.

   An 60 t transformer is to be discharged using the ship's own heavy lift derrick, the head of which is 20 m above the keel. At present the transformer is stowed in the hold at a kg of 3.5 m, on the centreline and it is to be landed on the quay at a distance of 8.0 m from the centreline.

   Using Datasheet Q2 – *Hydrostatic particulars 'A'*, calculate the maximum angle and direction of list during the discharge. (16)

   (b) Explain why it is important that free surfaces are eliminated or at least minimised during heavy lift operations. (4)

Section B

3. A vessel has just tied up alongside a lay-by berth for repairs and survey work. Access to the ship will be by a gangway which will be provided by the shore facilities. As part of the scheduled survey work, divers will be undertaking an inspection of the hull.

   (a) State the checks that the Officer of the Watch should make to ensure safe access when rigging the gangway. (10)

   (b) List the duties of the Officer of the Watch with respect to the diving operations that are to take place. (10)

4. With reference to MARPOL 73/78, Annex I:

   (a) list the conditions that must be complied with for the discharge of oil or oily mixtures from the cargo area of an oil tanker at sea; (13)

   (b) (i) state the document in which this discharge should be recorded; (2)

   (ii) list FIVE other operations that would be recorded in this document. (5)

5. (a) Explain the legal status of the *Code of Safe Working Practices for Merchant Seamen.* (4)

   (b) Define and explain the purpose of EACH of the following:

   (i) MSN; (5)

   (ii) MGN; (5)

   (iii) MIN. (3)

   (c) Explain the requirement for the carriage of current M Notices on board a UK ship. (3)

MAY 2012

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain EACH of the following terms:

   (i) stable ship; (4)

   (ii) unstable ship. (4)

   (b) With reference to Datasheet Q1(b), state EACH of the following for the TWO curves:

   (i) condition of initial stability; (2)

   (ii) approximate initial metacentric height; (2)

   (iii) range of stability. (2)

   (c) With reference to Datasheet Q1(b), GZ Curve Condition 'X', calculate the Righting Moment at an angle of heel of 25 degrees if the displacement is 15350 t. (6)

2. (a) A ship is floating in salt water at an even keel draft of 4.30 m and has a KG of 8.40 m.

   In this condition, a double bottom tank is full of fresh water. The tank is rectangular with the following dimensions:

   Length: 16 m Breadth (total): 18 m

   The tank is divided into two equal halves by a single longitudinal watertight subdivision.

   Using Datasheet Q2 – *Hydrostatic Particulars 'A'*, calculate the final effective metacentric height if a total of 288 t of fresh water is pumped out of the double bottom tank, leaving it slack. (15)

   Note: Equal volumes of water are pumped out from each side of the double bottom tank.

   (b) Explain how longitudinal subdivision of a tank affects free surface effect. (5)

Section B

3. A vessel has entered port and the security level has been set by both the flag and port states at 'Level 1'.

   (a) State the duties of the Officer of the Watch with respect to *security* at this level. (10)

   (b) List the additional duties if the security level is raised to 'Level 2'. (8)

   (c) State the document that should be consulted for details on the procedures to be followed at the different security levels for the vessel. (2)

4. (a) A general cargo vessel is in port for loading operations. The cargo to be loaded includes a number of palletised loads containing packaged dangerous goods.

      (i) State which publications and documents must be consulted when deciding on the stowage location and securing of dangerous goods. (5)

      (ii) Explain the duties of the Officer of the Watch when the pallets with dangerous goods are being loaded. (9)

   (b) With reference to the International Maritime Dangerous Goods (IMDG) Code, define EACH of the following, explaining the use of EACH:

      (i) Mfag; (3)

      (ii) EmS Guide. (3)

5. An oil tanker of more than 400 GT is to discharge *machinery space bilge water* inside a special area. With reference to MARPOL 73/78 Annex I:

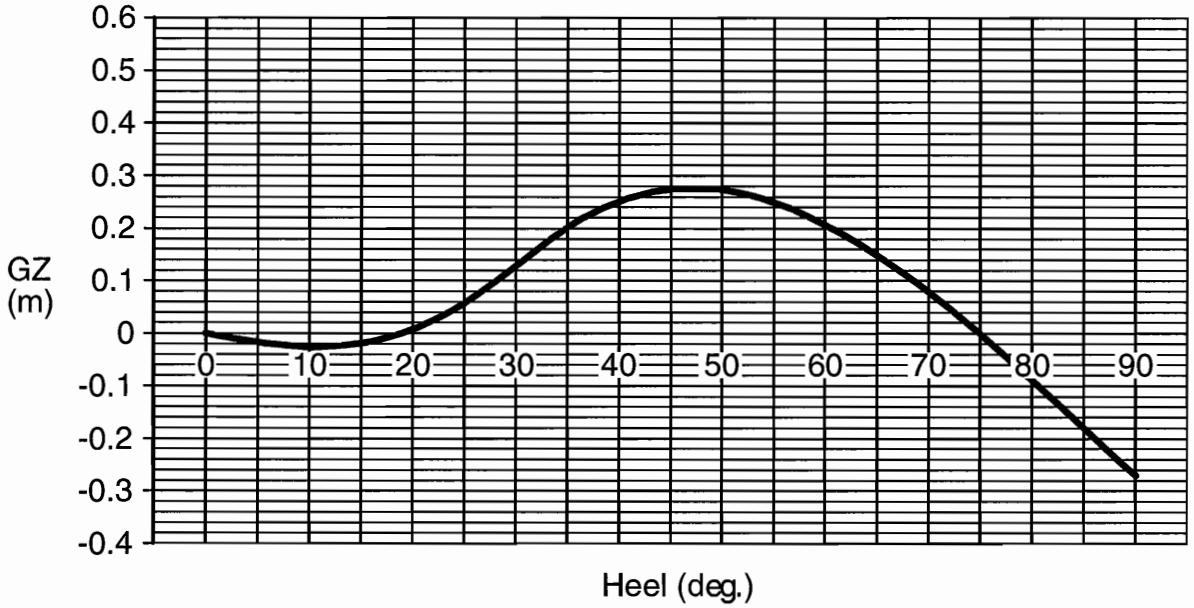
   (a) list the discharge criteria that must be complied with; (9)

   (b) state the document in which the discharge should be recorded; (2)

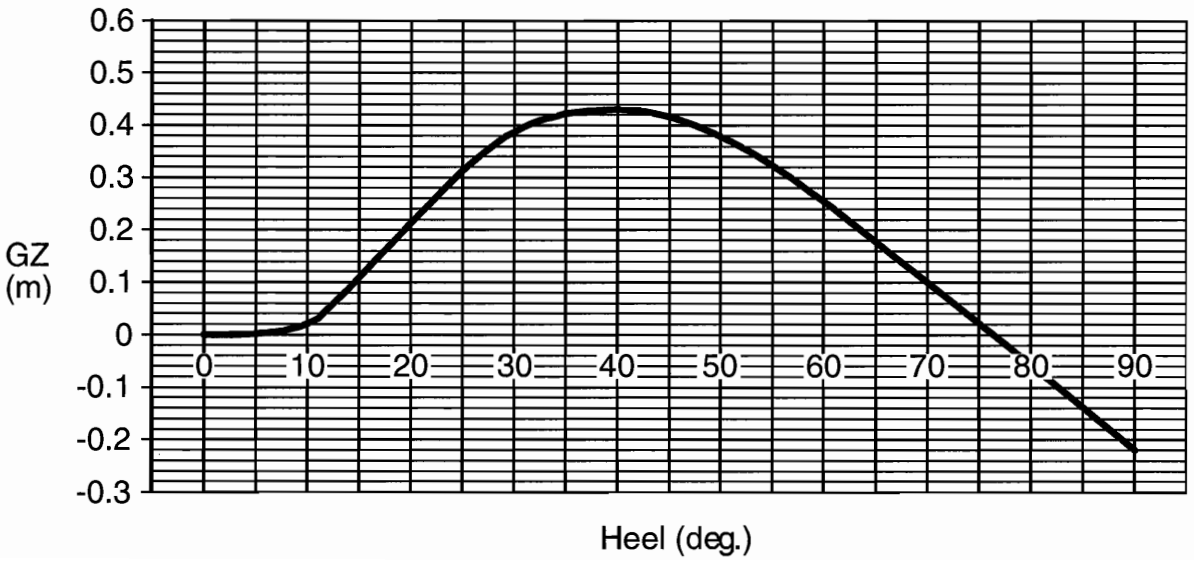
   (c) list FIVE of the operations that must be recorded in this particular document; (5)

   (d) state who should sign this document. (4)

GZ Curve condition 'X'



GZ Curve condition 'Y'



July 2012

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Sketch EACH of the following vessels, clearly indicating the positions of G, B, M and Z as appropriate and showing the action of forces:

   (i) an unstable vessel heeled to a small angle; (6)

   (ii) a vessel with neutral stability heeled to a small angle. (5)

   (b) Explain the term *stable equilibrium.* (2)

   (c) A vessel has a GM of 0.97m and a displacement of 15645 t. Calculate the Righting Moment at an angle of heel of 8°. (3)

   (d) Sketch a typical curve of statical stability for a vessel listed at an angle of 7° with a range of stability of 65°. (4)

July 2012

2. (a) A vessel LBP 138 m is lying in salt water with the following drafts:

   F'wd: 5.70 m Aft: 6.10 m

   Using Datasheet Q2 – *Hydrostatic Particulars A*, calculate the position of the vessel's LCG. (8)

   (b) A vessel LBP 140 m arrives at a fresh water port with an even keel draft of 6.00 m.

   The following cargo operations are then carried out:

   Load 753 t at lcg 62 m foap
   Load 620 t at lcg 66 m foap
   Discharge 114 t from lcg 42 m foap
   Discharge 154 t from lcg 70 m foap

   Using Datasheet Q2 – *Hydrostatic Particulars A*, calculate the final drafts in fresh water. (12)

Section B

3. (a) A general cargo vessel is in port and is to load a general cargo which includes palletized units, drums, timber and bagged cargo.

With reference to cargo operations, list EACH of the following:

(i) the duties of the Officer of the Watch prior to loading; (7)

(ii) the duties of the Officer of the Watch during loading operations. (7)

(b) List the basic information that should be detailed on a *Cargo Damage Report.* (6)

4. With reference to the *Code of Safe Working Practices for Merchant Seamen*, describe the requirements for safe access that must be complied with where a pilot is to board from a boat and the freeboard exceeds nine metres. (20)

5. (a) With reference to the International Maritime Dangerous Goods (IMDG) Code, define EACH of the following, explaining what they are used for:

(i) Mfag; (3)

(ii) EmS Guide. (3)

(b) With reference to the Code of Safe Working Practices for Merchant Seamen:

(i) describe what is meant by the term *dangerous space*; (3)

(ii) list the precautions that should be taken before a potentially dangerous space is entered; (7)

(iii) explain what is meant by the term *risk assessment.* (4)

OCT 2012

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain EACH of the following:

   (i) TPC; (3)

   (ii) C_w; (2)

   (iii) Freeboard. (2)

   (b) Complete the following calculations using Datasheet – *Hydrostatic Particulars A.*

   (i) A ship arrives in a salt water port with an even keel draught of 5.6 m. Calculate how much cargo can be loaded if the vessel is to sail with a draught of 6.0 m using only the displacement and draught values. (3)

   (ii) A ship displaces 12217 t in fresh water. A total of 1200 t of cargo is then discharged. Calculate the final draught in fresh water using only the displacement and draught values. (3)

   (iii) A ship initially has a salt water displacement of 12523 t and then discharges 675 t of cargo. Calculate the final draught in salt water using the appropriate TPC values. (7)

2. A vessel has completed loading in salt water at an even keel draught of 5.7 m and is upright. Her effective KG is 7.25 m at this time.

   At the time of departure, No 5 DB Port and No 5 DB Starboard tanks are both full and contain bunkers of relative density 0.96. EACH bunker tank is rectangular and has a length of 18 m, a breadth of 10 m and a depth of 1.6 m.

   During the voyage, bunkers are consumed from No 5 DB starboard tank only and the ullage on arrival for this tank is 1.40 m.

   Using Datasheet - *Hydrostatic Particulars A,* calculate EACH of the following:

   (a) the effective metacentric height on arrival at the discharge port; (14)

   (b) the angle of list at the time of arrival. (6)

Section B

3. (a) Outline the duties of the Officer of the Watch with respect to safety during cargo operations on a Ro-Ro passenger ferry. (18)

   (b) State the MCA code that should be consulted for advice on the securing of Ro-Ro cargo. (2)

4. A general cargo ship is loading pallets of drums using the ship's own crane. The drums contain liquid classified as *Dangerous Goods* and *Marine Pollutants*.

   During loading the ship's crane fails causing a pallet of drums to be dropped on to the tank-top where some of the liquid subsequently spills.

   (a) List the immediate action that the Officer of the Watch should take. (10)

   (b) State the publications and documents that should be consulted in the first instance for advice on how to deal with this emergency. (5)

   (c) State the reports that should subsequently be made. (5)

5. With reference to MARPOL 73/78, Annex V:

   (a) explain what is meant by the term *garbage*; (4)

   (b) state the occasions when entries must be made in the *Garbage Record Book*; (8)

   (c) state the maximum UK penalty on the Master for breach of garbage discharge requirements; (3)

   (d) (i) state how expired distress pyrotechnics should be disposed of; (3)

   (ii) state TWO methods of disposal of expired distress pyrotechnics that are specifically prohibited at sea. (2)

NOV 2012

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) State the reasons for loadlines. (3)

(b) A vessel is alongside in port where the dock water relative density is 1.009 and is planning to stop loading a cargo of bulk coal at a draught of 6.70 m. All required bunkers, stores and fresh water for the forthcoming voyage have already been taken.

Charterer's instructions require the ship to be loaded to the deepest draught possible for a voyage in a winter zone.

The vessel's FWA is 187.5 mm and the summer load draught is 6.443 m.

(i) State, with reasons, whether or not the vessel can proceed from the berth at this draught. (3)

(ii) Calculate the weight of cargo that must be either loaded or discharged so that the vessel sails at the required draught, if TPC is assumed to be constant at 23.3 t. (14)

2. (a) Define the term LCB. (3)

(b) A vessel LBP 133 m is floating in salt water at the following draughts:

For'd 7.32 m Aft 8.20 m

In order to enter port the vessel must cross a bar at the entrance which has a charted depth of 8.20 m. The vessel will cross the bar at high water when the height of tide will be 0.20 m. Underkeel clearance required by the owners is 0.40 m.

If LCF is 63 m foap and MCTC is 104.7 t-m.

Calculate EACH of the following:

(i) the quantity of ballast to be transferred, and in which direction, between the fore peak tank (lcg 130.2 m foap) and the aft peak tank (lcg 5.30 m foap) so that the vessel will pass over the shoal at the correct draught; (13)

(ii) the final draught for'd. (4)

Section B

3. (a) Outline the procedures and precautions that must be taken when a ship is to load a heavy lift. (18)

   (b) State the document that must be checked to ensure that the lifting gear has been adequately maintained and inspected. (2)

4. With reference to the Code of Safe Working Practices for Merchant Seamen:

   (a) list the precautions and procedures that should be observed prior to entering a deep tank on a general cargo vessel which has been used to store palm oil; (13)

   (b) list the procedures that should be followed when rescuing a casualty from an enclosed space. (7)

5. (a) State the objectives of the *ISM Code*. (3)

   (b) Explain what is meant by EACH of the following terms, stating an example for EACH:

      (i) a non-conformity; (5)

      (ii) a major non-conformity. (9)

   (c) State when major non-conformities must be rectified. (3)

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) A ship is initially upright in fresh water at an even keel draught of 5.3 m. The solid KG is 8.0 m.

The following cargo operations are then carried out:

Load 524 t at Kg 4.1 m
Load 114 t at Kg 2.3 m
Discharge 423 t from Kg 2.1 m
Shift 167 t from Kg 4.8 m to Kg 10.1 m

At the time the ship has a total Free Surface Moment of 3965 t-m.

Using Datasheet – *Hydrostatic Particulars A*, calculate the effective metacentric height after completion of cargo operations. (10)

(b) (i) Define the term *free surface effect*, explaining how it affects the ship's stability. (6)

(ii) State the possible consequences of free surface effect. (4)

FEB 2013

2. (a) A vessel is initially floating in salt water at a displacement of 10958 t, port side alongside. She is even keel but has an initial list of 2 degrees to starboard.

KG (solid) 7.67 m FSM 1843.9 t-m

There is a 75 t weight on the quay at a position 13 m from the centreline which is to be loaded on board using the ship's own derrick, the head of which is 24 m above the keel.

The final position of the weight will be kg 3.7 m, 5.5 m to starboard of the centreline.

Using Datasheet – *Hydrostatic Particulars A*, calculate the maximum angle and direction of list that will occur during the loading operation. (17)

(b) Explain why free surfaces should be eliminated or minimised during heavy lift operations. (3)

Section B

3. A product tanker with an Inert Gas System is preparing for loading operations.

   (a) With reference to the Ship/Shore Safety Checklist, list FIFTEEN of the physical checks that must be made prior to commencement of cargo operations. (15)

   (b) If the vessel was moored to a Single Point Mooring (SPM), state the checks the Officer of the Watch should make in addition to the standard routine deck duties during cargo watch. (5)

4. A vessel is in port loading cargo. She is to take bunkers from a barge which will tie up on the outboard side.

   (a) List the precautions that should be observed by the Officer of the Watch prior to the commencement of bunkering. (10)

   (b) State the immediate action that must be taken in the event of a spill of bunkers. (8)

   (c) State the document in which the spill should be recorded. (2)

5. (a) With reference to MARPOL 73/78 Annex II:

      (i) list the operational standards for discharges of noxious liquid substances of categories X, Y or Z when the vessel is at sea; (5)

      (ii) state which record book is required to be kept by a vessel carrying noxious liquid substances in bulk. (1)

   (b) State the criteria that must be complied with for discharge of sewage under Annex IV of MARPOL 73/78. (6)

   (c) With reference to MARPOL 73/78 Annex VI:

      (i) list the emissions which are regulated by the revised convention; (5)

      (ii) list THREE substances which must not be incinerated on board. (3)

MARCH 2013

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain EACH of the following:

   (i) C_w; (4)

   (ii) Waterplane area; (2)

   (iii) TPC. (4)

   (b) A vessel is in salt water and is to load a full cargo. She is floating at an even keel draught of 9.67m and is nearing the end of loading operations.

   Waterline length: 110 m Waterline Breadth: 29 m C_w: 0.88

   Calculate the final mean draught after a final 130 t of cargo is loaded. (10)

2. (a) Explain the term *LCF*. (4)

   (b) A vessel of length LBP 137.5 m arrives in a salt water port to discharge three parcels of cargo, after which she will sail. Draughts on arrival are:

   For'd: 8.48 m Aft: 9.10 m

   Cargo to be discharged is as follows:

   1653 t from lcg 89.97 m;
   2519 t from lcg 51.77 m;
   2374 t from lcg 65.75 m.

   The vessel cannot sail with a trim of more than 0.50 m by the stern.

   With reference to Datasheet Q2 - *Hydrostatic Particulars 'A'*, state, with reasons, if the vessel can sail at the end of discharge. (16)

Section B

3. A dry bulk carrier (LBP greater than 150 m) is in port loading a full cargo.

   (a) With reference to the *Ship/Shore safety checklist for the loading and unloading of dry bulk carriers*, list TEN items that must be checked prior to commencing cargo operations. (10)

   (b) List the duties of the Officer of the Watch during the loading of this ship. (10)

4. With reference to the *Code of Safe Working Practices for Merchant Seamen*:

   (a) explain what is meant by EACH of the following terms:

      (i) Security Level 1; (2)

      (ii) Security Level 2; (3)

      (iii) Security Level 3. (3)

   (b) list TEN principles that apply when using a *permit to work*; (10)

   (c) state the maximum period of validity of a *permit to work*. (2)

5. With reference to MARPOL 73/78 Annex I:

   (a) list the discharge criteria that must be complied with when a ship more than 400 GT is to discharge machinery space bilge water inside a special area; (8)

   (b) list the discharge criteria that must be complied with when an oil tanker more than 400 GT is to discharge cargo pumproom bilges; (8)

   (c) state the name and part of the document in which EACH of the above operations should be recorded. (4)

MAY 2013

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain the difference between an *angle of list* and an *angle of loll*. (4)

   (b) Using ballast on a typical bulk carrier which has double bottom tanks with a single centreline division, outline the methods of correcting:

   (i) an angle of list; (3)

   (ii) an angle of loll. (7)

   (c) Explain EACH of the following terms:

   (i) centre of gravity; (2)

   (ii) centre of buoyancy. (4)

2. (a) A vessel is initially upright with a KG of 9.8 m. A heavy lift is stowed on the centreline at Kg 3.0 m and is to be discharged using the ship's own derrick. It will be landed on the quay on the starboard side.

   Explain, with the aid of a sketch, how the ship's centre of gravity moves in EACH of the following:

   (i) when the weight is initially lifted; (2)

   (ii) when the derrick has slewed to starboard and the weight is suspended over the quay; (2)

   (iii) as the weight is lowered over the quay and before it touches the ground; (2)

   (iv) when the weight has been discharged. (2)

   (b) A general cargo ship is initially floating upright in salt water at a displacement of 14275 t, starboard side alongside. KG (solid) is 7.44 m. At the time there are free surfaces and the total Free Surface Correction is 0.39 m.

   A 70 t transformer is to be loaded using the ship's own derrick, the head of which is 21 m above the keel. The transformer is on the quay at a position 12 m from the centreline and will be loaded at Kg 2.95 m and 3 m to starboard of the centreline.

   Using the Datasheet Q2(b) *Hydrostatic Particulars'A'*, calculate the maximum angle and direction of list during the loading operation. (12)

Section B

3. A product tanker with an Inert Gas System is alongside preparing for loading operations.

   (a) With reference to the *Ship/Shore Safety Checklist:*

      (i) list the EIGHT checks that must be made in relation to the Inert Gas System, prior to commencement of cargo operations; (16)

      (ii) state the TWO items that should be addressed if the ship is planning to tank clean alongside. (2)

   (b) State the document in which the tank cleaning operations should be recorded. (2)

4. A vessel is in port loading cargo. She is to take bunkers from a barge which will tie up on the outboard side.

   (a) List the precautions that should be observed by the Officer of the Watch prior to the commencement of bunkering. (10)

   (b) State the immediate action that must be taken in the event of a spill of bunkers. (8)

   (c) State the document in which the spill should be recorded. (2)

5. (a) Describe the objectives of the *ISM Code.* (3)

   (b) State the functional requirements of a *Safety Management System.* (12)

   (c) Explain what is meant by a major non-conformity, stating an example. (5)

July 2013

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain the term DWA. (5)

(b) A vessel is loading in a dock water port (RD 1.008) in a Winter Zone and is upright.
Summer draught: 11.40 m FWA: 305 mm TPC_{SW}: 27 (constant)

The waterline is 500 mm below the top edge of the Summer Loadline.

Calculate EACH of the following:

(i) the sinkage required (in mm) so that the vessel will be at her winter marks when in salt water; (9)

(ii) the quantity of cargo that can be loaded given that 120 t of bunkers are still to be taken. (6)

2. (a) Describe the effect on free surface of longitudinal subdivision of a tank. (5)

(b) A ship is floating in salt water at an even keel draught of 5.30 m and has an initial KG of 7.80 m.

The ship has a rectangular double bottom of length 18.0m, breadth 22.0m and depth 1.2 m, which is subdivided by a single longitudinal centreline division into port and starboard tanks of equal dimensions.

Using Datasheet Q2 – *Hydrostatic Particulars A*, calculate the angle of list developed if the starboard side tank is filled to a depth of 0.60 m with bunkers RD 0.92.

Note: The bunkers in the starboard tank cause a total Free Surface Moment of 1836.8 t-m. (15)

Section B

3. A container vessel is in port for loading operations. The cargo to be loaded includes a number of containers with packaged dangerous goods.

   (a) State which publications and documents must be consulted when deciding on the stowage location and securing of dangerous goods. (5)

   (b) Explain the specific duties of the Officer of the Watch with respect to the dangerous goods containers. (12)

   (c) State the requirements with respect to the dangerous goods documentation after loading operations are completed. (3)

4. With reference to MARPOL Annex V, amended:

   (a) complete Worksheet Q4(a), stating where discharges are permitted or prohibited, together with any limiting distances or conditions; (14)

   (b) list the entries that should be made in the various columns of the *Garbage Record Book.* (6)

5. With reference to the *Code of Safe Working Practices for Merchant Seamen*:

   (a) list TEN of the general precautions that should be observed with respect to safe movement on board when the vessel is alongside in port; (10)

   (b) state the requirements and procedures with respect to power-operated watertight doors. (10)

(This Worksheet must be returned with your answer book)

Simplified overview of the discharge provisions of the revised MARPOL Annex V (resolution MEPC.201(62)) which entered into force on 1 January 2013

Type of Garbage	Ships outside special areas	Ships within special areas
Food waste comminuted or ground		
Food waste not comminuted or ground		
Cargo residues not contained in wash water		
Cargo residues contained in wash water		
Cleaning agents and additives contained in cargo hold wash water		
Cleaning agents and additives in deck and external surfaces wash water		
Carcasses of animals carried on board as cargo and which died during the voyage		
All other garbage including plastics, synthetic ropes, fishing gear, plastic garbage bags, incinerator ashes, clinkers, cooking oil, floating dunnage, lining and packing materials, paper, rags, glass, metal, bottles, crockery and similar refuse		
Mixed Garbage	When garbage is mixed with or contaminated by other substances prohibited from discharge or having different discharge requirements, the more stringent requirements shall apply	

Candidate's Name ..... Examination Centre .....

OCT 2013

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) State EACH of the following:

   (i) the reason for loadlines; (3)

   (ii) the reason for loadline zones. (2)

   (b) A vessel is in fresh water and is to load a full cargo. She is floating at an even keel draught of 8.34 m and is nearing the end of loading operations.

   Waterline length: 120 m Waterline Breadth: 22 m C_w: 0.85(assume constant)

   Calculate the final mean draft after a final 400 t of cargo is loaded. (8)

   (c) A vessel is in salt water at an initial displacement of 14576 t and then loads 2346 t of cargo. Using Datasheet – *Hydrostatic Particulars "A"*, calculate the final draft in salt water, using the appropriate TPC values. (7)

2. (a) Explain the term 'Free Surface Correction'. (2)

   (b) A vessel is initially upright in salt water at an even keel draft of 5.30 m with an effective KG of 7.75 m.

   A rectangular port and starboard double bottom tank EACH have the following dimensions:

   L = 25 m; B = 7.1 m; D = 2.0 m

   The tanks are then partially filled with bunkers RD 0.961 to an ullage of 1.40 m.

   (i) Using Datasheet – *Hydrostatic Particulars "A"*, calculate the vessel's final GM allowing for a total Free Surface Correction of 0.96 m. (12)

   (ii) Assuming the KM is constant, calculate the quantity of cargo that must then be loaded at Kg 4.50 m so that the vessel can sail with an effective GM of 0.50 m. (6)

Section B

3. With reference to a Ro-Ro cargo vessel:

   (a) state the information that should appear on the vessel's Cargo Loading Plan; (5)

   (b) outline the checks that should be made on the cargo before it is loaded; (5)

   (c) list the deck pre-sailing checks the Officer of the Watch should make prior to sailing. (10)

4. With reference to the Code of Safe Working Practices for Merchant Seamen list EACH of the following:

   (a) the duties of the Officer of the Watch when supervising mooring station operations; (10)

   (b) the precautions and procedures when rigging a gangway that has been provided by shore. (10)

5. (a) With reference to MARPOL Annex V, as amended:

   (i) state the types/categories of garbage that are listed under the new regulations; (10)

   (ii) list the THREE categories of Areas in which the discharge of garbage is regulated at sea. (4)

   (b) Describe the duties of the Officer of the Watch with respect to garbage management whilst in port. (6)

NOVEMBER 2013.

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) (i) Sketch a stable vessel listed to a small angle. The sketch should clearly indicate the positions of G, B and M and should also show the action of the different forces. (6)

(ii) Sketch a curve of statical stability for a vessel listed to an angle of 10° with a range of stability of 62°. (4)

(b) A vessel is at a mean draft of 5.75 m in dock water RD 1.009 and is listed 3° to starboard.

KG 7.95 m KM 8.80 m TPC (SW) 29 t Displacement 11700 t

(i) Calculate the weight of cargo to load in the tween deck 9.50 m off the centreline in order to finish upright. (5)

(ii) The vessel in Q2(b)(i) now loads 220 t bunkers at Kg 1.75 m. Calculate the mean draught on completion of loading. (5)

2. (a) A vessel LBP 138 m is floating in salt water at the following draughts:

For'd 7.00 m Aft 8.55 m

In order to enter port the vessel must cross a bar at the entrance which has a charted depth of 8.15 m. The vessel will cross the bar at high water when the height of tide will be 0.35 m. Underkeel clearance required by the owners is 0.50 m.

LCF is 64 m foap and MCTC is 106.4 t-m.

Calculate the quantity of ballast to be transferred, and in which direction, between the fore peak tank (lcg 130.2 m foap) and the aft peak tank (lcg 5.30 m foap) so that the vessel will pass over the shoal at the correct draught. (12)

(b) Explain EACH of the following:

(i) MCTC; (2)

(ii) LCF. (3)

(c) Explain why the LCF of a vessel changes with draught. (3)

Section B

3. A vessel has just tied up alongside a lay-by berth for repairs and survey work. Access to the ship will be by a gangway which will be provided by the shore facilities. As part of the scheduled survey work, divers will be undertaking an inspection of the hull.

   (a) State the checks that the Officer of the Watch should make to ensure safe access when rigging the gangway. (10)

   (b) List the duties of the Officer of the Watch with respect to the diving operations that are to take place. (10)

4. (a) With reference to the International Maritime Dangerous Goods (IMDG) Code, define EACH of the following, explaining what they are used for:

   (i) Mfag; (3)

   (ii) EmS Guide. (3)

   (b) With reference to the Code of Safe Working Practices for Merchant Seamen:

   (i) describe what is meant by the term '*dangerous space*'; (3)

   (ii) list the precautions that should be taken before a potentially dangerous space is entered; (7)

   (iii) explain what is meant by the term '*risk assessment*'. (4)

5. MGN 440 provides a link to the Department for Transport's *Guidance to UK Flagged Shipping on Measures to Counter Piracy, Robbery and other Acts of Violence Against Merchant Shipping*. With reference to this document:

   (a) outline the key guidance provided on how to deter attacks and how to deal with attacks if they occur; (8)

   (b) list the items that should be covered in the ship's 'Anti-Attack Plan'; (10)

   (c) state the action to be taken by crew in the event that pirates gain control of the vessel. (2)

HYDROSTATIC PARTICULARS 'A'

Draught m	Displacement t		TPC t		MCTC tm		KMt M	KB m	LCB foap m	LCF foap m
	SW RD 1.025	FW RD 1.000	SW RD 1.025	FW RD 1.000	SW RD 1.025	FW RD 1.000				
7.00	14576	14220	23.13	22.57	184.6	180.1	8.34	3.64	70.03	67.35
6.90	14345	13996	23.06	22.50	183.0	178.5	8.35	3.58	70.08	67.46
6.80	14115	13771	22.99	22.43	181.4	177.0	8.36	3.53	70.12	67.57
6.70	13886	13548	22.92	22.36	179.9	175.5	8.37	3.48	70.16	67.68
6.60	13657	13324	22.85	22.29	178.3	174.0	8.38	3.43	70.20	67.79
6.50	13429	13102	22.78	22.23	176.8	172.5	8.39	3.38	70.24	67.90
6.40	13201	12879	22.72	22.17	175.3	171.0	8.41	3.33	70.28	68.00
6.30	12975	12658	22.66	22.11	173.9	169.6	8.43	3.28	70.32	68.10
6.20	12748	12437	22.60	22.05	172.5	168.3	8.46	3.22	70.35	68.20
6.10	12523	12217	22.54	21.99	171.1	167.0	8.49	3.17	70.38	68.30
6.00	12297	11997	22.48	21.93	169.8	165.7	8.52	3.11	70.42	68.39
5.90	12073	11778	22.43	21.87	168.5	164.4	8.55	3.06	70.46	68.43
5.80	11848	11559	22.37	21.82	167.3	163.2	8.59	3.01	70.50	68.57
5.70	11625	11342	22.32	21.77	166.1	162.1	8.63	2.95	70.53	68.65
5.60	11402	11124	22.26	21.72	165.0	161.0	8.67	2.90	70.57	68.73
5.50	11180	10908	22.21	21.66	163.9	160.0	8.71	2.85	70.60	68.80
5.40	10958	10691	22.15	21.61	162.9	158.9	8.76	2.80	70.64	68.88
5.30	10737	10476	22.10	21.56	161.8	157.9	8.81	2.74	70.68	68.95
5.20	10516	10260	22.05	21.51	160.8	156.9	8.86	2.69	70.72	69.02
5.10	10296	10045	22.00	21.46	159.8	155.9	8.92	2.63	70.75	69.09
5.00	10076	9830	21.95	21.41	158.8	154.9	8.98	2.58	70.79	69.16
4.90	9857	9616	21.90	21.36	157.9	154.0	9.06	2.53	70.82	69.23
4.80	9638	9403	21.85	21.32	156.9	153.1	9.13	2.48	70.86	69.29
4.70	9420	9190	21.80	21.27	156.0	152.2	9.22	2.43	70.90	69.35
4.60	9202	8978	21.75	21.22	155.1	151.3	9.30	2.38	70.93	69.42
4.50	8985	8766	21.70	21.17	154.2	150.5	9.40	2.32	70.96	69.48
4.40	8768	8554	21.65	21.12	153.3	149.6	9.49	2.27	71.00	69.55
4.30	8552	8344	21.60	21.07	152.4	148.7	9.60	2.22	71.04	69.62
4.20	8336	8133	21.55	21.02	151.5	147.8	9.71	2.17	71.08	69.68
4.10	8121	7923	21.50	20.97	150.6	146.9	9.83	2.12	71.12	69.74
4.00	7906	7713	21.45	20.93	149.7	146.0	9.96	2.07	71.15	69.81
3.90	7692	7505	21.40	20.88	148.7	145.1	10.11	2.01	71.18	69.88
3.80	7478	7296	21.35	20.83	147.8	144.2	10.25	1.96	71.22	69.94
3.70	7265	7088	21.30	20.78	146.8	143.3	10.41	1.91	71.25	70.00
3.60	7052	6880	21.24	20.72	145.9	142.3	10.57	1.86	71.29	70.07
3.50	6840	6673	21.19	20.67	144.9	141.3	10.76	1.81	71.33	70.14

THESE HYDROSTATIC PARTICULARS HAVE BEEN DEVELOPED WITH THE VESSEL FLOATING ON EVEN KEEL

March 2010

0.555m

July 2010

0.784m, 1.138m, 9.4 S - F 6.104m, A 6.901m, 126.9tt

October 2010

4.16 S, 8,872t, 12,768t, 3896.5t, 6.21m

December 2010

F 4.302m, A 5.008m, 50.8t

February 2011

2. 4.3 degrees, 1.3 degrees

March 2011

1. RM 840.9tm 2. 2.2 Port, 49.25t

June 2011

1. 1122t, 2. 4.664 - 7.768 72.5t

July 2011

1. 1,091t, 5.94m, 5.602m 2. GMf 0.189m

October 2011

2. 109.5 tons aft to fwd, Fwd draft 6.808m

December 2011

1. 858.6 tons 2. 7 degrees to Port, 97.4 tons to Stbd

February 2012

1. 2,904tm 2. 5.9 degrees to Stbd

March 2012

2. 6.76 degrees to Stbd

May 2012

1. 921tm
2. Cannot answer-insufficient data given.

July 2012

1. 2,112tm
2. 69.9m LCG b. 6.398Fwd 6.596 Aft

October 2012

1. 895t, 5.55m, 5.80m
2. 1.16m, 5.2 deg to Port

November 2012

1. 631.4t,
2. 35.4t, 7.522m

February 2013

1. 0.33m
2. 5 deg to stbd.

(FEB 2015)

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) With the aid of a sketch, explain the relationship between a vessel being at an angle of loll and in a state of equilibrium. (5)

   (b) A vessel is at a mean draught of 6.84 m in dock water RD 1.012 and is listed 2° to port. Space remains available for cargo on the tanktop at Kg 2.50 m.

   KG 8.31 m KM 9.10 m TPC (SW) 27.4 t (constant) Displacement 12310 t

   (i) Calculate the weight of cargo to load on the tanktop, 6.0 m to starboard of the centreline in order to correct the list. (5)

   (ii) The vessel in Q1(b)(i) then loads 180 t bunkers on the centreline at Kg 1.75 m, causing a total FSM of 1987 t-m. Calculate both the mean draught and effective GM on completion of loading. (10)

2. (a) A vessel LBP 138 m is floating in salt water at the following draughts:

   For'd 6.85 m Aft 7.95 m

   In order to enter port the vessel must cross a bar at the entrance which has a charted depth of 7.90 m. The vessel will cross the bar at high water when the height of tide will be 0.35 m. Underkeel clearance required by the owners is 0.50 m.

   LCF is 68 m foap and MCTC is 108.7 t-m.

   Calculate the quantity of ballast to be transferred, and in which direction, between the fore peak tank (lcg 130.20 m foap) and the aft peak tank (lcg 5.30 m foap) so that the vessel will pass over the shoal at the correct draught. (8)

   (b) A vessel LBP 138 m is lying in salt water with the following draughts:

   F: 7.05 m A: 6.85 m

   Using Datasheet Q2(b) *Hydrostatic Particulars*, calculate the position of the ship's LCG at these draughts. (8)

   (c) Explain EACH of the following:

   (i) Trim; (2)

   (ii) LCB. (2)

[OVER

Section B

3. A general cargo vessel is in port for loading operations. The cargo to be loaded includes a number of palletised loads containing packaged dangerous goods.

   (a) State which publications and documents must be consulted when deciding on the stowage location and securing of dangerous packaged goods. (5)

   (b) Explain the duties of the Officer of the Watch with respect to the dangerous goods. (9)

   (c) Explain the duties of the Officer of the Watch with respect to *security*, which is set at Level 1. (6)

4. With reference to MARPOL 73/78, as amended:

   (a) explain EACH of the following:

      (i) Special area; (3)

      (ii) Particularly Sensitive sea area. (3)

   (b) list SIX of the Special areas adopted under Annex V; (6)

   (c) (i) state the document in which the discharge of oil or oily mixtures from the cargo area of an oil tanker at sea should be recorded; (2)

      (ii) list SIX other operations that would be recorded in this document. (6)

5. (a) Describe the objectives of the *ISM Code*. (3)

   (b) State the functional requirements of a *Safety Management System*. (12)

   (c) Explain what is meant by a major non-conformity, giving an example. (5)

MARCH 2015

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Sketch a vessel with initial neutral stability heeled to a small angle. The sketch should clearly indicate the positions of G, B and M and should also show the action of the forces. (5)

   (b) A vessel is nearing the end of loading and is floating at a mean draft of 5.95m in dock water RD 1.010. She is listed 1.5° to starboard. Space remains available for cargo on the tanktop at Kg 2.40 m.

   KG 7.94 m KM 8.85 m (constant) TPC_{SW} 24.6 t (constant)
   Displacement 12673 t

   (i) Calculate the final weight of cargo to load on the tanktop, 4.50 m to port of the centreline in order to correct the list. (5)

   (ii) The vessel in Q1(b)(i) then loads 220 t of bunkers at kg 1.50 m, on the centreline, causing a Free Surface Moment of 1763 t-m.

   Calculate BOTH the mean draft and effective metacentric height on completion of loading. (10)

2. (a) A vessel is initially floating upright and even keel in salt water at a displacement of 12748 t, starboard side alongside.

   KG (solid) 6.15 m FSM 1956 t-m

   There are TWO 85 t weights on the quay at a distance of 12.0 m from the centreline which are to be loading using the ship's own derrick. The head of the derrick is 25.0 m above the keel.

   Each weight will be loaded on deck at Kg 10.5 m. One weight will be loaded 4.0 m to port of the centreline and the other will be loaded 4.0 m to starboard of the centreline.

   Using Datasheet Q2(a) - *Hydrostatic Particulars*, calculate the maximum angle and direction of list that will occur during loading if the *inboard* weight is to be loaded first. (16)

   (b) Explain why free surfaces should be eliminated or minimised during heavy lift operations. (4)

Section B

3. A product tanker with an Inert Gas System is alongside preparing for discharging operations.

   (a) With reference to the *Ship/Shore Safety Checklist*:

      (i) list any TEN of the physical checks that must be made prior to commencement of cargo operations; (10)

      (ii) list any SIX of the checks that must be made in relation to the Inert Gas System, prior to commencement of cargo operations; (6)

      (iii) state the TWO items that should be addressed if the product tanker is planning to tank clean alongside. (2)

   (b) State the document in which the tank cleaning operations in Q3(a)(iii) should be recorded. (2)

4. Describe the requirements for safe access that must be complied with where a pilot is to board from a boat and the freeboard exceeds nine metres. (20)

5. A vessel has entered port and the security level has been set by both the flag and port states at 'Level 1'.

   (a) State the duties of the Officer of the Watch with respect to *security* at this level. (10)

   (b) List the additional duties if the security level is raised to 'Level 2'. (8)

   (c) State the document that should be consulted for details on the procedures to be followed at the different security levels for the vessel. (2)

ISPS

June 2015

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) Explain EACH of the following terms:

   (i) initial transverse metacentre; (3)

   (ii) initial metacentric height. (2)

   (b) Sketch a stable vessel listed to a small angle. The sketch should clearly indicate the positions of G, B and M in the listed condition as well as the angle of list. (5)

   (c) Explain the difference between an angle of list and an angle of loll. (4)

   (d) Outline the methods of correcting an angle of loll using ballast on a typical general cargo ship which has empty double bottom tanks of equal dimensions and a single centreline division. (6)

2. (a) A vessel is initially floating upright in salt water at an even keel draft of 6.00 m, port side alongside. The initial KG (solid) is 7.63 m and the total Free Surface Moments at the time of cargo operations are 1264 t-m.

   A 60 t transformer is to be discharged using the ship's own heavy lift derrick, the head of which is 19 m above the keel. At present the transformer is stowed in the hold at a Kg of 3.5 m, 2.0 m to starboard of the centreline and it is to be landed on the quay at a distance of 12.0 m from the centreline.

   Using Datasheet Q2 - *Hydrostatic Particulars*, calculate the maximum angle and direction of list during the discharge. (16)

   (b) Explain why it is important that free surfaces are minimised during heavy lift operations. (4)

Section B

3. A general cargo vessel is in port for loading operations. The cargo to be loaded includes drums, bagged cargo and a number of palletised loads.

   (a) Outline the duties of the Officer of the Watch prior to loading with respect to the cargo operations. (7)

   (b) Some of the drums contain dangerous goods. Outline the duties of the Officer of the Watch with respect to these dangerous goods. (9)

   (c) List any FOUR publications or documents which must be consulted when deciding on the stowage location and securing of dangerous goods. (4)

4. With reference to the *Code of Safe Working Practices for Merchant Seamen*:

   (a) state the requirements and procedures with respect to power-operated watertight doors; (10)

   (b) explain EACH of the following:

      (i) dangerous space; (3)

      (ii) risk assessment; (3)

      (iii) competent person. (2)

   (c) State the purpose of an Emergency Escape Breathing Device (EEBD). (2)

5. (a) Describe the objectives of the *ISM Code*. (3)

   (b) State the functional requirements of a *Safety Management System* (12)

   (c) Explain what is meant by a major non-conformity, giving ONE example. (5)

JULY 2015

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. A vessel is at anchor outside a river port in salt water. She is even keel and floating at her summer draught of 6.95 m.

   Summer Displacement = 13194 t TPC_{SW} (constant) = 21.60 t

   (a) Calculate the weight of cargo that must be discharged into barges so that the vessel can pass over a bar at the port entrance (RD 1.025) where the depth of water is 7.35 m, with an underkeel clearance of 1.00 m. (4)

   (b) Ignoring the effects of fuel consumption, calculate the vessel's new mean draft on arrival at an upriver berth where the dock water RD is 1.006. (4)

   (c) At the berth 600t of cargo is discharged and 90t of bunkers loaded. Calculate the new draught at the berth (RD 1.006). (5)

   (d) Explain EACH of the following terms:

      (i) Dock water allowance; (3)

      (ii) TPC. (4)

2. A vessel is initially lying in salt water at a displacement of 9202 t and has a port list of two degrees. Initial KG (fluid) is 8.15 m. Cargo is then worked as follows:

Load	133 t at Kg 6.0 m, 2.9 m to port of centreline
Discharge	144 t from Kg 3.5 m, on the centreline

120 t of bunkers are then loaded into No. 5 DB starboard double bottom tank, causing a free surface moment of 590 t-m.

The Kg of the bunkers is 1.10 m and the transverse centre of gravity of the tank is 4.0 m from the centreline.

Using Datasheet Q2 - *Hydrostatic Particulars*:

(a) calculate the final angle of list after completion of all operations;

(b) calculate the weight of ballast that must be transferred, and in which direction, between No 4 port and starboard double bottom ballast tanks so that the vessel finishes upright. (15)

Note: EACH double bottom tank is rectangular with a breadth of 8.0 m and is already slack. (5)

Section B

3. (a) Outline the precautions that must be taken prior to a ship loading a heavy lift. (18)

   (b) State the document that must be checked to ensure that the lifting gear has been adequately maintained and inspected. (2)

4. With reference to the *Code of Safe Working Practices for Merchant Seamen*:

   (a) list TEN of the general precautions that should be observed with respect to safe movement on board when the vessel is alongside in port; (10)

   (b) list the duties of the Officer of the Watch when supervising mooring station operations. (10)

5. (a) With reference to the International Maritime Dangerous Goods (IMDG) Code, define EACH of the following, explaining what they are used for:

      (i) Mfag; (4)

      (ii) EmS Guide. (3)

   (b) With reference to MARPOL 73 (as amended), Annex I:

      (i) list the conditions that must be complied with for the discharge of oil or oily mixtures from the cargo area of an oil tanker at sea; (11)

      (ii) state the document in which this discharge should be recorded. (2)

OCTOBER 2015

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) (i) State how a vessel's mean draft changes when passing from dock water to salt water. (2)

(ii) Explain *why* the draft changes as stated in your answer for Q1(a)(i) above. (3)

(b) A bulk carrier is loading in a dock water port (RD 1.008). She is upright and at an even keel draft with the waterline 300 mm below the upper edge of the summer loadline.

The vessel has a summer displacement of 15240 t which corresponds to a summer draft of 7.20 m.

Using a TPC_{SW} of 21.4 t (constant), calculate the maximum weight of cargo that can be loaded if the vessel is to load for a Tropical zone, given that 100t of MDO is still to be loaded prior to departure. (15)

2. (a) Explain the term 'LCB'. (2)

(i) A vessel LBP 143 m arrives in a salt water port for cargo operations. Drafts on arrival are as follows:

For'd: 6.65 m Aft: 7.35 m

Using Datasheet Q2 - *Hydrostatic Particulars*, calculate the vessel's initial LCG on arrival at the load port. (7)

(ii) After arrival, the vessel in part (i) above is brought to even keel by transferring ballast. State the new LCG of the vessel after it has been brought to even keel. (1)

(b) A vessel is alongside a berth is salt water at an even keel draft of 8.00 m.

Cargo operations are then carried out as follows:

Discharge 1747 t from lcg 87.65 m foap;
Discharge 2269 t from lcg 71.50 m foap
Load 2134 t at 85.32 m foap;

The vessel cannot sail with a trim of more than 0.50 m by the stern.

Using Datasheet Q2 - *Hydrostatic Particulars*, state, with reasons, if the vessel may sail after cargo operations are complete. (10)

Section B

3. A general cargo ship is loading pallets of drums using the ship's own cranes. The drums contain liquid classified as 'Dangerous Goods' and 'Marine Pollutants'.

   During loading the ship's crane fails causing a pallet of drums to be dropped on to the tank-top where some of the liquid subsequently spills.

   (a) List the immediate action that the Officer of the Watch should take. (10)

   (b) State the publications and documents that should be consulted in the first instance for advice on how to deal with this emergency. (5)

   (c) List the basic information that should be detailed on a *Cargo Damage Report*. (5)

4. A helicopter is to land on a bulk carrier and the Officer of the Watch has been designated as the officer in charge on deck.

   (a) List the general procedures and precautions that the Officer of the Watch on deck should ensure before the helicopter makes an approach. (14)

   (b) List the items of equipment that should be ready on deck. (6)

5. With reference to MARPOL 73/78 Annex I:

   (a) list the discharge criteria that must be complied with when a ship more than 400 GT is to discharge machinery space bilge water inside a special area; (7)

   (b) list the discharge criteria that must be complied with when an oil tanker more than 400 GT is to discharge cargo pumproom bilges; (9)

   (c) state the name and part of the document in which EACH of the above operations should be recorded. (4)

STABILITY AND OPERATIONS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. (a) With reference to Datasheet Q1(a) - *GZ Curve*, determine EACH of the following:

   (i) the initial condition of stability; (2)
   (ii) range of stability; (1)
   (iii) angle of vanishing stability; (1)
   (iv) approximate initial metacentric height; (2)
   (v) approximate angle of deck edge immersion. (1)

   (b) Explain the relationship between equilibrium and the angle of loll. (5)

   (c) A vessel is initially floating in fresh water at an even keel draught of 6.45 m and has almost completed cargo operations.

   Waterline length: 130 m Waterline breadth: 18 m C_w:0.83 (assume constant)

   Calculate the final mean draft after the last 25t of cargo has been discharged. (8)

2. (a) Explain the term *Free Surface Correction*. (4)

   (b) A general cargo vessel is initially upright and at even keel in salt water at a displacement of 13201 t. KG is 8.20 m. The following cargo operations are carried out:

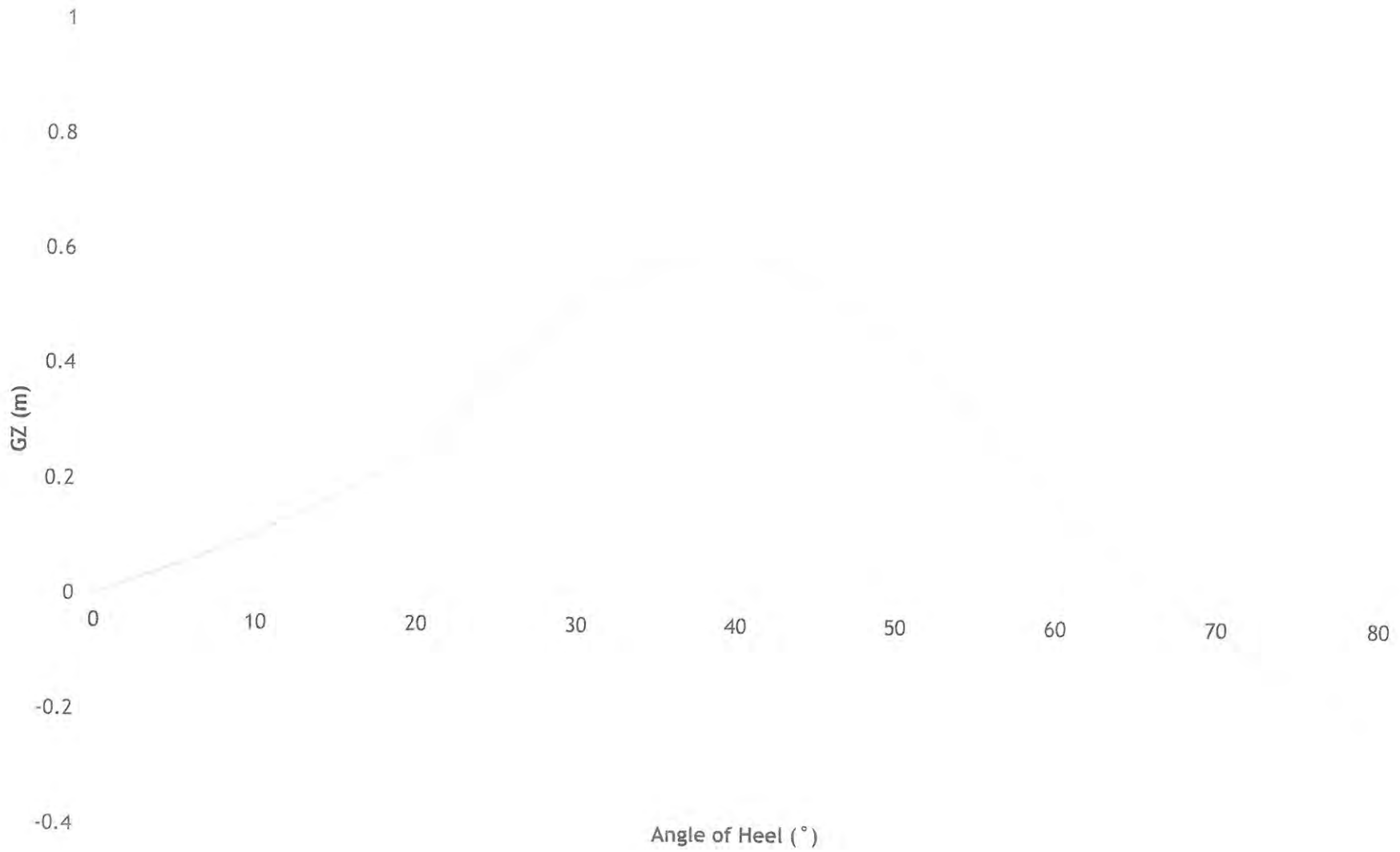
   Load 300 t at kg 4.20 m, 2.60 m to port of the centreline;
   Load 155 t at kg 2.20 m, 8.00 m to starboard of the centreline;
   Load 310 t at kg 3.10 m, 3.50 m to port of the centreline;
   Discharge 225 t from kg 6.60 m, 4.1 m to port of the centreline.

   The vessel <u>then</u> loads bunkers (RD 0.96) into NO. 5 <u>Port</u> DB tank to a depth of 1.20 m, causing a free surface moment of 817 t-m.

   No.5 DB tank is rectangular and is subdivided by a single centreline division into two tanks of equal dimensions - No.5 Starboard DB tank and No.5 Port DB tank. EACH tank has the following dimensions:

   Length 14.00 m Breadth: 9.00 m Depth: 1.50 m

   Using Datasheet Q2 - *Hydrostatic Particulars*, calculate the final angle of list after all cargo and bunkering operations are completed. (16)


1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
GZ (m)
0
10
20
30
40
50
60
70
80
Angle of Heel (°)

Section B

3. (a) Outline the duties of the Officer of the Watch with respect to safety during cargo operations on a Ro-Ro passenger ferry. (18)

   (b) State the MCA code that should be consulted for advice on the securing of Ro-Ro cargo. (2)

4. With reference to the *Code of Safe Working Practices for Merchant Seamen:*

   (a) list FIVE principles that apply when using a *permit to work*; (5)

   (b) state the maximum period of validity of a permit to work; (2)

   (c) describe what is meant by the term *dangerous space*; (3)

   (d) list the precautions that should be taken before a potentially dangerous space is entered; (7)

   (e) explain what is meant by the term *risk assessment*. (3)

5. With reference to MARPOL Annex V, amended:

   (a) complete Worksheet Q5(a), stating where discharges are permitted or prohibited, together with any limiting distances or conditions; (16)

   (b) list the entries that should be made in the various columns of the *Garbage Record Book* when incinerating garbage at sea. (4)

Simplified overview of the discharge provisions of the revised MARPOL Annex V (resolution MEPC.201(62)) which entered into force on 1 January 2013

Type of Garbage	Ships outside special areas
Food waste comminuted or ground	
Food waste not comminuted or ground	
Cargo residues not contained in wash water	
Cargo residues contained in wash water	
Cleaning agents and additives contained in cargo hold wash water	
Cleaning agents and additives in deck and external surfaces wash water	
Carcasses of animals carried on board as cargo and which died during the voyage	
All other garbage including plastics, synthetic ropes, fishing gear, plastic garbage bags, incinerator ashes, clinkers, cooking oil, floating dunnage, lining and packing materials, paper, rags, glass, metal, bottles, crockery and similar refuse	

Candidate's Name .....

Examination Centre .....