CERTIFICATES OF COMPETENCY IN THE MERCHANT NAVY –DECK OFFICER

STCW 78 as amended CHIEF MATE/MASTER REG. II/2 (UNLIMITED)

032-74 – STABILITY AND STRUCTURE

FRIDAY, 22 MARCH 2024

0915 - 1145 hrs

<u>Materials to be supplied by examination centres</u>

> Candidate's examination workbook
> Stability Data Booklet B
> Stability Formulae Datasheet (Version: September 2020)

<u>Examination Paper Inserts</u>

> Worksheet Q5 Draught Survey Report

<u>Notes for the guidance of candidates:</u>

1. Examinations administered by the SQA on behalf of the Maritime & Coastguard Agency.

2. Candidates should note that 200 marks are allocated to this paper. To pass candidates must achieve 120 marks.

3. Non-programmable calculators may be used.

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

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STABILITY AND STRUCTURE

Attempt ALL questions

Marks for each question are shown in brackets

1. A vessel's loaded particulars in salt water are as follows:

   Displacement 42 625 t   TMD 8.450   KG 13.02 m

   Using the *Stability Data Booklet Ship B*, compare the vessel's stability with ALL the minimum stability criteria required by the current Load Line Regulations (excluding the severe wind and rolling criterion), commenting on the result. (44)

2. A vessel is to enter drydock in salt water.

   Present draughts: Forward 3.323 m Aft 3.577 m and KG 10.37 m

   (a) Using the *Stability Data Booklet B*, calculate the vessel's effective GM at the critical instant. (30)

   (b) Explain the consequences of having a large 'P' Force during the critical period. (8)

3. With reference to Offshore supply vessels:

   (a) explain why the Fixed and Free Trim curves are the same up to the angle of Deck Edge immersion; (8)

   (b) explain why a GZ curve calculated on a *Free Trim* basis may differ from that calculated on a *Fixed Trim* basis for an offshore supply vessel; (18)

   (c) sketch a supply vessel's statical stability diagram, showing how the GZ curve for the vessel calculated on a *Free Trim* basis may differ from that calculated on a *Fixed Trim* basis. (14)

4. (a) Sketch and describe the cause of a high sided vessel's heel when subjected to a beam wind. (14)

(b) Describe how the consequences of a gusting wind is taken into account when determining a vessel's compliance with the International Code on Intact Stability, 2008, as amended. (4)

(c) State, with the aid of an appropriate sketch, the TWO Severe wind and rolling criterion that are required to be met by all vessels under the International Code on Intact Stability, 2008, as amended. (14)

(d) Explain why a wind heel is detrimental to a vessel's intact stability. (8)

5. A vessel is floating in salt water and has completed loading.

Present draughts: Forward 7.872 m   Aft 9.252 m
                     Midship (Port) 8.512 m   Midship (Starboard) 8.536 m

The draught marks are displaced as follows:
Forward: 3.040 m aft of the FP
Aft: 9.680 m forward of the AP
Midship: 0.780 m forward of amidships

The *Stability Data Booklet B (with the exclusion of Page 35)* provides the necessary hydrostatic and ship particulars for the vessel.

(a) By completion of Worksheet Q5(a) and showing any additional calculations in the answer book, determine the vessel's present displacement; (32)

(b) The vessel's loading computer provides the following simultaneous data:

Lightweight   10 968.00
Deadweight   32 236.50
Total weight   43 204.50

With reference to your answer to Part (a) and the data above state two reasons for the apparent difference in displacement values. (6)