Candidate's Name:

Ports and Maritime Organization
Seafarer's Examination and Certification Directorate
Exams Code: CMSS

Subject : Ship stability **Date :**
Rank : Chief Mate (GT≥3000) **Time Allowed : 2.5 Hrs**

Pass mark: 60

Q.1)-A vessel of 14500 t displacement , LBP = 160 m , MCTC = 800 t-m , TPC = 60 , LCF = 72 m forward of the aft perpendicular , draft(forward) =7.90 m & draft(aft) = 8.10 m in salt water.
Calculate the amount of cargo to be loaded in hold no.1 with LCG=140 m forward of the aft perpendicular & hold no.4 with LCG = 45 m forward of the aft perpendicular ,if true mean draft should not exceed 8.20 m and the vessel ends up on even keel. ***(20M)***

Q.2)-A vessel has a summer freeboard of 4.20 m which corresponds to a draft of 8.90 m. Her FWA is 178 mm and TPC 22.5 . The vessel is floating in river water of RD =1.010 in a tropical zone , with present freeboards (measured at midlength) of 4.40 m to starboard and 4.30 m to port . It is estimated that the vessel will use 70 t of fuel and 5 t of fresh water on her passage down river to the sea .
What is the maximum amount of cargo which she may load in the river. ***(20M)***

Q.3)-A vessel laden with grain in bulk of stowage factor 1.184 m^3/t has a displacement of 87284 t. Her KG calculated assuming the cg of the cargoes in the filled holds to be at the volumetric centroids of the compartments is 10.36 m . Free Surface moment =2643 t-m , KM=13.20m.The VHM of all filled holds is 5864 m4 and for partially filled hold is 14400 m4 . The angle of flooding is 37º .
Her KN values are as follow ;

Heel º	;	12	15	30	40	45
KN (m)	;	2.730	3.440	6.857	8.584	9.292

Ascertain whether she satisfies the stability criteria for vessels laden with grain in bulk. ***(25M)***

Q.4)-A ship with LBP=143.16 m ,sailed from port in condition No.8 as attached .Soon after departure she grounded on an isolated rock ,without damage to her hull. The drafts then were observed to be Forward ;5.90 m & Aft ; 9.30 m .Calculate the upthrust provided by the rock.
. ***(20M)***

Q.5)
(a) Describe briefly , synchronous rolling and its associated danger. ***(6M)***

(b) Describe briefly three methods a mate can consider for reducing the effects of synchronous rolling. ***(9M)***

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Q.1)- A vessel of summer displacement 35000 t has a summer load draft of 11.5m and TPC =30.6m . If the vessel is floating at a draft of 11.6 m in water of density 1.020 t/ m^3 in tropical zone , how much more cargo may she load to bring her to her summer load line when floating in salt water. ***(20M)***

Q.2)- The hydrostatic data for a vessel at even keel draft of 9.20 m in SW are as follow ; Displacement= 11500 t , LBP = 140 m , LCF = 73 m FOAP , LCB = 68 m FOAP ,TPC=25 t ,MCTC = 170 tm .
Calculate the drafts forward and aft, after entering into Fresh Water. ***(20M)***

Q.3)- A box shaped barge of uniform construction is 40 m long and displaces 440 t when empty. The barge is divided by transverse bulkheads into five equal compartments and is level stowed by bulk cargo as follows (the compartments are numbered from forward to aft;

No.1: 286 t , **No.2:** 318 t , **No.3:** Empty , **No.4:** 366 t , **No.5:** 270 t

a) Construct the load and shearing force diagrams, showing the force at each bulk head. ***(14M)***
b) At what distance from aft the maximum bending moment occurs. ***(6M)***

Q.4)- A box shaped vessel, floating in SW on even keel has the following particulars;
Length = 130 m , Breadth = 20 m , draft = 5 m , KG = 4.50 m
There is an empty forward end compartment of 20 m in length , which extends the full breadth of the vessel. Calculate the final drafts forward and aft if this compartment is bilged.

(20M)