Candidate's Name:

Ports and Maritime Organization
Seafarers' Examination and Certification Directorate
Exams Code: CMSS - 946

Subject : Ship Stability and Construction **Date : 139 4.09.01**
Rank : Chief Mate (GT≥3000) **Time Allowed : 3.0 Hrs**

(Pass mark: 60)

Q.1) - A vessel displacing 17500 t has KG= 12.5m, KM=14.2m and is listed **2.5**˚ to port.
A rectangular tank of length=14m, breadth=6m and 1.8m deep with center of gravity(CG) 8m to port of centre line is full of fuel oil with a relative density of **0.95**
Calculate the resulting list **if** half of this fuel oil is transferred to a similar tank on the starboard side of the vessel. **(20 M)**

Q.2) - A vessel is loading in tropical zone in water of relative density 1.010
She is to enter a port in summer zone after **5** days steaming, where she is to receive 300t of fuel and 100t of fresh water. She is expected to enter winter zone after a further **7** days steaming.
Calculate the maximum amount of cargo she can load if she has 230t of fuel, 150t of fresh water, 100 t of stores and 20 t of un-pumpable ballast.
Her constant is 120t and daily consumption is 36 t of fuel and 15 t of fresh water.
Tropical Deadweight = 14585t
Summer Deadweight = 14117t
Winter Deadweight = 13651t
(20 M)

Q.3) - Following GZ values are extracted from cross curves of stability for an assumed KG of 9m.

Angle of heel(θ˚)	**0**	**15**	**30**	**45**	**60**	**75**	**90**
GZ (m)	**0**	**0.75**	**1.5**	**1.75**	**1.25**	**0.4**	**-0.55**

Using these values **draw** the corresponding curve of statical stability when displacement= 45000t, KG=8.50m and FSM=6750t.m. From the curve **find** following;
a) - Initial GM **(3M)**
b) - Maximum GZ and angle at which it occurs. **(3M)**
c) - Righting moment at **25**˚ angle of heel. **(4M)**
d) - Dynamical stability at **40**˚ angle of heel. **(10 M)**

Q.4) – **a) -** With reference to SOLAS define **watertight** and **weather-tight.** **(6M)**
b) - Sketch a sliding type water tight door showing its structural arrangements in details and explain briefly its function and the applicable SOLAS requirements for these type of doors.
(8M)

Q.5) – What is **high tensile strength steel** and what are the advantages of using this type of steel in ship structure comparing to that of mild steel?
(14 M)

Q.6) - With the aid of a suitable drawing explain how corrosion is prevented by use of an **impressed current system**. **(12 M)**