

Indian Maritime University
June 2022 ESE
DNS
Semester II
Ship Construction and Stability - II
Subject Code: UD11T5204

Max. Marks: 70
Date :23.06.2022
Note: Section A

Pass Marks: 35
Time: 2 hours

Use of Non-programmable Scientific Calculator &
M.V. Hindship Stability Particulars booklet are
permitted.

Part A – (10x2=20 Marks) – Q1 & Q2 are compulsory.

Q1 MCQs **(10 x 1mark)**

(i) When a vessel is experiencing compressive stress on the deck, what is its possible effect to the vessel?

- a. Hogging
- b. Sagging
- c. Pounding
- d. Dynamic force

(ii) The free surface effects of a partially filled liquid tank decrease

- a. With increased size of the surface area in the tank
- b. Density of the liquid
- c. Placement of the tank above the keel
- d. Displacement volume of the ship

(iii) A vessel having $KG=7.85m$, $KM=7.90m$, $FSC=0.05m$, State vessel is at

- a. Stable equilibrium
- b. Unstable equilibrium
- c. Neutral equilibrium
- d. None of the above

(iv) Centre girder on a ship is fitted

- a. Transversely
- b. Longitudinally
- c. Athwartship
- d. All of above

(v) When a weight is lifted by a crane, the centre of gravity of the weight is transferred to

- a. The point of suspension
 - b. The base of the crane
 - c. The actual position of the weight
 - d. None of the above
- (vi) Location of International shore connection and coupling is found on
- a. General arrangement Plan
 - b. Life Saving Appliances Plan
 - c. Fire Fighting Appliances Plan
 - d. Pumping and Pipe line Arrangement Plan
- (vii) One of the intact stability requirements is Initial GM or metacentric height, on arrival at the destination port (berth)
- a. More than 0.30m
 - b. Less than 0.30m
 - c. Not less than 0.15 m.
 - d. More than 0.15m
- (viii) The garboard strake is located
- a. At the very bottom center
 - b. Just under the sheer line
 - c. At each side of the keel plate
 - d. At the turn of the bilge
- (ix) The addition of weight at the longitudinal center of flotation will
- a. Increase the forward draft and decrease the after draft
 - b. Decrease the forward draft and increase the after draft
 - c. Have no effect on the trim
 - d. Have no effect on the stability
- (x) Fuel oil tank vents are fitted with corrosion resistant screens to prevent
- a. Flames entering through the tank vent
 - b. Escape of flammable vapors
 - c. Corrosion in the tank vent
 - d. Damage to the ball check

- Q2. Part B- Short Questions - **(5 x 2 = 10 Marks)**
- a) Explain the function of double bottom tank on a vessel
 - b) Describe the cause and effect of point loading.
 - c) Explain functions of watertight bulkhead on a ship
 - d) Label a diagram of a mid-ship cross section of a vessel heeled to a small angle to show (i) the weight acting through G and force of buoyancy acting through B.(ii) Metacenter (iii) GZ
 - e) A barge of length 6.5 m beam 10.2 m and draft 4m in even keel condition is floating in seawater. Find the bodily sinkage of the mean draft if she arrives in water of relative density 1.006 t/m³ if displacement remaining constant

Part B- (10x5=50 Marks) Answer any 5 questions from Q3 to Q9

Q3. **(10 marks)**

M.V. Hind ship arrives at a seawater port with drafts F 6.25m, A 7.35m. Her sailing even keel draft was 5.65m. Calculate the weight of cargo discharged at that port, if 85 tons of fuel and fresh water were consumed in the port.

Q4. **(10 marks)**

A ship of 13,750 tons of displacement $GM=0.75m$, is listed 2.5° to starboard and has yet to load 250 tons of cargo. There is space available in each side of no.3 tween deck (centre of gravity, 6.1m from the centre line). Find how much cargo to load on each side if the ship is to be upright on completing loading

Q5. **(10 marks)**

(a) A ship arrives with a displacement of 18529 tons and $Kg\ 7.54m$, carries out following operations:

i. Discharges 682 tons of cargo, $Kg\ 11.17m$;
 543 tons of cargo $Kg\ 13.76m$;
 235 tons of cargo, $Kg\ 10.36m$

ii. Loads 418 tons of cargo, $Kg\ 6.91m$

iii. Fills up ballast 264 tons in DB tank, $Kg\ 0.63$

In the final condition $KM\ 8.28m$ and $FSM\ 1552\ t\cdot m$. Calculate her $GM(\text{fluid})$.

(b) Describe the effect on a ship's behavior of a large GM (Stiff Ship) and a small GM (Tender Ship)

Q6. **(10 Marks)**

Sketch profile and view of a typical double hull tanker and label the following parts:

1. Bulk heads 2. Engine Room 3. Pump Room/Cofferdam 4. Bunker and peak tanks 5. Cargo tanks and permanent ballast tanks (on a plan view)

Q7. **(5x2=10marks)**

(a) Describe content of LSA plan

(b) Explain what is meant by Panting and Pounding? List which parts of the ship are affected by them.

Q8. **(5x2=10marks)**

(a) Describe the arrangement of a Fire Main and what pumps may be used to pressurize it.

(b) A ship sails out in the final condition of loading with a displacement 19617

tons, $KG\ 7.52m$ and $FSM\ 1372\ t\cdot m$. During the voyage she consumes following from the tanks which were 100% full

(i) HFO 300 tons from No.2 DB tank $Kg\ 0.65m$, $FSM\ 682\ t\cdot m$, tank slack now

(ii) DO 50 tons from No.5 DB tank Kg 0.85, FSM 152 t-m, tank slack now

(iii) FW 120 tons from No.8 tank Kg 2.77 , FSM 21t-m,tank slack now
Find her arrival GM Fluid if KM on arrival was 8.395m

Q 9.

(5x2=10marks)

(a) Illustrate Double-Bottom Structure for Longitudinal Framing

(b) Sketch and label air pipes to ballast tanks

-----End of question paper-----

