(Paper Format)

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 M.V.HINDSHIP (Advanced Problems on Ship Stability)

Q. 2 BILGING (Box shaped vessel)

Q. 3 CENTER OF PRESSURE/ THRUST DUE TO LIQUID PRESSURE/ SF AND BM

Q. 4 SKETCH AND LABEL MIDSHIP SECTIONS

Q. 5 THEORY ON STABILITY (Rolling of Ships/ Heel while turning/ Wind and Weather heeling criteria/ Torsional Stress)

Q. 6 PASSENGER SHIP SUBDIVISION/ FIRE INTEGRITY

Q. 7 TONNAGE/ LOADLINE CONVENTION

Q. 8 SHIP BUILDING MATERIALS/ SHIPYARD PRACTICES

Q. 9 INCLINING TEST/ STABILITY AT MODERATE AND LARGE ANGLES OF HEEL

Please note that the above format is only an indicative of the examination paper. The candidates are advised to refer to detailed teaching syllabus and the course outline.

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GOVERNMENT OF INDIA

PM PAPER **Date: - 12th-Nov-2025**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

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4. Wherever applicable sketches should be drawn to support the answer.

Q.1 MV Hindship is floating at a displacement of 17,250 tonnes in water of R.D. 1.008.
She is at Angle of Loll of 7.5°.
Her FSM is 1485 TM.
Assuming she is wall-sided, calculate her KG and also find her GM at Angle of Loll.

Q.2 A box-shaped vessel 40 m long and 20 m wide and 5.0 m deep is floating in D.W of R.D 1.005 with even keel draft of 3.0 m with KG 4.2 m.
A mid-ship compartment extending from side to side, 15 m long, with permeability 80% is bilged.
Calculate the GM after bilging.

Q.3 An end bulkhead 9.6 m deep has the following equally spaced horizontal ordinates commencing from the top:
8.8, 8.5, 8.6, 7.6, 6.8 and 5.1 respectively.
Tank contains water of density 1.015 to a sounding of 11.3 m.
Calculate the thrust and height of centre of pressure from base.

Q.4 Sketch and label the midship section of a Type 2 Chemical Carrier.

Q.5 Master of a very large container vessel, such as Post-Panamax vessels, have complained that they have encountered very severe rolling with heavy seas from the bows or quarters, at times losing large numbers of containers overboard.
Discuss the factors responsible for such large rolling and remedial action required to prevent it.

Q.6 With respect to subdivision requirements of passenger ships as per SOLAS 1974 as amended, explain:
a) Flooded length
b) Permissible length
c) Subdivision loadlines

Q.7 Discuss the “Conditions of Assignment” as per the International Convention on Loadlines as amended.

Q.8 Write short notes on:
a) Torsional stresses induced by a ship’s rolling motion
b) Racking stresses due to heavy rolling

Q.9 Describe the damage stability criteria for passenger ships.

GOVERNMENT OF INDIA

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4. Wherever applicable sketches should be drawn to support the answer.

Q.1 MV Hindship is floating at a displacement of 17250 tonnes in water of R.D 1.008. She is at an angle of loll of 7.5°. Her FSM is 1485 TM.
Assuming she is wall-sided, calculate her KG and also find her GM at Angle of Loll.

Q.2 A cantilever 10 m long carries a concentrated load of 50 kN at its free end.
The weight of the cantilever is 150 kN.
Determine the S.F / B.M values at 1 m equal interval and draw the curves.

Q.3 A box-shaped vessel 40 m long and 20 m wide and 5.0 m deep is floating in D.W of R.D 1.005 with even keel draft of 3.0 m with KG 4.2 m.
A mid-ship compartment extending from side to side, 15 m long, with permeability 80% is bilged. Calculate the GM after bilging.

Q.4 Sketch and label the midship section of a hatch-coverless cellular container vessel.

Q.5 a) Explain what is heel due to turning, and discuss the effect of KG on direction of heel.
b) What are the advantages of prefabrication?

Q.6 a) Sketch and describe sheer plan and body plan.
b) Explain what is Angle of Loll and its corrective actions you will take on a general cargo ship.

Q.7 a) Explain in detail a test carried out on metals to determine its toughness.
b) Write short notes on three ways of connecting aluminium structures to steel.

Q.8 a) Explain in detail why subdivision load lines are assigned.
b) Write notes on passenger ship subdivision load lines

Q.9 Describe the damage stability criteria for Passenger ships.

GOVERNMENT OF INDIA

PM PAPER **Date: - 4th-Aug-2025**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

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3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 M.V. Hind ship is floating at a displacement of 17250 tonnes in water of R.D 1.008. She is at Angle of Loll of 7.5°. Her FSM is 1485 TM. Assuming she is wall sided, calculate her KG and also find her GM_F at Angle of Loll.

Q.2 A box shaped vessel 160m x 18m floats in SW at an even keel draft of 6.4m. A forward hold of length 25 m whose aft bulkhead is 40m aft of the FP and is bilged. If the permeability of the hold is 80% and KG of vessel was 4.7 m. Determine Fwd & Aft draft in the final condition.

Q.3 A box shaped barge of length 60 m has 4 identical compartments. Hold No. 1 & No. 4 has 300t each and Hold No. 2 & No. 3 has 120 t each and floating on an even keel. If the light displacement is 480t draw the SF & BM diagram at 5 m interval.

Q.4 Sketch and label mid-ships section of a LNG vessel and describe its salient features.

Q.5 Write Short Notes on:
i) Racking Stresses induced by ships Rolling Motion.
ii) Reduction of Torsional Stresses in a vessel.

Q.6 i) Describe the stress-strain relationship in a metal.
ii) Compare and contrast between Steel and Aluminum in ship building.

Q.7 a. As a Chief Officer, give full details of the items that you will have checked and prepared to ensure the weather-tight integrity of the ship to present the ship for Load Line Survey.
b. What do you understand by subdivision load line and why is it necessary on passenger ships?

Q.8 As per the Tonnage Convention, draw neat diagrams for the following:
a. An excluded space with restricted end opening;
b. An enclosed space that is covered from above and below;

Q.9 a. With the help of suitable sketches explain the principle of inclining experiment.
b. List the precautions which must be taken while conducting the experiment.

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GOVERNMENT OF INDIA

AM PAPER **Date: - 4th-Aug-2025**

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Notes:
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4. Wherever applicable sketches should be drawn to support the answer.

Q.1 M.V. 'Hindship' was floating with all compartments empty except as follows:
No. 2 (P & S) DB tanks full with water ballast.
No. 1 DB tank contained 100 tonnes of H.F.O.
An Inclining Experiment was conducted in this condition. A weight of 10 tonnes Kg. 10.2 m, shifted transversely through a distance of 17.6 m, caused a deflection of 8.3 cms in a plumb line 8.5 m in length. Calculate the GM (solid) and the KG of the light ship.

Q.2 A box shaped vessel 160 m x 18 m floats in SW at an even keel draft of 6.4 m. A forward hold of length 25 m whose aft bulkhead is 40 m aft of the FP and is bilged. If the permeability of the hold is 80% and KG of vessel was 4.7 m. Determine Fwd & Aft draft in the final condition.

Q.3 A box shaped vessel 24 m long and 6 m wide has light displacement of 120 tonnes. Iron ore (SF 0.6) is loaded, 3 m high at the forward and aft ends, sloping steadily to zero at the centre. Draw the SF and BM diagrams to scale. Note: The cargo has no slope in the athwart ships direction.

Q.4 Sketch and label the mid-ship section of a Ro-Ro vessel.

Q.5 With reference to Intact Stability Code (2008) explain with suitable diagram the severe wind and weather heeling criteria to be satisfied by cargo ships.

Q.6 a) Describe body plan, sheer plan, half breadth plan and their uses?
b) Differentiate between 'Floodable length' & 'Permissible length'.

Q.7 Define as per International Convention on Tonnage measurement:
i) Upper Deck ii) Depth
iii) Weather tight iv) Excluded space

Q.8 a) What are the advantages and disadvantages of using Aluminum in ship building?
b) Explain how Aluminum is joint to steel as corrosion control methods.

Q.9 a) With the help of suitable sketches, explain the principle of inclining experiment.
b) List the precautions which must be taken while conducting the experiment.

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GOVERNMENT OF INDIA

PM PAPER **Date: - 14th-May-2025**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. Question No.1, 2 & 3 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 M.V. Hindship floating at a draught of F:5.73m, A:6.42m, at an angle of loll of 4°. FS moment = 1563 tm. Assuming the ship to be wall-sided, calculate her KG.

Q.2 A box-shaped vessel 190m x 25m is floating at an even keel draft of 8m. There is a watertight compartment 8m deep with watertight flat at 2m. The length of the compartment is 15m and its aft bulkhead is 20m forward of midship. Find the draft of the vessel if the watertight compartment gets bilged above the flat. The permeability of cargo in the water tight compartment is 70%.

Q.3 A box shaped vessel 50m x 12m is divided into four compartments of equal length when loaded with homogeneous cargo level stowed as follows: No. 1 and No. 4 = 125t each. No. 2 and No. 3= 180t each, the vessel floats in SW at EK draft of 3m. Draw SF / BM diagram for the vessel.

Q.4 Sketch & label the mid-ship section of double hull oil tanker.

Q.5 Describe the importance of following for subdivision load lines as per SOLAS:
a) Uniform average permeability b) Criterion of service numeral
c) Factor of subdivision

Q.6 Describe the IMO weather criteria for severe wind and rolling as required by intact stability.

Q.7 With reference to 'International Convention' on 'Tonnage of Ships' write short notes on the following:
i) Gross Tonnage ii) Net Tonnage
iii) Excluded spaces iv) Enclosed Spaces

Q.8 a) What are the special measures adopted to maintain fire growth potential on ships?
b) Write short notes on the following:
i) Standard fire test ii) Types of bulkheads iii) Special Category Spaces.

Q.9 a) What are the Limitations of rolling period test?
b) What is forced rolling and synchronise rolling?
c) Explain the principle involved in inclining experiment to determine KG of light ship?

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GOVERNMENT OF INDIA

AM PAPER **Date: - 14th-May-2025**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
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TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

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4. Wherever applicable sketches should be drawn to support the answer.

Q.1 A box-shaped barge, 32m long and 5m broad, is empty and afloat on an even keel. It has four identical holds and its light displacement in 120t, Bulk cargo is then loaded and trimmed level as follows: No. 1: 124 t, No.2: 216 t, No. 3: 134 t and No. 4: 225 t. The final drafts are 4m fwd and 6m aft. Draw the SF and BM curves to scale.

Q.2 A deep tank bulkhead 10m deep has following equally spaced horizontal ordinates commencing from top: 8.0, 7.5, 6.8, 5.8, 4.5m. Tank contains SW to a sounding of 11m. Calculate the thrust and position of COP with respect to top of bulkhead.

Q.3 MV Hindship is floating at an even keel draught of 8.20m in water of density 1.020. She has to proceed to an upriver port where the density of water is 1.005 and where maximum allowable draught is 8.00m.
Calculate the amount of cargo to discharge and position with respect to aft perpendicular from where it should be discharged, so that she arrives at the upriver port with an even keel draught of 8.00m.

Q.4 Sketch and label the mid-ship section of a Cellular Container Ship.

Q.5 Write notes on:
a) Parametric rolling
b) Free surface effect due to a slack tank.
c) Effect of draft and displacement of rolling.

Q.6 Write short notes on:
a) Type B-60 Ship
b) Net Tonnage
c) Permissible length

Q.7 a) What is meant by 'Subdivision Load Lines'?
b) What are the requirements as per SOLAS for assigning, marking and recording of subdivision load lines for passenger ships?

Q.8 a) Explain significance of different grades of steel for shipbuilding.
b) Briefly describe methods of corrosion control at joint of steel hull with Aluminum super structure?

Q.9 In accordance with Intact stability code 2008 what are the requirements.
i) Regarding Righting lever and GM for Cargo ship
ii) Regarding heeling for a Passenger ship.

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GOVERNMENT OF INDIA

PM PAPER **Date: - 5th-Feb-2025**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
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4. Wherever applicable sketches should be drawn to support the answer.

Q.1 M.V. Hindship is floating at a draught of F/5.73m, A/6.42m, at an angle of loll of 4°. FS moment = 1563 mt. Assuming the ship to be wall-sided, calculate her KG.

Q.2 A box-shaped vessel (150m x 20m) is floating in SW at a draught of 6.7m. A 20m long compartment whose fwd bulkhead is 40m from the fwd end of the vessel is loaded with cargo of a permeability of 50%. Calculate the new drafts if this compartment is bilged.

Q.3 An end bulkhead 9.6m deep has the following equally spaced horizontal ordinates commencing from the top: 8.8, 8.5, 8.0, 7.4, 6.8, 6.0 & 5.1 respectively. Tank contains water of density 1.015 to a sounding of 11.3m. Calculate the thrust and height of the centre of pressure from the base.

Q.4 Sketch & label the mid-ship section of a hatch coverless container ship. Illustrate additional features for compensating loss in strength due to large openings.

Q.5 Explain how the rolling test is taken. What is the relationship between GM_T and rolling period? What precautions must be observed when using the formula?

Q.6 Write short notes on the following:
a) Functional requirements of fire protection and detection.
b) "A" class division.
c) Sprinkler type fixed fire extinguishing system.

Q.7 a) Explain the salient features of the Load Line Convention.
b) State the difference between Type A and Type B-60 ships.

Q.8 a) Sketch and describe a sheer plan and body plan.
b) What are the advantages of prefabrication?

Q.9 a) Which ships are required to undergo an inclining experiment?
b) An inclining experiment was conducted on M.V. Hindship with all tanks and compartments empty except 30t of diesel oil in each of 7P and 7S tanks, and also 10t of fresh water in each of the tween deck drinking water tanks P and S. When a weight of 5.70t (KG 10.2m) was shifted transversely through 17.1m, a plum line deflected 5 cms. Calculate her light KG and GM.

---------- X—X ----------

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4. Wherever applicable sketches should be drawn to support the answer.

Q.1 MV Hindship is floating in water of density 1.015 at draughts of F/6.40m, A/7.20m. Calculate the amount of cargo to discharge and position with respect to the aft perpendicular from where it should be discharged to reduce her forward draught by 40 cms without change in draught aft.

Q.2 The slop tank of a tanker has vertical ordinates measured from the deck downwards spaced equally at intervals of one meter as follows: 0, 3.25, 4.4, 5.15, 5.65, 5.9, and 6.0m. Find KP (ht of COP above the bottom) and the thrust when the tank is full of slop of RD 0.98.

Q.3 a) A coaster of length 80m, breadth 8m, has a rolling period of 10 seconds. If her rolling coefficient is 0.75, calculate her approximate GM.

b) MV Hindship is at a draught of F/7.4, A/8.62m, KG 7.0m, FSM 1200, and speed of 13.0 knots. She turns in a circle of radius 400m. Calculate the heel produced.

Q.4 Sketch and label the mid-ship section of an LPG ship.

Q.5 With reference to Intact Stability Code (2008) explain with suitable diagrams, the severe wind and weather heeling criteria to be satisfied by Cargo vessels.

Q.6 Under subdivision of ships, describe any three:

i) Permeability of compartments
ii) Criterion of service numeral
iii) Floodable length
iv) Permissible length

Q.7 Differentiate between enclosed spaces and excluded spaces as per International Tonnage Convention.

Q.8 With the help of a block diagram, explain the general layout of a shipyard and their inter-relationship.

Q.9 Describe fully the procedure for doing the inclining experiment.

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GOVERNMENT OF INDIA

PM PAPER **Date: - 12th-Nov-2024**

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4. Wherever applicable sketches should be drawn to support the answer.

Q.1 A undivided DB tank of length 18m has the following ½ ordinates of waterline at equal intervals measured from forward bulkhead:
2.0, 2.8, 3.9, 5.2, 6.7, 8.0, 10.1m respectively. F.O. of RD 0.9 is loaded to a sounding of 0.8m in the tank. Assume the tank to be wall-sided. Determine the KG fluid in the final condition if initial displacement was 20,000 Ts and KG = 10m.

Q.2 A box-shaped vessel 160m X 18m is floating in S.W. at an even keel draft of 6.4m. A forward hold of length 25m whose aft bulkhead is 40m aft of F.P. is bilged. If the permeability of the hold is 80% and KG of the vessel was 4.7m. Determine F & A draft in final condition.

Q.3 A box-shaped vessel 30m X 8m floats in SW with ore of S.F. 0.67m^3/T stored to a height of 4m at the mid length and sloping uniformly to nil at sides. The vessel then floats in FW at an even keel draft of 4m. Draw S.F. & B.M. diagram for the vessel.

Q.4 Draw the mid-ship section of large double-hull crude oil tanker.

Q.5 Explain how the rolling test is taken. What is the relationship between GM_T and rolling period? What precautions must be observed when using the formula.

Q.6 Write short notes on the following:
a) Functional requirements of fire protection and detection.
b) "A" class division.
c) Sprinkler type fixed fire extinguishing system.

Q.7 Write short notes on:
a) Multiple loadline
b) Enclosed space as per Tonnage convention

Q.8 a) Sketch and describe sheer plan and body plan.
b) What are the advantages of pre-fabrication?

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Q.1 M.V. Hindship is in condition No. 5 at a discharge port. After discharging 400t cargo from No. 1 TDK and 500t from No. 3 TDK and the entire cargo from No. 5 Poop Deck has to proceed to a nearby port for balance discharge. Calculate GMF and Dynamical Stability till 30°.

Q.2 A box-shaped vessel 40 long, 20m broad and 5m deep is floating in DW of RD 1.005 with drafts F=3.0m and A=3.0m, KG 4.2m. If an amidships compartment, 15m long, extending from side to side with permeability 80% is bilged. Calculate GM after bilging.

Q.3 The breadths of water-plane of a vessel 180m in length, displacing 20,000 tonnes in water of density 1.005, measured at equi-spaced intervals from forward are 0, 5, 11, 18, 29, 29, 22, 18, 12 & 9 meters respectively. Calculate BMT.

Q.4 Sketch and label the mid-ship section of Ro-Ro vessel.

Q.5 With the help of a suitable sketch, explain the Wind and Weather Criterion (Rolling Criterion) as enumerated in the IMO Code of Intact Stability.

Q.6 Explain:
a) Type A-60 Fire division
b) Alternate Load lines
c) Permissible length

Q.7 Write short notes on:
a) Multiple loadline
b) Enclosed space as per Tonnage convention

Q.8 a) Explain the testing of metals in ship building.
b) Sketch and describe sheer plan and body plan.

Q.9 State with suitable sketches the difference between the Heeling arm curve and the Righting arm curve for a vessel authorized to carry grain.

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PM PAPER **Date: - 5th-Aug-2024**

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4. Wherever applicable sketches should be drawn to support the answer.

Q.1 M.V. Hindship is floating at a draft if F 5.73 m, A 6.42 m, is at an angle of loll of 4^{O}, FS moment 1563 mt. Assuming the ship to be wall sided, calculate her KG.

Q.2 A box shaped vessel 40m long, 20m broad and 5m deep is floating in DW of RD 1.005 with drafts F = 3.0m and A = 3.0m, KG 4.2m. If an amidships compartment, 15m long extending from side to side with permeability 80% is bilged. Calculate GM after bilging.

Q.3 The breadths of water plane of a vessel 180m in length, displacing 20,000 tonnes in water of density 1.005, measured at equi-spaced intervals from forward are 0, 5, 11, 18, 29, 29, 22, 18, 12 and 9 meters respectively. Calculate BM.

Q.4 Sketch & label the Mid-ship section of a hatch coverless container ship. Illustrate additional features for compensating loss in strength due to large openings.

Q.5 Master of very large container vessel, such as Post Panamax Vessels, have complained that they have encountered very severe rolling with heavy seas from the bows or quarters, at times losing large numbers of containers overboard. Discuss the factors responsible for such large rolling & remedial action required to prevent it.

Q.6 With respect to subdivision requirements of passenger ships as per SOLAS 1974 as amended explain:
a) Flooded length b) Permissible length c) Subdivisions Loadlines

Q.7 Discuss the "Conditions of Assignment" as per the International convention on Loadlines as amended.

Q.8 Write short notes on:
a) Torsional stresses induced by a ships Rolling motion.
b) Racking Stresses due to Heavy Rolling.

Q.9 Why & when the inclining test is conducted on ships? Describe the procedure of such test and state the precautions necessary?

---------- X—X ----------

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3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 MV Hindship is floating in water of density 1.015 at draughts of F/6.40m, A/7.20m. Calculate the amount of cargo to discharge and position with respect to aft perpendicular from where it should be discharged to reduce her forward draught by 40 cms without change in draught aft.

Q.2 A uniform beam is 16m long and weighs 160 kg. It is supported at points 2m from each end. A load of 15 kg is placed at a point 6m from end A and uniform weights of 30 kg is spread over a length of 5m from end B. Find the SF and BM. What is the maximum value of BM and at what point does it occur.

Q.3 A vessel 120m long and 20m wide is floating in DW of RD 1.018 with an even keel draft of 5.0m. A mid-ships compartment extending from side to side, 15m long, with its aft bulkhead at midship is bilged. It has a DB tank 1.2m below the hold. The hold with permeability 40% is bilged. Calculate the forward and aft drafts.

Q.4 Sketch & describe the construction of a midship section of a Double Hull VLCC.

Q.5 Describe IMO severe wind and weather heeling criteria with suitable diagram.

Q.6 a) List down Conditions of assignment as per ILLC 1966. Describe special conditions of assignment for Type A ship.
b) Explain the different types of Fire Bulkheads as mentioned in SOLAS?

Q.7 What is Basic Freeboard? Explain how are the following corrections applied to the basic freeboard:
a) Correction for Block Coefficient
b) Correction for Depth
c) Correction for Position of Deck line

Q.8 With suitable sketches explain various basic tests carried out on steel in shipyard.

Q.9 Describe the procedures of Inclining experiment of a ship and state precautions to be observed.

---------- X—X ----------

GOVERNMENT OF INDIA

PAPER 1 **Date: - 10th-May-2024**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 The vertical ordinates of a transverse watertight bulkhead 12 m broad, measured from ship side to the center line at equal intervals are: 0, 3.5, 6.8, 7.5, 10m resp. Find the height of COP from tank bottom and the thrust when the tank is filled with sea water to a sounding of 15 m.

Q.2 A cantilever 10 m long carries a concentrated load of 50 KN at its free end. The weight of the cantilever is 150 KN. Determine the SF / BM values at 1m equal interval and draw the curves.

Q.3 A box shaped vessel 180m long and 30 m wide is in SW with an even keel draft of 7m. A compartment of length 24m whose forward bulkhead if 24m from the forward perpendicular, permeability 60%, is bilged. Find the new drafts.

Q.4 Sketch and label the midship section of a hatch cover less cellular container vessel.

Q.5 Describe with the neat sketch IMO wind and weather heeling criteria as required by code of intact stability.

Q.6 a) State the procedures for conducting an inclining experiment.
b) State the difference between Type A and Type B- 60 ships.

Q.7 a) Explain in detail a test which is carried out on metals to determine its toughness.
b) Write short notes on three ways of connecting aluminum structures to steel.

Q.8 List the 'conditions of Assignment' of Loadline of a ship as per the Loadline Convention. Describe any three conditions of assignment.

Q.9 Sketch and describe the following:
i) Sheer Plan
ii) Half breadth plan
iii) Body Plan
iv) Management of a steel stockyard.

---------- X—X ----------

GOVERNMENT OF INDIA

PAPER 2 **Date: - 10th-May-2024**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. Question No.1, 2 & 3 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 M.V. Hindship is in condition No. 5 at a discharge port. After discharging 400t cargo from No. 1 TDk and 500t from No. 3 TDk and the entire cargo from No. 5 Poop Deck has to proceed to a nearby port for balance discharge. Calculate GM_T and Dynamical stability till 30^O.

Q.2 A box shaped vessel 150 x 20 m is floating is SW at a draft 6.7m. A 20m long compartment whose fwd bulkhead is 40m from the fwd end of the vessel, is loaded with cargo of a permeability 50%. Calculate the new drafts if this compartment is bilged.

Q.3 An end bulkhead 9.6m deep has the following equally spaced horizontal ordinates commencing from the top 8.8, 8.5, 8.0, 7.4, 6.8, 6.0 & 5.1 respectively. Tank contains water of density 1.015 to a sounding of 11.3m. calculate the trust and height of centre of pressure from base.

Q.4 Sketch and label the Mid-ship section of ro-ro vessel.

Q.5 Master of very large container vessel, such as Post Panamax Vessels, have complained that they have encountered very severe rolling with heavy seas from the bows or quarters, at times losing large numbers of containers overboard. Discuss the factors responsible for such large rolling & remedial action required to prevent it.

Q.6 With respect to subdivision requirements of passenger ships as per SOLAS 1974 as amended explain:
a) Flooded length b) Permissible length c) Subdivisions Loadlines

Q.7 Discuss the "Conditions of Assignment" as per the International convention on Loadlines as amended.

Q.8 Write short notes on:
a) Torsional stresses induced by a ships rolling motion.
b) Racking Stresses due to Heavy Rolling.

Q.9 Why & when the inclining test is conducted on ships? Describe the procedure of such test and state the precautions necessary?

---------- X—X ----------

GOVERNMENT OF INDIA

PAPER 2 **Date: - 5th-Feb-2024**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 The equally spaced horizontal ordinates of the after bulkhead of a tank 12m high measured from the keel upwards are: 4.0, 6.1, 8.2, 9.1, 10.5 and 12.0 respectively. Find the height of COP above the bottom when the tank is full of SW to a sounding of 12.0m.

Q.2 M.V. Hindship is floating at a displacement of 17250 tonnes in water of R.D. 1.008. She is at Angle of Loll of 7.5^{O}. Her FSM is 1485 TM.
Assuming she is wall sided, calculate her KG and also find her GM_F at Angle of Loll.

Q.3 A box shaped vessel 40m long and 20m wide and 5.0m deep is floating in DW of RD 1.005 with even keel draft of 3.0 m with KG 4.2m. A mid-ship compartment extending from side to side, 15m long, with permeability 80% is bilged. Calculate the GM after bilging.

Q.4 Sketch and label the Mid-ship section of a Type 2 Chemical carrier.

Q.5 a) Explain what is heel due to turning and discuss the effect of KG on direction of heel.
b) What are the advantages of prefabrication.

Q.6 a) Sketch and describe sheer plan and body plan
b) Explain what is Angle of loll and its corrective action you will take on a general cargo ship.

Q.7 a) Explain in detail a test which is carried out on metals to determine its toughness.
b) Write short notes on three ways of connecting aluminum structures to steel.

Q.8 a) Explain in detail why subdivision load lines are assigned.
b) Show with a neat sketch damaged stability criteria to be complied with by passenger ship.

Q.9 Describe the damage stability criteria for Passenger ships.

---------- X—X ----------

GOVERNMENT OF INDIA

PAPER 1 **Date: - 5th-Feb-2024**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 M. V. HINDSHIP is floating at an even keel draught of 8.20m in water of density 1.020. She has to proceed to any upriver port where the density of water is 1.005 and where maximum allowable draught is 8.00m. Calculate the amount of cargo to discharge and position with respect to aft perpendicular from where it should be discharged, so that she arrives at the upriver port with an even keel draught of 8.00m.

Q.2 A fore-peak bulkheads is 21m wide at its upper edge. Its vertical depth at the centre-line is 4.2m. The vertical depts on each side of the centre-line at 3.5m intervals are 3.6, 2.7 and 0.3m, respectively. Calculate the load on the bulkhead and the depth of the centre of pressure below the top of the bulkhead when the fore-peak tank is filled with salt water to a head of 5m above the top of the bulkhead.

Q.3 A box shaped vessel 100 m long, 20m wide, 12 m deep is floating in salt water on an even keel draft of 6m. A forward centre compartment is 10m long, 12m wide and extends from the outer bottom to a watertight flat, 4m above the keel. The compartment contains cargo of permeability 25 per cent. Find the new drafts if this compartment is bilged.

Q.4 Sketch, label & describe the construction of a midship section of an OBO carrier. Describe salient features of this ship.

Q.5 Explain how the rolling test is taken. What is the relationship between GMT and rolling period? What precautions must be observed when using the formula?

Q.6 a) Write short notes on Sprinkler type fixed fire extinguishing system.
b) Explain Standard Fire test of Fire Bulkheads for Fire Integrity of Ships.

Q.7 a) Draw and explain Passenger ship subdivision load lines.
b) For assignment of free board to ship explain the following:
i) Block coefficient ii) Correction for sheer profile iii) Bow Height Correction

Q.8 Write short note on:
a) Multiple Loadline b) Enclosed space as per Tonnage Convention

Q.9 Sketch and describe the following:
i) Sheer Plan ii) Half breadth plan
iii) Body Plan iv) Write a short note on ‘management of a steel stockyard’.

---------- X—X ----------

GOVERNMENT OF INDIA

PM PAPER **Date: - 1st-Nov-2023**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 M. V. Hindship condition No.3 is listed 3^{O} to Stbd. It is desired to increase her trim to 3 metres by stern and to bring her upright by transferring ballast from No. 2 DB tanks to No. 4 DB tanks P and S only. Calculate final distribution of water ballast in No. 2 & No. 4 DB tanks to achieve this, with No. 4 port is filled to capacity. Assume CGs of No. 2 and No. 4 (P & S) tanks are 6.7 metres from the centre line.

Q.2 A box shaped vessel 75m x 10m x 6m is floating in SW on an even keel draft of 4.5m. Find the new drafts Fwd & Aft if the forward compartment 5m long is bilged.

Q.3 A uniform log AB is 15m long, weights 150 KN, it is supported at midpoint by a 3m platform. It also carries a point load of 45 KN at end B. Draw the SF & BM diagrams of the beam stating their values at intervals of 3 metres.

Q.4 Sketch and label the Mid-ship section of membrane type LNG carrier?

Q.5 With reference to Intact Stability Code (2008) explain with suitable diagrams, the severe wind and weather heeling criteria to be satisfied by Cargo vessels.

Q.6 Write short notes on:
a) Non-combustible material
b) Standard Fire Test
c) Type of bulkheads

Q.7 Differentiate between enclosed spaces and excluded space as per International Tonnage Convention.

Q.8 a) What is 'Wire frame model' in ship building?
b) Write notes on:
   i) Plate nesting
   ii) Prefrabrication

Q.9 a) With the help of suitable sketches explain the principle of inclining experiment.
b) List the precautions which must be taken while conducting the experiment.

---------- X—X ----------

GOVERNMENT OF INDIA

AM PAPER **Date: - 1st-Nov-2023**

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 M. V. HINDSHIP at even keel draft 8.3m in water of density 1.017. She is to sail at summer draft in SW with a trim of 20cms by stern. Space allocated as follows for three parcels of cargo.

450t in No.2 hold
300t in No. 4 hold
600t in No. 5 hold

Remaining cargo is to be loaded in No. 1 Tdk & No. 5 Tdk. Calculate amount to be loaded in each of those spaces.

Q.2 A box shaped vessel 120 x 20 m even keel draft of 6.6m, has a forward end compartment 14m long extending the full width above the DB tank which is 1.6m high. The compartment is filled with homogeneous cargo (p=70%). The compartment is bilged above the DB tank. Find the drafts if the initial KG is 5.2m.

Q.3 A box shaped barge of length 60m has 4 identical compartments. Hold 1 & Hold 4 has 300t each. Hold 2 & Hold 3 has 120t each. Barge is on an even keel with light displacement 480t. Draw the S.F. & B.M. curves.

Q.4 Sketch and label the Mid-ship section of a spherical tank type LNG carrier and enumerate the special features of these type of ships.

Q.5 a) Derive the expression for the angle of heel of a vessel during turning.
b) A vessel turns in a circle of radius 100m at a speed of 15 knots. Her KG, KB and GM (F) are 6m, 5m and 0.60m respectively. Find the heel to which the vessel will settle during the turn.

Q.6 a) What do you understand by the term 'Subdivision Loadlines'? Why is it necessary? Explain.
b) Explain: i) 'Permissible Length' ii) Factor of Subdivision iii) Floodable length.

Q.7 List the items to be checked during the loadline renewal survey.

Q.8 With the help of suitable sketch explain the following:
a) Sheer plan b) Half breadth plan c) Body plan

Q.9 a) With the help of suitable sketches explain the principle of inclining experiment.
b) List the precautions which must be taken while conducting the experiment.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 3rd-Aug-2023

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 A cantilever 6 meters long carries a concentrated load of 45 KN at its free end and also uniformly distributed load of 20 KN/meter over its entire length. Find the SF and BM at the wall and draw the SF/BM diagram?

Q.2 A box shaped vessel of length 120m, breadth 25m is floating at an even keel draft of 6m, KG of the vessel is 7m. It has a mid-ship compartment of 20m in length extending from side to side with its forward bulkhead amidships. The permeability is 70%. The compartment contains a watertight flat at height of 6.3m above the keel. Calculate the drafts forwards and aft and GMT if that compartment is bilged below the watertight flat.

Q.3 M.V.Hindship was floating with all compartments empty expect as follows:

No.2 (P& S) DB tanks full water ballast

No.1 DB tank contained 100 tonnes of H.F.O. (FSM at SG 1.0 (T/M) = 419m). An inclining experiment was conducted in this condition. A weight of 10 tonnes Kg 10.2m shifted transversely through a distance of 17.6m cause a deflection of 8.3 cms in a plumb line 8.5m in length. Calculate the GM (Solid) and the KG of the light ship.

Q.4 a) Sketch and label Mid-ship section of a Hatch coverless Cellular container ship.
b) Discuss the advantage and disadvantages of such ships over a normal container ship.

Q.5 Write short notes on the following:
a) Natural rolling period of ships.
b) Synchronous rolling
c) Symmetric parametric rolling

Q.6 a) Describe: i) Objective of fire integrity and subdivision of ship ii) Standard fire rest

Q.7 a) Describe: i) Type A ii) Type B & iii) Type C Bulkheads
b) What changes have been brought by implementation of international tonnage convention 1969, advantages of it.
c) With neat sketches, give two examples of enclosed and excluded space under ITC 1969.

Q.8 Explain with reference to shipbuilding
a) Economy of scale.
b) Prefabrication

Q.9 Describe the damage stability criteria for Passenger ships.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 11th-May-2023

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q.1 Hindship at drafts 6.70 and 8.86 has KG 7.26 m and FSM 1372 tm. Draw her curve of statical stability up to angle of 40^O. From the curve calculate dynamical stability at angle of 40^O using ordinates at intervals of 10^O. Also, determine what will be the angle of heel produced if a heeling moment of 900 tm was applied.

Q.2 A box shaped barge 140m long, 24m broad, KG 5.60m, is floating at even keel draft of 6.2m has double bottom tank. 1.2m deep, throughout her length. A compartment 20m in length situated above the double bottom extending from side to side with its forward bulkhead amidships has permeability of 70%. Calculate the drafts if that compartment is bilged above the double bottom.

Q.3 A bulkhead is 10m in height. The horizontal ordinates at equal intervals starting from tank top are as follow: 12m, 10.6m, 9.0m, 7.2m, 5.0m and 2.0m respectively. Calculate the thrust on the bulkhead and the height above base it can be considered to be acting if the tank is filled to head of 2m.

Q.4 Sketch and label the mid-ship section of a bulk carrier.

Q.5 Explain how a rolling period test is taken. What is the relationship between GMT and rolling period? What precautions must be observed when using this formula?

Q.6 Write short note on the following:
a) Functional requirements of fire protection and detection.
b) "A" class division
c) Sprinkler type fixed fire extinguishing system.

Q.7 a) Why large ships tend to roll heavier in following seas
b) Explain parametric rolling.

Q.8 a) Sketch and describe sheer plan and body plan.
b) Describe with the help of neat diagrams three examples of excluded spaces as per International Tonnage Convention 1969 as amended.

Q.9 Define the following with respect to chapter II/2 of SOLAS 74 as amended.
a) Central Control Station b) 'C' class division
c) Services spaces d) Main vertical zones.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 3rd-Feb-2023

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hindship is floating at a displacement of 17250 tonnes in water of R.D. 1.008. She is at Angle of Loll of 7.5^{O}. Her FSM is 1485 TM. Assuming she is wall sided, calculate her KG and also find her GM_F at Angle of Loll.

Q.2 A box shaped vessel 160m x 18m floats in SW at an even keel draft of 6.4m. A forward hold of length 25m whose aft bulkhead is 40m aft of the FP and is bilged. If the permeability of the hold is 80% and KG of vessel was 4.7m. Determine Fwd & Aft draft in the final condition.

Q.3 A box shaped barge of length 60m has 4 identical compartments. Hold No. 1 & No. 4 has 300t each and Hold No. 2 & No.3 has 120t each and floating on an even keel. If the light displacement is 480t draw the SF & BM diagram at 5m interval.

Q.4 Sketch and label the mid-ship section of a Ro-Ro vessel.

Q.5 With reference to Intact Stability Code (2008) explain with suitable diagrams, the severe wind and weather heeling criteria to be satisfied by Cargo ships.

Q.6 a) Describe body plan, sheer plan, half breadth plan and their uses?
b) Differentiate between 'Floodable length' & 'Permissible length'.

Q.7 Define as per International Convention on Tonnage measurement:
i) Upper Deck ii) Depth
iii) Weather light iv) Excluded Space

Q.8 i) Describe the stress strain relationship in a metal.
ii) Compare and contrast between steel and aluminum in ship building.

Q.9 a) With the help of suitable sketches explain the principle of inclining experiments.
b) List the precautions which must be taken while conducting the experiment.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 11th-Nov-2022

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hindship is floating in water of density 1.015 at draughts of F:6.40m, A: 7.20m. Calculate the amount of cargo to discharge and position with respect to aft perpendicular from where it should be discharged to reduce her forward draught by 40 cms without change in draught aft.

Q.2 A slop tank of a tanker has vertical ordinates measured from the deck downwards spaced equally at intervals of one metre as follows: 0, 3.25, 4.4, 5.15, 5.65, 5.9 and 6.0 m. Find KP (ht of COP above the bottom) and thrust when the tank is full of slop of RD 0.98.

Q.3 a) A coaster of length 80m breadth 8m, has a rolling period of 10 seconds. If her rolling coefficient is 0.75, calculate her approximate GM.
b) M.V. Hindship is at a draught of F:7.4m, A:8.62m, KG:7.0m, FSM 1200 and speed of 13.0 kts. She turns in a circle of radius of 400m. Calculate the heel produced.

Q.4 Sketch and label the mid-ship section of an LPG ship.

Q.5 With reference to Intact Stability Code (2008) explain with suitable diagrams, the severe wind and weather heeling criteria to be satisfied by Cargo vessels.

Q.6 Under subdivision of ships, describe any three:
i) Permeability of compartments ii) Criterion of service numeral
iii) Floodable length iv) Permissible length

Q.7 Differentiate between enclosed spaces and excluded spaces as per International Tonnage Convention.

Q.8 With the help of a block diagram explain the general layout of a ship yard and their Inter relationship.

Q.9 Describe fully the procedure for doing the inclining experiment.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 6th-Oct-2022

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hindship is in dock water of RD 1.015 at drafts of F 8.68m, A 9.18m. She has to load cargo such that when in salt water she is at her summer load line and trimmed 1m by stern.

Calculate: i) Quantity of cargo that can be loaded.
ii) where with respect to AP should it be loaded.
iii) Drafts forward and aft in saltwater.

Q.2 A box shaped vessel has length 80m and light displacement 800 tonnes. The vessel loads 200 tonnes in a forward compartment of length 20m and 200 tonnes in an after compartment of length 20m. Draw the SF and BM graphs for the vessel.

Q.3 A box shaped vessel 75m x 10m x 6m is floating is SW on an even keel draft of 4.5m. Find the new drafts Fwd & Aft if the forward compartment 5m long is bilged.

Q.4 Sketch and label the mid-ship section of a general cargo ship.

Q.5 a) Describe the IMO weather criteria against wind and wave as required by code of intact stability.
b) What do you understand by "Torsional Moment"? How do you calculate the Torsional Moment in a container ship? How significant is Torsional Stress in a container ship.

Q.6 With the help of suitable sketches describe:
a) The difference between 'A-60' and 'A-0' class fire division.
b) The requirements for a 'trunk way' passing through an A-class division.

Q.7 a) Differentiate between a Type "A" and Type "B" – "100" ships as per International Load Line Convention 1966 as amended.
b) With respect to International Tonnage Convention 1969 as amended, give two examples of excluded space.

Q.8 a) Describe the sequence of events which take place in a modern Shipyard while building a ship.
b) With the aid of sketch, describe the procedure of impact text conducted on a metal.

Q.9 When inclining tests are required on cargo and passenger ships? Describe the procedure of such tests and state the precautions necessary?

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 7th-Sept-2022

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hindship is floating at an even keel draught of 8.20m in water density 1.020. She has to proceed to an upriver port where the density of water is 1.005 and where maximum allowable draught is 8.00m.
Calculate the amount of cargo to discharge and position with respect to aft perpendicular from where it should be discharged, so that she arrives at the upriver port with an even keel draught of 8.00m.

Q.2 A box shaped vessel 190m x 25m is floating at an even keel draft of 8m. There is a watertight compartment 8m deep with watertight flat at 2m. The length of the compartment is 15m and its aft bulkhead is 20m forward of midship. Find the draft of the vessel if the watertight compartment gets bilged above the flat. The permeability of cargo in the water tight compartment is 70%.

Q.3 A box shaped vessel 50m x 12m is divided into four compartments of equal length is now loaded, with homogeneous cargo level stowed as follows: No. 1 and No. 4 = 125 t each, No. 2 and No. 3 = 180 t each vessel floats in SW at EK draft of 3m. Draw SF, BM diagram for the vessel.

Q.4 Sketch and label the mid-ship section of a Cellular Container Ship.

Q.5 Describe the IMO weather criteria for severe wind and rolling as required by intact stability.

Q.6 a) What is meant by 'Subdivision Load Lines'?
b) What are the requirements as per SOLAS for assigning, marking and recording of subdivision load lines for passenger ships?

Q.7 With reference to 'International Convention' on Tonnage of Ship's write short notes on the following:
i) Gross Tonnage ii) Net Tonnage iii) Excluded Spaces iv) Enclosed Spaces.

Q.8 a) What are the special measures adopted to maintain fire growth potential on ships?
b) Write short notes on the following:
i) Standard Fire test ii) Types of bulkhead iii) Special Category Spaces

Q.9 a) What are the Limitations of rolling period test?
b) What is forced rolling and synchronise rolling?
c) Explain the principle involved in inclining experiment to determine KG of light ship?

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 6th-July-2022

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 A box – shaped barge, 32 m long and 5 m broad, is empty and afloat on an even keel. It has four identical holds and its light displacement is 120 t. Bulk cargo is then loaded and trimmed level as follows: No. 1: 124 t, No. 2: 216t, No. 3: 134t and No. 4: 225t. The final drafts are 4m fwd and 6m aft. Draw the SF and BM curves to scale.

Q.2 A deep tank bulkhead 10m deep has following equally spaced horizontal ordinates commencing from top: 8.0, 7.5, 6.8, 5.8, 4.5m. Tank contains SW to a sounding of 11m. Calculate the thrust and position of COP with respect to top of bulkhead.

Q.3 M.V. Hindship floating at a draft of F: 5.73m, A: 6.42m, is at an angle of loll of 4^{O}, FS moment 1563 tm. Assuming the ship to be wall sided, calculate her KG.

Q.4 Sketch and label mid-ship section of double hull oil tanker.

Q.5 Write notes on a) Parametric rolling b) Free surface effect due to slack tank
c) Effect of draft and displacement on rolling

Q.6 Write short notes on: a) Type B-60 ship b) Net Tonnage c) Permissible length

Q.7 Describe the importance of following for subdivision load lines as per SOLAS:
a) Uniform average permeability b) Criterion of service numeral
c) Factor of subdivision

Q.8 a) Explain significance of different grades of steel for shipbuilding.
b) Briefly describe methods of corrosion control at joint of steel hull with aluminium super structure?

Q.9 In accordance with Intact stability code 2008 what are the requirements
i) Regarding righting lever and GM for Cargo ship
ii) Regarding heeling for a Passenger ship.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 12th-May-2022

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, & 3 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 An undivided DB tank of length 18m has following ½ ordinates of waterline at equal intervals measured from forward bulkheads.
2.0, 2.8, 3.9, 5.2, 6.7, 8.0, 10.1m respectively. F.O. of RD 0.9 is loaded to a sounding of 0.8m in the tank. Assume the tank to be wall-sided. Determine the KG fluid in the final conditions if initial displacement was 20,000 Ts and KG = 10m.

Q.2 A box shaped vessel 160m x 18m floats in SW at an even keel draft of 6.4m. A forward hold of length 25m whose aft bulkhead is 40m aft of the FP and is bilged. If the permeability of the hold is 80% and KG of vessel was 4.7m. Determine F & A draft in the final condition.

Q.3 A box shaped vessel 30m x 8m floats in SW with ore of S.F. 0.67m^3/T stored to a height of 4m at the mid length and sloping uniformly to nil at sides. The vessel then floats in FW at an even keel draft of 4m. Draw SF & BM diagram for the vessel.

Q.4 Draw the mid-ship section of large double-hull crude oil tanker.

Q.5 Explain how the rolling test is taken. What is the relationship between GM_T and rolling period? What precautions must be observed when using the formula.

Q.6 Write short notes on the following:
a) Functional requirements of fire protection and detection.
b) "A" class division.
c) Sprinkler type fixed fire extinguishing system.

Q.7 Write short notes on:
a) Multiple loadline
b) England space as per Tonnage convention.

Q.8 a) Sketch and describe sheer plan and body plant.
b) What are the advantages of pre-fabrication.

Q.9 a) Which ships are required to undergo inclining experiment?
b) An inclining experiment was conducted on M.V. Hindship with all the tanks and compartments empty except 30t of diesel oil in each of 7P and 7S tanks and also 10t of fresh water in each of the tween deck drinking water tanks P and S. When a weight of 5.70t (Kg 10.2m) was shifted transversely through 17.1m a plum line deflected 5 cms. Calculate her light KG and GM.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 4th-March-2022

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. 'Hindship' was floating with all compartments empty except as follows:-
No. 2 (P & S) DB tanks full with water ballast.
No. 1 DB tank contained 100 tonnes of H.F.O.
An inclining experiment was conducted in this condition. A weight of 10 tonnes KG 10.2 m, shifted transversely through a distance of 17.6m, caused a deflection of 8.3 cms in a plumb line 8.5 m in length. Calculate the GM (solid) and the KG of the light ship.

Q.2 A box shaped vessel 160m x 18m floats in SW at an even keel draft of 6.4m. A forward hold of length 25m whose aft bulkhead is 40m aft of the FP and is bilged. If the permeability of the hold is 80% and KG of vessel was 4.7m. Determine Fwd & Aft draft in the final condition.

Q.3 A box shaped vessel 24m long and 6m wide has light displacement of 120 tonnes. Iron ore (SF 0.6) is loaded, 3m high at the forward and after ends, sloping steadily to zero at the centre. Draw the SF and BM diagrams to scale. Note: The cargo has no slope in the athwart ships direction.

Q.4 Sketch and label the mid-ship section of a LNG vessel and describe its salient features.

Q.5 Write short notes on:-
i) Racking Stresses induced by ships Rolling Motion.
ii) Reduction of Torsional Stresses in a vessel.

Q.6 a) What are the advantages and disadvantages of using Aluminum in ship building?
b) Explain how Aluminum is joint to steel as corrosion control methods.

Q.7 a) As a Chief Officer, give full details of the items that you will have checked and prepared to ensure the weather tight integrity of the ship to present the ship for Load Line Survey.
b) What do you understand by subdivision load line and why is it necessary on passenger ships?

Q.8 As per the Tonnage Convention, draw neat diagrams for the following:
a) An excluded space with restricted end opening.
b) An enclosed space that is covered from above and below.

Q.9 a) With the help of suitable sketches, explain the principle of inclining experiment.
b) List the precautions which must be taken while conducting the experiment.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 13th-January-2022

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. 'Hindship' in Condition No. 7 while approaching a port, runs aground on an isolated rock, off her center line, without rupturing her bottom. After fall of tide, she was bound to be listed 3^{O} to port and her mean forward & aft draughts were found to be 9.0m and 8.0m respectively.
Calculate the followings:

a) Virtual GM_F of the vessel then
b) Position with respect to aft perpendicular, where grounding occurred
c) Position with reference to the center line where grounding occurred.

Q.2 A box shaped vessel 190m x 25m at even keel draft of 8m, KG 4.34m has a compartment at the fore end 15 mts in length extending full width of vessel. Calculate draft F/A after that compartment is bilged.

Q.3 A uniform beam AB, 16 m long weighing 112 Kgs, is supported at a point 2 meters from end 'A' and at a point 4 meters from end 'B'. It carries a point load of 13 Kgs at its mid length. Draw the S.F. & B.M. diagrams of the beam and state their valves at point 2.55 meters from end 'B'.

Q.4 Sketch and label the mid-ship section of a Ro-Ro Passenger Ship.

Q.5 Elaborate the Alternative Stability Criteria for Ships with Timber Deck Cargo with suitable GZ Curve diagram, as per the IMO Code of Intact Stability.

Q.6 Write short notes on the followings: a) Standard fire Test b) Types of Bulkhead
c) Identification of the sub-division load lines on Passenger Ship.

Q.7 Define as per International Load Line Convention 1966. (Any five)

a) Length
b) Enclosed Superstructure
c) Effective Length of Superstructure
d) Well
e) Side scuttle
f) Sheer credit

Q.8 a) What is prefabrication and what are its advantage? To what extent has it replaced 'erection sequence' in ship building?
b) Describe and sketch sheer plan.

Q.9 An inclining Experiment was conducted on M.V. HINDSHIP with all tanks and compartments empty except 28 tonne each of diesel oil in No. 7 port & stbd, tanks and also 12 tonnes each of fresh water in the tween deck drinking water tanks port & stbd.
When an inclining weight of 5.75 tonnes (Kg 10.2m) is shifted transversely through a distance of 16.95m, a plumb line 8m in length is deflected 5 cm. calculate her light KG & GM.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 3rd-November-2021

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. 'Hindship' in Condition No. 7 is listed 2.5^{O} to port, No. 7 DB tank (Stbd) is then filled with Diesel Oil, C.O.G. 3.8m starboard of center line.
Calculate her list in:
i) Salt water ii) Water of R.D. 1.004.

Q.2 A box shaped vessel 180 x 20 m is floating in water of R.D. 1.015. The vessel has a mid-ship tank of 30m length extending for the full width and height of the vessel.
The tank, which is slack, contains seawater to a sounding of 8.0m.
The draught KM_T GM_F and the FSM of the vessel then are 6.0m even keel, 7m, 0.75m and 1000 tm respectively. Calculate her draughts F/A and GM_T after this tank is bilged by a damage below the waterline.

Q.3 The half ordinates of vessels W/P Area spaced 20m apart area:
1.0, 13.0, 24.5, 33.0, 35.0, 35.3, 34.8, 31.0, 25.0 and 5.0 m respectively, commencing from forward end.
If the saltwater displacement of the vessel up that W/P is 11, 5,000 tonnes, calculate her:
i) Transverse BM
ii) Longitudinal BM.

Q.4 Sketch and label the mid-ship section of an LPG Tanker.

Q.5 Discuss the effect of GM_T, Draft & Displacement, Beam & distribution of weights on board, on the rolling of ships in a seaway.

Q.6 Write short notes on the followings: a) Noncombustible material
b) Standard fire test c) Types of bulkheads.

Q.7 a) What do you understand by Gross Tonnage (GT) and Net Tonnage (NT) and how are they calculated?
b) As per International Tonnage Convention, what is an Enclosed Space? By drawing a suitable diagram, explain an enclosed space covered from above and below.

Q.8 a) What is prefabrication and what are its advantage? To what extent has it replaced 'erection sequence' in ship building?
b) What is a 'wire frame model'? What are its benefits when used with hidden line removal and 'tendering' applications?

Q.9 Explain the purpose of inclining test and state the procedures to be followed and precautions that should be taken during this test.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 14th-September-2021

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. 'Hindship' in Condition No. 8 has to discharge 300 tonnes, prior to sailing. Calculate the position with respect to AP, from where this weight is to be discharged to enable her so sail trimmed 1.5 meters by the stern. Also find the sailing drafts F & A.

Q.2 A box shaped vessel 120 m long, 22m broad floating at even keel draft 6.2m, KG 5.6m, has an end 15 meter long compartment extends full width of the ship and has watertight flat at height of 1.2 m from Keel. Calculate the drafts at which the vessel will settle if the compartment having cargo of permeability 60% is bilged above the watertight flat.

Q.3 A box shaped barge 100 m long 12m broad is loaded with bulk cargo level stowed in the 5 equal length holds as follows: Nos. 1 and 5 1400t each, Nos. 2 and 4 1100t and No.3 1500t. After loading her draft is 6m even keel in FW. Determine the values of SF and BM curves at a distance of every 20m.

Q.4 Sketch and label the mid-ship section of a Ro-Ro vessel and enumerate the special features of these types of ships.

Q.5 Parametric rolling is not experienced on small coastal vessels. Justify the above statement giving reasons.

Q.6 Write short notes on: a) Sub division load lines b) Multiple load lines
c) Floodable length d) Permissible length

Q.7 a) What type 'A' vessels assigned lesser freeboard then Type 'B' vessels.
b) Explain with sketches excluded spaces and enclosed spaces as per international tonnage Convention 69 as amended.

Q.8 a) Describe prefabrication shipbuilding techniques and it's advantages.
b) Describe various tests for ship building steel.

Q.9 a) Explain the principle of inclining experiment.
b) State the precautions that must be taken while performing the experiment.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 11th-August-2021

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. 'Hindship' in Condition No. 3 sustained damage aft. To effect repairs, it is required to reduce the after draft to 4.55 meters by loading 520 tonnes in the fore part of the vessel. Find how far abaft the fore perpendicular, this weight should be loaded.

Q.2 A vessel 150m long and 14m wide is box shaped and afloat in SW at an even keel draft of 8m. The after-most compartment, 18m long & 14m wide, is full of cargo. Find the new drafts fwd & aft if this compartment, having permeability = 30%, gets bilged.

Q.3 A beam of mass 61.162 kg and length 10 m rests completely on a flat support. A concentrated mass of 30.581 kg is placed on the centre of the beam. Draw the SF and BM diagrams to scale.

Q.4 Sketch and label the mid-ship section of a Ro-Ro vessel and describe its salient features.

Q.5 Explain following: a) Unresisted Rolling of a large vessel b) Parametric Rolling

Q.6 Explain following: a) Standard fire test b) Class A div c) Class B div d) Class C div

Q.7 a) What are the requirements and special conditions needed for a ship to be categorized as a Type – A ship as per load line regulations? Under what circumstances is a Load Line Exemption Certificate issued?
b) Briefly explain the corrections to be made to Basic Freeboard to find the Summer Freeboard of a vessel.

Q.8 a) Define and describe: 1) Normalizing 2) Brittle Fracture 3) Yield point.
b) With the help of neat diagrams describe two destructive tests for steel.

Q.9 When and how is an inclining Test conducted on a ship? What are the precautions to be undertaken prior doing the Test.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 7th-April-2021

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hindship in DW of R.D. = 1.012 is at a draft of F = 7.5m, A = 8.5m. Calculate the total quantity of cargo to be loaded & its location with respect to A.P. so that when in S.W. she is at her winter loadline & also trimmed by 0.6m by stern.

Q.2 A box shaped vessel 190m long & 25m wide at even keel draft of 8m, kg = 5.5m has a fwd compartments 15m in length with a permeability of 65%. Calculate draft F & A if that compartment is bilged.

Q.3 A uniform log AB is 10m long weighs 100 KN, it is supported at a point 2m from end A. It also carries a point load of 30 KN at end B. Draw the SF & BM diagrams of the beam stating their values at intervals of 2 meters.

Q.4 Sketch and label the mid-ship section of a Double Hull Crude oil tanker.

Q.5 Write short notes on:
a) Rolling motion of a vessel in still water
b) Synchronous rolling

Q.6 Explain the requirements of SOLAS convention for sub-division of a passenger ship.

Q.7 Write short notes on any three:
a) Sub divisional load line
b) Excluded spaces
c) Permissible Length
d) Standard Fire test
e) Floodable Length

Q.8 a) Describe in brief the sequence of events that take place in a modern shipyard.
b) Describe the advantages and disadvantages of using high tensile steel in ship building.

Q.9 a) Which ships are required to undergo inclining experiment?
b) An inclining experiment was conducted on M.V. Hindship with all the tanks and compartments empty except 30t of diesel oil in each of 7P and 7S tanks and also 10t of fresh water in each of the tween deck drinking water tanks P and S. When a weight of 5.70t (Kg 10.2 m) was shifted transversely through 17.1m, a plum line deflected 5 cms. Calculate her light KG and GM.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 6th-Jan-2021

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hindship was floating with all compartments empty except as follows:
No. 2 (P & S) DB tanks full with water ballast.
No. 1 DB tank contained 100 tonnes of H. F. O. (FSM at SG 1.0 (t/m) = 419).
An inclining experiment was conducted in this condition. A weight of 10 tonnes Kg. 10.2 m shifted transversely through a distance of 17.6m, caused a deflection of 8.3 cms in a plumb line 8.5m in length. Calculate the GM (solid) and the KG of the light ship.

Q.2 A vessel of L: 80m, B: 18m is floating at draft 4.6m in water of relative density 1.020. A compartment 10m long 18m broad with its forward bulkhead 30m forward of mid-ship contains homogenous cargo of permeability 60%. It has water tight flat 1.2m above keel. Calculate the drafts forward and aft if this compartment is bilged above the water tight flat.

Q.3 A box shaped barge 100m long 15m broad floating in FW at even keel draft of 5m is loaded with bulk cargo level stowed in the five equal length holds as follows: Nos. 1 and 5, 1400t each, Nos. 2 & 4, 1200t each & No.3, 1500t. Draw the SF and BM curves for the barge.

Q.4 Sketch and label the mid-ship section of Ro-Ro Vessel.

Q.5 What was the traditional method of building a ship? In what ways is prefabrication different from earlier method? What are the advantages of prefabrication?

Q.6 Describe step by step the procedures for computing the summer free board of 'Type B' ship.

Q.7 Write short notes on any three:
a) Floodable Length b) Margin Line c) Permissible Length
d) Multiple Load Line e) Super Structure

Q.8 a) Describe the sequence of events which take place in a modern Shipyard while building a ship.
b) With the aid of sketch, describe the procedure of impact test conducted on a metal.

Q.9 Write short notes on the following:
a) Gross Tonnage b) Net Tonnage
c) Effect of increasing beam on GZ curve d) Sub-division Loadline.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 4th-Nov-2020

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hindship is at an even draught of 7.50 in water of R.D. 1.010, KG 7.35m, FSM 1700tm. She proceeds to sea in water of R.D. 1.025 and turns on a circle of radius 365m, at a speed of 13.5 kts. Calculate the heel produced due to turning.

Q.2 A box shaped vessel 190 x 25 m at an even keel draft of 8m in SW, has KG 5.5m, has a fwd compartment of length 15m with cargo of permeability 70%. Calculate the drafts when this compartment is bilged.

Q.3 A deep tank bulkhead 10m deep has the following equally spaced horizontal ordinates commencing from the top 8.0, 7.5, 6.8, 5.8 & 4.5. Tank contains SW to a sounding of 12m. Calculate the thrust and position of centre of pressure w.r.t. top of bulkhead.

Q.4 Describe with the help of a neat diagram, the cross section of a L.N.G. ship.

Q.5 i) Write short notes on Parametric and Synchronous rolling.
ii) What action is taken to avoid Synchronous rolling?

Q.6 Write short notes on the followings:
i) Noncombustible material.
ii) Limitations in the use of oil as fuel.

Q.7 Differentiate between enclosed spaces and excluded spaces as per the International Tonnage Convention.

Q.8 Describe the sequence of events that take place in a shipyard during construction of a new ship. How the co-ordination is maintained?

Q.9 i) With the aid of suitable sketches, explain the damage stability criteria of passenger ship.
ii) Describe the purpose of inclining test carried out on a ship.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 6th-Feb-2020

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hindship is in condition No. 5 at discharge port. After discharging 400 tonnes. Cargo from No.1 tween deck, 500t from No.3 tween deck & entire cargo from No.5 poop deck has to be proceed to a nearby port to balance discharge. Calculate a) GM (F) b) Dynamical Stability till 30^{O} c) Dynamical stability till 40^{O}.

Q.2 A box shaped vessel length 120m breadth 20m drafts 6m GM 1.3m has a centre line mid ship compartment 14m long full of homogeneous cargo (permeability 70%). Find new GM after the compartment is bilged and equilibrium is attained.

Q.3 A undivided DB tank of length 18m has following half ordinates of waterline at equal intervals measured from fwd bulkhead 2.0, 2.5, 3.9, 5.2, 6.7, 8.0, 10.1m respectively. F.O. of R.D. = 0.9 is loaded to a sounding of 0.8m in the tank. Assume tank to be a wall sided. Determine the kg fluid in the final condition of initial displacement was 20,000t. Kg=10m.

Q.4 a) Sketch and label the mid-ship section of a Modern Chemical Tanker.
b) In the above sketch indicate the spacing required for these tank sides from the ship's side and the bottom for different types of chemical tankers are required by the IBC Code.

Q.5 Write short notes on the following:-
a) Calculation of approximate GM by rolling period of the ship.
b) Parametric rolling and how to avoid it.
c) Surf riding and broaching.

Q.6 a) Describe the process of computation of freeboard on type B ships?
b) Describe additional requirement for B-60 ships.

Q.7 Write short notes on any three:
a) Floodable Length b) Margin Line c) Net Tonnage d) Multiple Load Line
e) Super Structure

Q.8 Describe following with respect to Chapter II – 2 of SOLAS 74/78:
a) A standard fire test
b) "A" Class Divisions
c) Service Spaces

Q.9 Describe fully the procedure for doing the inclining experiment.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 7th-Nov-2019

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hindship condition No.3 is listed 3^{O} to Stbd. It desired to increase her trim upto 3m by stern and to bring her upright by transferring ballast from No. 2 DB to No. 4 DB's only. Calculate final distribution of water ballast in No.2 & No.4 DB's. To achieve this with No.4 port is filled to capacity. (cgs of No.2 & 4 (P & S) tanks are 6.7m from the c/l.)

Q.2 A box shaped vessel 150m long and 20m wide is in SW with a draft of 7m fwd and 7.6m aft. A compartment on ships centerline is 20m long whose forward bulkhead is 35m from the forward perpendicular is bilged. Find the new drafts.

Q.3 The horizontal ordinates, equally spaced, of a deep tank bulkhead from the deck downwards 8, 7.5, 6.8, 5.8 and 4.5. Find the KP (ht of COP above the bottom) and thrust when the tank contains SW to a sounding of 12m.

Q.4 Sketch and Label mid-ship section of a bulk carrier. What will the provisions for panting and pounding in the fore peak tank of this ship?

Q.5 Describe the IMO severe wind and weather heeling criteria to be satisfied on Merchant vessels with suitable sketches.

Q.6 Explain: a) Floodable length b) Subdivision Load lines c) Type B-60 ship.

Q.7 a) Explain annealing, fatigue and ductility for ship building materials.
b) Describe the procedure of Impact Test during ship building.

Q.8 a) How is the fire integrity maintained in the construction of a ship?
b) State the difference between A-60 and A-0 Class of fire divisions.

Q.9 a) Describe parametric and synchronous rolling and state what actions should be taken when these occur.
b) Describe 'Inclining Test' and its purpose.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 6th-Aug-2019

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 a) M. V. Hindship at a draft of F/7.23m, A/8.79m, KG 7.42m, FSM 1732 tm turns in a circle of radius 380m at a speed of 13.2kts. Calculate the angle of heel produced. (10)

b) M.V. Hindship floating at a draft of F/5.73m, A/6.42m, is at angle of loll of 4^{O}.
F.S. Moment 1563 tm.
Assuming she is wall sided, calculate her KG. (15)

Q.2 A box vessel is 120m long and 20m broad. It has a double bottom tank 2m high running for the full length and breadth of the vessel.
There is a forward compartment 30m long above the D.B. tank extending for the full width of the vessel. This compartment contains cargo of R.D. 1.80 and of S.F. 1.20 for the full height of the compartment. Vessel's KG is 5.30m.
Vessel is floating at an even keel draft 6.0m.
Find vessel's GM_T after the D.B. tank as well as the forward compartment is bilged.

Q.3 A vertical bulkhead is in the form of a triangle, apex downwards.
The bulk head is 9m broad at the top & 12m deep.
The tank contains sea water to a sounding of 8m.
Find the thrust on the bulkhead and the position of Centre of Pressure with reference to the bottom of the tank.

Q.4 Sketch and Label mid-ship section of a double hull oil tanker?

Q.5 a) What are the Intact Stability requirements of Oil Tanker Ships?
b) Write short notes on Torsional Stress on ships.

Q.6 Write short notes on the following:
a) Limitations in the use of oils as fuel.
b) Standard Fire Test
c) Non Combustible material
d) Types of bulkheads
e) Special category Spaces

Q.7 Differentiate between Enclosed spaces and Excluded Spaces as per International Tonnage Convention 1969 with appropriate sketches.

Q.8 a) What are the differences between GRT, NRT and GT, NT?
b) What are the various criteria for excluding a space while calculating the volume as per Tonnage Convention?

Q.9 a) Differentiate between the Synchronous Rolling and Parametric Rolling of ships.
b) Describe the precautions to be taken while carrying out inclining test.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 10th-May-2019

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER – II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Whenever applicable sketches should be drawn to support the answer.**

Q.1 M. V. Hindship in SW at draft of 7.25m ford and 8.10m aft, has to load 170t of cargo. Where with respect to AP should this cargo be loaded so that her ford draft would remain the same in water of RD 1.015?

Q.2 A box shaped V/L 190 x 25 at E.K. draft of 8m KG 5.5m has a fwd compartment 15m in length with a permeability 70%. Calculate draft F & A if that compartment is bilged.

Q.3 A uniform beam AB 16m long weights 160kg. It is supported at points two meters from each end. A load of 15 kg is appoint 6m from end A. Draw the SF and BM diagrams for the beam. What is the maximum value of BM and the position on the beam where it occurs? Calculate the point on the beam between the load and end B, where the BM is nil.

Q.4 Sketch & Label the mid-ship section of an LNG tanker.

Q.5 Write note on:
a) Free surface effect due to slack tank.
b) Multiple loadline.
c) Effect of draft and displacement on rolling.

Q.6 a) At present a large number of ocean going ships are built with high tensile steel, in this regard explain the advantage and disadvantages of using high tensile steel with respect to:
i) Initial Cost ii) Structural maintenance iii) Earning capacity
b) What are the advantages and limitations of Aluminum used as the construction material for ship building?

Q.7 With reference to 'International Convention on Load Lines 1966'. Write short notes on the following:
i) Length ii) Block Co-efficient iii) Watertight and Weather tight iv) How the minimum bowl height is assigned and importance of the bow height.

Q.8 a) What are the special measures adopted when aluminium structures are to be connected to the steel structure?
b) Describe with sketches: i) Body plan ii) Half Breadth plan iii) Sheer Plan

Q.9 Enumerate the precautions to be taken against capsizing and intact and damage stability criteria for passenger and cargo ships as per IMO intact stability code.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 8th-Feb-2019

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Whenever applicable sketches should be drawn to support the answer.**

Q.1 M. V. 'Hindship' is floating in water of density 1.015 at draughts of F/6.40m, A/7.20m. Calculate the amount of cargo to discharge and position with respect to aft perpendicular from where it should be discharged to reduce her forward draught by 40 cms without change in draught aft.

Q.2 The slop tank of a tanker has vertical ordinates measured from the deck downwards spaced equally at intervals of one metre as follows: 0, 3.25, 4.4, 5.15, 5.65, 5.9 and 6.0m. Find KP (ht of COP above the bottom) and thrust when the tank is full of slop of RD 0.98.

Q.3 a) A coaster of length 80n breadth 8m, has a rolling period of 10 seconds. If her rolling coefficient is 0.75, calculate her approximate GM.
b) M. V. Hindship is at a draught of F/7.4, A/8.62m, KG 7.0m, FSM 1200 and speed of 13.0 kts. She turns in a circle of radius of 400m. Calculate the heel produced.

Q.4 Sketch & Label the mid-ship section of an LPG ship.

Q.5 With the help of a suitable sketch, explain the Wind and Weather Criterion (Rolling Criterian) as enumerated in the IMO Code of Intact Stability.

Q.6 Explain: a) Type A-60 Fire division b) Alternate Load Lines c) Permissible length.

Q.7 a) Explain the salient features of the Load line convention.
b) State the difference between Type A and Type B-60 ships.

Q.8 a) Explain the testing of metals in ship building.
b) Sketch and describe sheer plan and body plan.

Q.9 State with suitable sketches the difference between the Heeling arm curve and the Righting arm curve for a vessel authorized to carry grain.

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 9th-Nov-2018

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any Four from the remaining questions.**
2. **All questions carry equal marks**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Whenever applicable sketches should be drawn to support the answer.**

Q.1 M. V. 'Hindship' is floating at a draft if F 5.73 m, A 6.42m, is at an angle of loll of 4^{O}, FS moment 1563 mt. Assuming the ship to be wall sided, calculate her KG.

Q.2 A box shaped vessel 40m long, 20m broad and 5m deep is floating in DW of RD 1.005 with drafts F=3.0m and A=3.0m, KG 4.2m, If an amidships compartment, 15m long, extending from side to side with permeability 80% is bilged, Calculate GM after bilging.

Q.3 The breadths of water-plane of a vessel 180m in length, displacing 20,000 tonnes in water of density 1.005, measured at equi-spaced intervals from forward are 0, 5, 11, 18, 29, 29, 22, 18, 12 and 9 meters respectively. Calculate BM_T.

Q.4 Sketch & Label the mid-ship section of a hatch coverless container ship. Illustrate additional features for compensating loss in strength due to large openings.

Q.5 Master of very large container vessel, such as Post Panamax Vessels, have complained that have encountered very severe rolling with heavy seas from the bows or quarters, at times losing large numbers of containers overboard. Discuss the factors responsible for such large rolling & remedial action required to prevent it.

Q.6 With respect to subdivision requirements of passenger ships as per SOLAS 1974 as amended explain:
a) Flooded length b) Permissible length c) Subdivisions Loadlines.

Q.7 Discuss the "Conditions of Assignment" as per the International convention on Loadlines as amended.

Q.8 Write short notes on:
a) Torsional stresses induced by a ships Rolling motion.
b) Racking Stresses due to Heavy Rolling.

Q.9 Why & when the inclining test is conducted on ships? Describe the procedure of such test and state the precautions necessary?

---------- X—X ----------

GOVERNMENT OF INDIA

Date: - 6th-Aug-2018

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any four from the remaining questions.**
2. **All questions carry equal marks**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 A undivided DB tank of length 18m has following ½ ordinates of waterline at equal intervals measured from forward bulkhead:
2.0, 2.8, 3.9, 5.2, 6.7, 8.0, 10.1m respectively, F.O. of RD 0.9 is loaded to a sounding of 0.8m in the tank. Assume the tank to be wall-sided. Determine the KG fluid in the final condition if initial displacement was 20,000Ts and KG=10m.

Q.2 A box shaped vessel 160m x 18m is floating in S.W. at an even keel draft of 6.4m. A forward hold of length 25m whose aft bulkhead is 40m aft of FP is bilged. If the permeability of the hold is 80% and KG of vessel was 4.7m determine F & A draft in final condition?

Q.3 A box shaped vessel 30m x 8m floats in SW with ore of S.F.: $0.67m^3$/T stored to a height of 4m at the mid length and sloping uniformly to nil at sides. The vessel then floats in FW at an even keel draft of 4m. Draw SF & BM diagram for the vessel.

Q.4 Draw the mid-ship section of large double-hull crude oil tanker.

Q.5 a) Explain how a rolling period test is taken. What is the relationship between GMT and rolling period? What precautions must be observed when using this formula?
b) Find the still water period of roll for a ship when the radius of gyration is 8m and metacentric height is 0.8m.

Q.6 Write short notes on the following:
a) Functional requirements of fire protection and detection.
b) "A" class division
c) Sprinkler type fixed fire extinguishing system.

Q.7 a) Why large ships tend to roll heavier in following seas.
b) Explain parametric rolling.

Q.8 a) Sketch and describe sheer plan and body plan.
b) Describe with the help of neat diagrams three examples of excluded spaces as per International Tonnage Convention 1969 as amended.

Q.9 Define the following with respect to chapter II/ 2 of SOLAS 74 as amended:
a) Central Control Station
b) 'C' class divisions
c) Services spaces
d) Main vertical zones

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GOVERNMENT OF INDIA

Date: - 9th-May-2018

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 Hours **PASS MARKS: 100** **MAX. MARKS: 200**

Notes:

1. **Question No.1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 A Cantilever 6 meters long carries a concentrated load of 45 KN at its free end and also uniformly distributed load of 20 KN/meter over its entire length. Find the SF and BM at the wall and draw the SF / BM diagram?

Q.2 A box shaped vessel of length 120m, breadth 25m is floating at an even keel draft of 6m. KG of the vessel is 7m. It has a mid-ship compartment of 20m in length extending from side to side with its forward bulkhead amidships. The permeability is 70%. The compartment contains a watertight flat at height of 6.3m above the keel. Calculate the drafts forward and Aft and GMT if that compartment is bilged below the watertight flat.

Q.3 M. V. Hindship was floating with all compartments empty expect as follows:
No.2 (P & S) DB tanks full water ballast. No.1 DB tank contained 100 tonnes of H.F.O (FSM at SG 1.0 (T/M) = 419 tm). An inclining experiment was conducted in this condition. A weight of 10 tonnes Kg. 10.2m shifted transversely through a distance of 17.6m caused a deflection of 8.3cms in a plumb line 8.5 in length. Calculate the GM (solid) and the KG of the light ship.

Q.4 a) Sketch and label Mid-ship section of a hatch coverless cellular container ship.
b) Discuss the advantage and disadvantages of such ship over a normal container ship.

Q.5 a) Describe the IMO weather criteria against wind and wave as required by code of intact stability.
b) What do you understand by "Torsional Moment"? How do you calculate the Torsional Moment in a container ship? How significant is Torsional Stress in a Container ship.

Q.6 With the help of suitable sketches describe:
a) The Differences between 'A-60' and 'A-0' class fire division
b) The requirements for a 'trunk way' passing through an A-class division

Q.7 a) Differentiate between Type "A" and Type "B" – "100" ships as per International Load line Convention 1966 as amended.
b) With respect to International Tonnage convention 1969 as amended, give two examples of excluded space.

Q.8 a) Describe the sequences of events which take place in modern Shipyard while building a ship.
b) With the aid of sketch, describe the procedure of impact test conducted on a metal.

Q.9 When inclining tests are required on cargo and passenger ships? Describe the procedure of such tests and state the precautions necessary?

---------- X—X ----------

GOVERNMENT OF INDIA
FIRST MATE OF A FOREIGHN GOING SHIP PHASE II
FUNCTION: NAVIGATION
PAPER: NAVAL ARCHITECTURE PAPER - II

Code BF

TIME: 3 HOURS PASS MARKS: 100 MAX MARKS: 200

Notes:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hind ship is in dock water of RD 1.015 at drafts of F 8.68m A 9.18m. She has to Load cargo such that when in salt water she is at her summer load line and trimmed 1m by stern calculate (i) quantity of cargo that can be loaded, (ii) where with respect To AP should it be loaded and (iii) drafts forward and aft in saltwater.

Q2 A box shaped vessel 75m x 10m x 6m is floating is SW on an even keel draft of 4.5m. Find the new drafts Fwd& Aft if the forward compartment 5m long is bilged.

Q.3 A box shaped vessel has length 80m and light displacement 800 tonnes. The vessel loads 200 tonnes in a forward compartment of length 20m and 200 tonnes in an after compartment of length 20m. Draw the SF and BM graphs for the vessel.

Q.4 Sketch and label the mid ship section of a general cargo ship.

Q5. With Reference to Intact Stability Code (2008) explain with suitable diagrams, the severe wind and weather heeling criteria to be satisfied by Cargo vessels.

Q.6 Under subdivision of ships, describe any three (I) permeability of compartments (II) criterion of Service numeral (III) floodable length (IV) permissible length

Q7: Differentiate between enclosed spaces and excluded spaces as per International Tonnage Convention.

Q.8 With the help of a block diagram explain the general layout of a ship yard and their inter relationship.

Q.9 Describe fully the procedure for doing the inclining experiment.

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GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGHN GOING SHIP PHASE II

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD

PAPER: NAVAL ARCHITECTURE

Code AX

TIME: 3 HOURS **PASS MARKS: 100** **MAX MARKS: 200**

Notes:

1. Question No. 1, 2, 3 & 4 are compulsory. Attempt any Four from the remaining questions
2. All questions carry equal marks
3. Non-programmable single memory scientific calculator is permitted
4. Whenever applicable sketches should be drawn to support the answer

Q.1 M.V. HINDSHIP at a draft of F 7.23m, A 8.79m, KG 7.42m, FSM 1732 tm. Turns in a circle of radius 380m at a speed of 13.2 kts. Calculate the angle of heel produces

Q.2 A box shaped V/L 190m x 25m @ an E.K draft of 8 mtrs. KG = 6.823m has a midship compartment 15m in length divided in port, centre & Stbd compartments. Port & Stbd compartments are 6mts wide each and centre 13 metre wide
Calculate GM of V/L
a) If only centre compartment is bilged
b) If only P & S compartments are bilged

Q.3 a) A beam of length 'l' and weight 'w' per unit length is supported at its ends. Draw SF and BM diagram of the beam.
b) A triangular collision bulkhead is 15 m broad at top and 12m deep. The F.PK tank contains ballast of R.D 1.015. Calculate thrust on bulkhead and posn. Of COP below top of the bulkhead when sounding in tank is: 12mtrs

Q.4 Sketch & Label the mid ship section of a Spherical type LNG Carrier and enumerate the special features of these of ships

Q.5 a) How will you determine ships stability by rolling period test?
b) A ship turns to port in a circle of the radius 150 m at a speed of 16knots? The GM is 0.8m and BG is 1.5m. If g = 9.81m/sec2 and 1knot =1852m/hour, find the heel due to turning

Q.6 Explain "Factor of Subdivision" and "Criteria Service Numeral". How do both relate to "Floodable Length" and "Permissible Length" of passenger ships with respect to subdivision requirements as per SOLAS 74 as amended?

Q.7 a) Differentiate between a Type "A" and Type "B"- 100" ships as per International Load line convention 1966 as amended
b) With respect to International Tonnage convention 1969 as amended, give two examples of Excluded space

Q.8 What are the advantages and disadvantages of Aluminium in ship building? Explain the process of connecting an aluminium superstructure to steel deck and hull of the ship?

Q.9 Describe the inclining test to be carried out on a vessel under the following headings:
(i) Purpose (ii) Procedure (iii) Precautions

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$$\left(\frac{16 \times 1852.3}{60 \times 60}\right)^2 \times \frac{1.5}{0.8 \times 150 \times 9.81}$$

Code BB

GOVERNMENT OF INDIA
FIRST MATE OF A FOREIGHN GOING SHIP PHASE II
FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD
PAPER: NAVAL ARCHITECTURE - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX MARKS: 200**

Notes:
1. Question No. 1, 2, 3 & 4 are compulsory. Attempt any four from the remaining questions
2. All questions carry equal marks
3. Non-programmable single memory scientific calculator is permitted
4. Whenever applicable sketches should be drawn to support the answer

Q.1. M.V. Hindship is floating at drafts Ford 7.18m Aft 7.96m in dock where the RD of water is 1.012. She is to load 600 tonnes of cargo. Where this parcel should be loaded with respect to Aft Perpendicular, so that the vessel will finish loading with trim of 20 cms by stern

Q.2 A box shaped vessel 160 m X 18 m floating at even keel draft of 6.4m. A forward compartment 25m long is having cargo of permeability 80%. This compartment is extending from side to side and tank's COG is 27.5 m forward of mid-ship. KG = 4.7m. Find the draft F & A if this compartment gets bilged, above the DB tank of height 1.4m

Q.3 A box shaped vessel 30m X 8m floats in SW with ore of S.F: 0.677 m3 /t stored to a height of 4m at the ends sloping uniformly to nil at middle length. The vessel then floats in FW at an even keel draft of 4m. Draw SF & BM diagram for the vessel

Q.4 a) Sketch and label mid-ship section of a double hull oil tanker
b) Discuss the advantages and disadvantages of such construction over single hull tankers

Q.5 Write short notes on the following:
a) Calculation of approximate GM by rolling period of the ship
b) Parametric rolling & how to avoid it
c) Synchronous rolling

Q.6 Explain "Factor of Subdivision" and "Criteria Service Numeral". How do both relate to "Floodable Length "and "Permissible Length" of passenger ships with respect to Subdivision requirement s as per SOLAS 74 as amended?

Q.7 Describe the checks which will be carried out during the load line renewal survey

Q.8 Explain the following with respect to properties and treatment of steel:
a) Malleability b) Ductility c) Elasticity
d) Annealing e) Hardening

Q.9 Enumerate the precautions to be taken against capsizing and intact & damage stability criteria for passenger and cargo ships as per IMO Intact Stability Code 2008

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A4

GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 A bulkhead of a tank consists of a rectangle of dimension 20m **x** 9m with an isosceles triangle of dimensions 20m **x** 8m on top of it. Calculate the position of Centre of Pressure **(CoP)** and the thrust on the bulkhead if the tank is filled with dock water of RD 1.015 to a sounding of 15m.

Q. 2 No. 3(C) and No. 4(C) tanks of M.V. Hindship are partially filled with fuel oil, and the ship is floating in SW at drafts F 8.65m.,A 9.55m. With KG 7.44m. Draw the full GZ curve and from it ascertain whether the ship satisfies the stability criteria. Angle of flooding is 42°.

Q. 3 A uniform beam AB, 16m long, weighing 112 kgs, is supported at a point 2 meters from end 'A' and at a point 4 meters from ~~and~~ 'B' It carries a point load of 13 kgs at its mid length. Draw the S.F & B.M. diagrams of the beam & state their values at a point 2.55 metre from end 'B'.

Q. 4 Draw the mid-ship section of a large double-hull crude oil tanker. Discuss the advantages and disadvantages of such construction over the traditional single hull types.

Q. 5 a) Differentiate between a Type "A" and Type "B-100" ship as per International Load line Conventions 1966 as amended.
b) State the conditions of assignment of freeboard for a vessel of 200 meters long.

Q. 6 a) Describe body plan, sheer plan, half breadth plan and their uses.
b) What parts of a ship counteract sagging, hogging, racking and grounding stresses?

Q. 7 a) Describe following and support with sketches where necessary:
i) Stress-Strain graph of Mild steel ii) Grades of steel
b) Venting arrangement requirements for oil tankers as per SOLAS

Q. 8 a) Explain the erection sequence in shipyard practice in ship construction.
b) Describe 'severe wind and weather heeling criteria' as per Intact stability code.

Q. 9 a) What do you understand by the term 'Subdivision Load Lines? Why it is necessary – explain?
b) Explain the procedure of calculating 'Permissible Length'. Where and how do we use this?

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GOVERNMENT OF INDIA
FIRST MATE OF A FOREIGHN GOING SHIP PHASE II
FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD
PAPER: NAVAL ARCHITECTURE

Code A W

TIME: 3 HOURS **PASS MARKS: 100** **MAX MARKS: 200**

Notes:
1. Question No. 1, 2, 3 & 4 are compulsory. Attempt any Four from the remaining questions
2. All questions carry equal marks
3. Non-programmable single memory scientific calculator is permitted
4. Whenever applicable sketches should be drawn to support the answer

Q.1. M.V. HINDSHIP is floating at a displacement of 17250 tonnes in water of R.D 1.008. She is at an angle of loll of 75°. Her FSM is 1485 tm. Assuming she is wall sided, calculate her KG And also find her GM at angle of loll $0.813 \cdot \text{Ig} = 8.21\%$

Q.2 A vessel of length 200m, displacement 65907.5 tonnes, KB 5.9m, KG 8.9m, has the following equally spaced half ordinates of water plane, commencing from aft:
0, 10, 13, 14, 14.2, 14.3, 14.1, 14, 11.5, 6.2, and 0.2 metres respectively.
Calculate her change of trim if 500 tonnes of weight, already on board is shifted 60m longitudinally.

Q.3 A rectangular bulkhead is 12m broad and 8m deep. The tank contains liquid and COP is 3.0m above the bottom of bulkhead. Calculate sounding of tank

Q.4 Make a sketch of the mid-ship section of a double skin bulk carrier. What are the various features which ensure that it is strengthened for the carriage of high density cargoes?

Q.5 Enumerate the Minimum Intact and Damage stability criteria for Passenger ships, with Suitable features for compensating loss in strength due to large openings

Q.6 Define following with respect to Chapter II – 2 of SOLAS 74/78
i) A standard Fire Test
ii) "A" Class Divisions
iii) Service Spaces

Q.7 Define as per International Load Line Convention 1966
a) Length
b) Effective length of superstructure
c) Weather tight
d) Side scuttle

Q.8 a) Differentiate in-between steel castings? Give examples of scantlings on a ship where these are used
b) What is a wire frame model? Discuss its benefits

Q.9 a) How the initial KG of the vessel is calculated?
b) Why large ship tend to roll heavier in following seas?

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GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGHN GOING SHIP PHASE II

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD

PAPER: NAVAL ARCHITECTURE

Code AY

TIME: 3 HOURS **PASS MARKS: 100** **MAX MARKS: 200**

Notes:

1. Question No. 1, 2, 3 & 4 are compulsory. Attempt any Four from the remaining questions
2. All questions carry equal marks
3. Non-programmable single memory scientific calculator is permitted
4. Whenever applicable sketches should be drawn to support the answer

Q.1 M.V. HINDSHIP in DW of RD 1.012 is at a draft of F: 7.5m, A: 8.5m. Calculate the total Quantity of cargo to be loaded and its location with respect to AP so that when in SW she Is at her winter load line and also trimmed by 0.6m by stern

Q.2 A box shaped vessel 160 x 18m floating at an even keel draft of 6.4m. A fwd compartment 25m long is having cargo of permeability 80%. This compartment is extending from side to side and tank's C.O.G. is 27.5m fwd of midship. KG = 4.7m.
Find the draft F & A if this compartment gets bilged, above the D.B tank of height 1.4m

Q.3 A box shaped vessel 200m X 30m is floating at an even keel draught of 8m. It has a midship tank 40m long extending for the full width of the vessel. Below this tank is a 3m high double bottom tank. The DB tank is empty. The main tank above the DB contains oil R.D 0.8 to a sounding of 15m. The KG of the vessel is 7.5m.
Find the new draughts F & A and vessel's GM_T after this tank carrying oil is bilged above the W/T flat

Q.4 Sketch & Label midship section of a hatch coverless cellular container vessel

Q.5 Describe the IMO weather criteria for severe wind and rolling as required by code of intact stability

Q.6 Differentiate between 'Floodable Length' & 'Permissible Length' of a typical passenger vessel. Give a very brief outline as to how are these calculated and what parameters go as input into its calculations

Q.7 a) With respect to International Tonnage Convention 1969 (as amended) write short Notes on the following:
i) Excluded Spaces ii) Gross Tonnage iii) Net Tonnage
iv) Describe with the help of neat diagrams two examples of Excluded Spaces

Q.8 Discuss with the aid of block diagram the flow of information & sequence of ship construction in a modern ship yard

Q.9 Distinguish between stability at small and large angle of heel with the help of suitable sketches

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GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q.1 M.V. Hindship at a draft of 5.0m forward, 5.8m aft in water of density 1.005, KG 7.5m, FSM 1300tm turns in a circle of radius 400m to starboard at a speed of 12 knots. Calculate the heel caused during the turn.

Q.2 A box shaped V/L 190 X 25 at E.K. draft of 8m KG 5.5m has a fwd compartment 15m in length with a permeability 70%. Calculate draft F & A if that compartment is bilged.

Q.3 A light beam AC, 12m long is supported by a point support at end A (left end), while resting on plane ground over one-fourth of its length at end C. If the beam is loaded with 60KN of load, uniformly distributed along the entire length of the beam, draw the SF & BM curve to scale. From the diagram, state the distance of the point of maximum BM from end C.

Q.4 Draw the midship section of a Ro-Ro vessel.

Q.5 With suitable sketches, explain why does a vessel normally heels outwards and not inwards when settles into a turn at uniform rate of turn.

Q.6 What do you understand by the term 'Subdivision Loadlines' ? Why is it necessary? Explain.

Q.7 Explain the purpose of Gross Tonnage (GT) and Net Tonnage (NT) and write the respective formula for calculating GT and NT.

Q.8 With the help of suitable sketch explain the following:
a) Sheer plan
b) Half breadth plan
c) Body plan

Q.9 Write short notes on :-
a.Parametric Rolling
b.Undamped Rolling in large ships.

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May 2016

GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS PASS MARKS: 100 MAX. MARKS: 200

NOTES:

1. Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q. 1 M.V. Hindship is floating at drafts Ford 8.18m Aft 8.96m in dock where, the RD of water is 1.012. She is to load 600 tonnes of cargo. Where should this cargo be loaded with respect to Aft Perpendicular so that the vessel will finish with trim of 20 cms by stern. State final F & A drafts.

Q. 2 The end bulkhead of a deep tank 9.6m high has following equally spaced horizontal ordinates starting from tank top 8.8m, 8.5m, 8.0m, 7.4m, 6.8m, 6.0m and 5.1m respectively. The tank is filled with water of density 1.015 to sounding of 11.3m. Calculate the thrust on bulkhead and height of centre of pressure from base.

Q. 3 A box shaped tank vessel 200m x 20m is in SW at even keel draft of 6.2m. The aftermost deep tanks (No.7 P, C & S) are each 15m long. The wing tanks are 6m broad and centre tank is 8m broad. Find the drafts forward and aft if both wing tanks containing homogenous cargo of 60% are bilged.

Q. 4 Describe with the help of a neat diagram, the specified features of a Cellular container ship.

Q. 5 State the intact stability criteria for i) Cargo ship ii) Severe wind and Weather heeling criteria for ships.

Q. 6 Define floodable and permissible length and explain which length is larger and why?

Q. 7 Explain following:
i) Net tonnage. ii) Multiple load line.

Q. 8 Explain:
i) Lines plans ii) Lofting

Q. 9 M.V. Hindship was floating with all compartments empty except as follows: No.2 DB P & S full of ballast, No.1 DB contained 90 tonnes FO. An inclining experiment was conducted in this condition. A weight of 12 tonnes KG 10.1m shifted transversely through a distance of 17.5m caused the deflection of 8.2cms in plumb line of 8.1m in length. Calculate the GMs and KG of lightship.

GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

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PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS PASS MARKS: 100 MAX. MARKS: 200

NOTES:

1. Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q. 1 M.V. Hindship in dock water of RD 1.007 is at drafts of 7.62 m and 7.94. m. She has to load 450t of cargo. Where should this cargo be loaded so as to complete the loading with a trim of 1.0m by stern. (25)

40·302 iN LCG = 72·259 FLCG = 71·376

Q. 2 The vertical ordinates of a bulkhead 10m wide are 4.0m, 5.5m, 7.2m, 5.5m, and 4.0m. Calculate the thrust on the bulkhead and location of its Centre of Pressure from the base of the tank if the tank is filled with water of density 1.010 to a sounding of 9.0m. (25)

THRUST = 259·29 t CoP = 5·289/3·711

Q. 3 A box shaped vessel 140m long, 18m broad floating at even keel draft 7m, has a compartment 20m long 18m broad with its forward bulkhead midship and with a watertight flat at height of 1.4m is loaded with cargo of permeability 60%. Calculate the drafts fore and aft if the compartment is bilged above the watertight flat. (25)

F = 7·301m A = 7·754 m

Q. 4 Describe with the help of a neat diagram, the specified features of a L.N.G. ship. (10)

Q. 5 Describe the Phenomenon and cause of Synchronous rolling. What action can be taken if its onset is suspected. (10)

Q. 6 Write short notes as per SOLAS: (10)

i) Uniform average permeability
ii) Floodable length
iii) Sub divisional load line

Q. 7 Explain following w. r. t. ITC:

i) Enclosed space
ii) Excluded space

Q. 8 Compare & contrast between Steel and aluminum as ship building material (10)

Q. 9 Describe the damage stability criteria for passenger ships. (10)

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(125)

GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 An Inclining Experiment was conducted on M.V HINDHSHIP with all tanks & compartments empty except 25 tonnes each of diesel oil in No 7 Port & starboard tanks and also 10 tonnes each of fresh water in the Tween deck drinking water tanks port & starboard. When an inclining weight of 5.5 tonnes (Kg 10.25m) is shifted transversely through 17.0m, a plumb line 8.05 m in length is deflected 5 cms. Calculate her light KG & GM_T.

Q. 2 M. V. 'Hindship' in Condition No. 7 struck a rock piercing her outer bottom in way of No. 4 P, C & S and No. 5 P & S DB tanks. Calculate the drafts forward and aft at which she will float and her GM (fluid) after bilging.

Q. 3 The half ordinates of vessel's water plane area spaced 25m apart are: 0.4, 14.5, 26.6, 34.0, 37.0, 37.3, 37.1, 35.8, 28.8 & 6.0 meters respectively, commencing from forward end.
If the SW displacement of the vessel up to that water plane is 150,000 T, calculate transverse BM and longitudinal BM.

Q. 4 Sketch & label the mid-ship section of a Spherical type Gas Carrier and enumerate the special features of these types of ships.

Q. 5 How is Brittle Fracture different from Ductile Fracture?
Elaborate on grounds of temperature, thickness, superficial appearance, speed of propagation, type of steel used to withstand and tests used to evaluate the above.

Q. 6 Describe with the help of a neat diagram the following tests:
a) Tensile Test b) Bend Test c) Hardness Test

Q. 7 a) With the help of a block diagram explain the general layout of a shipyard and co-operation between various departments.
b) What are the various tests carried out for ship building steel.

Q. 8 a) Sketch and describe sheer plan and body plan.
b) Describe with the help of neat diagrams three examples of excluded spaces as per International Tonnage Convention 1969 as amended.

Q. 9 Describe the Inclining test to be carried out on a vessel under the following headings: (i) Purpose (ii) Procedure (iii) Precautions

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Q.No. 2 to be replaced with the Q.No. 2 given below –

Those candidates who have already answered question no. 2 need not attempt this one.

Q.2 A box shaped vessel 160mx18m is floating in S.W. at an even keel draft of 6.4m. A forward hold of length 25m whose aft bulkhead is 40m aft of FP is bilged. If the permeability of the hold is 80% and KG of vessel was 4.7m determine F&A draft in final condition?

09.11.2015
Capt S. D. DARAKAR

08/8/15

Ryan

GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 M.V. 'Hindship' was floating with all compartments empty except as follows:-
No. 2 (P & S) DB tanks full with water ballast.
No. 1 DB tank contained 100 tonnes of H.F.O.
An inclining experiment was conducted in this condition. A weight of 10 tonnes Kg. 10.2 m, shifted transversely through a distance of 17.6 m, caused a deflection of 9 cms in a plumb line 10 m in length. Calculate the GM (solid) and the KG of the light ship.

Q. 2 A box shaped vessel 160 m X 18 m floating at an even keel draft of 6.4m. A forward compartment 25m long is having cargo of permeability 80%. This compartment is extending from side to side and tank's COG is 27.5m forward of mid-ship. KG = 4.7m.
Find the draft F & A if this compartment gets bilged, above the DB tank of height 1.4m.

Q. 3 A box shaped vessel 30m X 8m floats in SW with ore of S.F: 0.667 m^3/t stored to a height of 4m at the ends sloping uniformly to nil at middle length. The vessel then floats in FW at an even keel draft of 4m. Draw SF & BM diagram for the vessel.

Q. 4 a) Sketch and label Mid-ship section of a Hatch coverless Cellular container ship. (15 marks)

b) Discuss the advantages and disadvantages of such ship over a normal container ship. (10 marks)

Q. 5 Describe the IMO weather criteria for severe wind and rolling as required by code of intact stability. (25 marks)

Q. 6 a) What do you understand by the term 'Subdivision Load lines'? Why it is necessary? Explain. (13 marks)

b) Explain the procedure of calculating 'Permissible Length'. Where and how do we use this? (12 marks)

Q. 7 a) Differentiate between a Type "A" and Type "B – 100" ships as per International Load line Convention 1966 as amended.
b) With respect to International Tonnage Convention 1969 as amended, give two examples of Excluded space.

Q. 8 a) Describe the sequence of events which take place in a modern Shipyard while building a ship.
b) With the aid of sketch, describe the procedure of impact test conducted on a metal.

Q. 9 When inclining tests are required on cargo and passenger ships? Describe the procedure of such tests and state the precautions necessary?

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AO
12/5/15

GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

12/05/15

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 M.V. Hindship was floating with all compartments empty except as follows:-
No.2 (P& S) DB tanks full with water ballast.
No.1 DB tank contained 100tonnes of H.F.O
An inclining experiment was conducted in this condition. A weight of 10tonnes Kg. 10.2m, shifted transversely through a distance of 17.6m, caused a Deflection 8.3cms in a plump line 8.5m in length. Calculate the GM (solid) and the KG of the light ship.

Q. 2 A box shaped vessel 160x18m floating at an even keel draft of 6.4m. A for'd compartment 25m long is having cargo of permeability 80%.This compartment is extending from side to side and tank's C.O.G is 27.5m for'd of midship. KG = 4.7m find the draft F & A if this compartment gets bilged.

Q. 3 A box shaped barge length = 40m, light displacement=160t is loaded with 200t of cargo peaking at mid length slopping uniformly till nil at the ends. Draw SF and BM diagram indicating their values at the appropriate position.

Q. 4 Sketch, label and describe the midship section of a bulk carrier.

Q. 5 Discuss the following:
a) Forced rolling
b) Synchronous rolling
c) Why large ships tend to roll heavier in following seas?

Q. 6 Write short notes on the following: (any 3)
a) Limitations in the use of oils as fuel
b) Standard fire test
c) Non combustible material
d) Types of bulkheads
e) Special category spaces

Q. 7 Define as per International Load Line Convention 1966 (any 4)
a) Length
b) Enclosed superstructure
c) Effective length superstructure
d) Well
e) Side scuttle
f) Sheer credit

Q. 8 Describe the sequence of events that take place in a shipyard during Construction of a new ship.

Q. 9 Describe the inclining experiment on a newly built vessel under the following Headings
a) Principle b) Procedure c) Precautions

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GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 An undivided DB tank of length 18m has following ½ ordinates of waterline at equal intervals measured from forward bulkhead: 2.0, 2.8, 3.9, 5.2, 6.7, 8.0, 10.1m respectively.
F.O. of RD 0.9 is loaded to a sounding of 0.8m in the tank. Assume the tank to be wall-sided.
Determine the KG fluid in the final condition if initial displacement was 20,000Ts and KG=10M.

Q. 2 A vessel of length 80m breadth 18m is floating at draft of 4.6m in water of relative density 1.020. A compartment 10m long 18m broad with its forward bulkhead 30m forward of mid-ship contains homogeneous cargo of permeability 60%. It has water tight flat 1.2m above keel. Calculate the drafts forward and aft if this compartment is bilged above the water tight flat.

Q. 3 M. V. Hindship was floating with all compartments empty except as follows:
No.2 (P&S) DB tanks full with water ballast
No.1 DB tank contained 100 tonnes of H. F. O. (FSM at SG 1.0 (T/M)=419 tm). An inclining experiment was conducted in this condition. A weight of 10 tonnes Kg. 10.2m shifted transversely through a distance of 17.6m caused a deflection of 8.3 cms in a plumb line 8.5 m in length. Calculate the GM (solid) and the KG of the light ship.

Q. 4 Draw the mid-ship section of a large double hull crude oil tanker.

Q. 5 Write short notes on the following:
a) Calculation of approximate GM by rolling period of the ship.
b) Parametric rolling & how to avoid it
c) Synchronous rolling

Q. 6 Masters of very large container vessels, such as Post Panamax vessels, have complained that they have encountered very severe rolling with heavy seas from the bows or quarters, at times losing large number of containers overboard.
Discuss the factors responsible for such large rolling & remedial action required to prevent it.

.....Cont 'Page 2....

Q. 7 a) Differentiate between a type "A" and "B – 100" ships as per International Load line Convention 1966 as amended.
b) With respect to International Tonnage Convention 1969 as amended, give two examples of Excluded space.

Q. 8 a) Sketch and describe sheer plan and body plan.
b) Describe the sequence of events which takes place in a modern shipyard while building a ship.

Q. 9 When inclining tests are required on cargo and passenger ships? Describe the procedure of such tests and state the precautions necessary?

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GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 A beam of mass 61.162 kg and length 10 m rests on two flat supports. Each support extends 2 m inwards from the end of the beam. A concentrated mass of 30.581 kg is placed on the centre of the beam. Draw the SF and BM diagrams to scale.

Q. 2 M.V' Hindship' in Fresh Water is at a draft of F 6.32 m, A 7.18 m. Calculate the position with respect to AP, from where 140 t should be discharged to reduce her ford draft by 32 cms.

Q. 3 A box shaped vessel 200m x 25 m is floating at an even keel of 6.0 m in SW. The vessel has a deep tank amidships 30 x 25 x 8 m in size. The deep tank is presently full of dry cargo of RD 0.6 and SF 4.0 m^3/t. The tank is closed with its watertight cover. Vessel has GM 1.48m. Calculate the GM, if the deep tank is bilged.

Q. 4 Draw and describe midship section of a LNG tanker showing membrane tank. Also explain the purpose of secondary barrier?

Q. 5 What is a non combustible material? How is a standard fire test used to qualify a non combustible material for bulkheads used on board ships?

Q. 6 (i) With respect to the subdivision of passenger ships, explain the relationship between subdivision Load line and Floodable length.
(ii) What is the sequence of calculating assigned Free board?

Q. 7 Write short notes on the following with following reference to International Convention on Load Lines 1966'.

(a) Length
(b) Block Coefficient correction
(c) Watertight and weather tight
(d) How is the ' Minimum Bow Height' to be achieved

Q. 8 Explain how a wire frame model in modern shipyard practice helps in achieving the advantages of:

(a) Plate nesting
(b) Prefabrication

Q. 9 (a) Describe how Parametric Rolling occurs and is threat to large container Ships?
(b) Explain Unresisted Rolling in still waters.

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4/8/14

GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS PASS MARKS: 100 MAX. MARKS: 200

NOTES:

1. Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable single memory scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q. 1 a) M. V. Hindship at a draft of F 7.23m, A 8.79m, KG 7.42m, FSM 1732tm. turns in a circle of radius 380m at a speed of 13.2kts. Calculate the angle of heel produced

b) M. V. 'Hindship' is floating at a draft of F 5.73m, A 6.42m, is at an angle of loll of 4^0, FS moment 1563mt assuming the ship to be wallsided, calculate her KG.

Q. 2 A box shaped vessel 75m x 10m x 6m deep is floating in S/W on an even keel Draft of 4.5m. Find the new draft Forward and Aft if a forward compartment 5mts long is bilged.

Q. 3 A vertical bulkhead is in the form of a triangle, apex downwards
The bulkhead is 9m broad at the top and 12m deep.
The tank contains sea water to a sounding of 8m.
Find the thrust on the bulkhead and the position of Center of Pressure with reference to the bottom of the tank.

Q. 4 Sketch and label mid ship section of a LPG Carrier.

Q. 5 a) What are conditions under which parametric or synchronous rolling occurs? What actions are to be taken to mitigate it?

b) What are the several precautions against capsizing of ships?

Q. 6 Write short notes on :
i) Permissible length ii) Sub Divisional Load Line iii) Standard fire test

Q. 7 Explain the formula used for calculating the tonnages of a ship in accordance with the tonnage convention.

Q. 8 a) What precaution are to be taken against corrosion when Aluminum is connected to steal work?

b) Describe with sketch: i) Sheer plan ii) Body plan.

Q. 9 Describe the principles and necessity for carrying out an "Inclining Test" on a newly built vessel.
What are the precautions to be observed when carrying out the test?

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GOVERNMENT OF INDIA

15/11/14

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE-PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 M. V. Hindship is in condition no.5 at discharge port. After discharging 400 tonnes cargo from No. 1 Tween deck, 500t from No.3 Tween deck and entire cargo from No. 5 poop deck, has to proceed to a nearby port to balance discharge. Calculate a) GM fluid b) Dynamical stability till 30° and c) Dynamical stability till 40°.

Q. 2 A box-shaped vessel of dimensions 150 x 20 m is floating in SW at draft F 6.7m ~~6.2m., A 7.2m~~. A 20m long compartment, whose forward bulkhead is 40m from the forward end of the vessel, is loaded with cargo of permeability 50% Calculate new forward and aft drafts if this compartment is bilged.

Q. 3 A transverse bulkhead consists of a rectangle of breadth 18m and height 12m and below it an isosceles triangle of breadth 18m and height 9m. If the adjacent tank is filled with oil of RD 0.92 to a head of 2.8m, calculate the thrust and COP of the bulkhead.

Q. 4 Sketch, label end describe the mid-ship section of a bulk carrier.

Q. 5 With the aid of suitable sketches describe the IMO severe wind and weather heeling criteria to be satisfied by Merchant ships.

Q. 6 a) Discuss the fire safety objectives & its functional requirement as per SOLAS.
b) State the constructional features of type A- division for fire safety.

Q. 7 Write short notes on: a) Multiple load line b) Enclosed spaces as to tonnage convention c) Standard fire test.

Q. 8 a) Explain Stress - Strain curve for mild steel and its significance.
b) What are the various types of heat treatment given to steel and reasons for conducting it?

Q. 9 Explain the purpose of inclining test and state the procedures to be followed and precautions that should be taken during this test.

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GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

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2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 M.V. 'Hindship' is floating at a displacement of 16875.5 tonnes, KG 8.158m, FS moment 1798mt. Assuming her to be wall sided, calculate her angle of loll. Also calculate her GM at the angle loll.

Q. 2 A box shaped vessel 190m x 25m has a M' ship DB tank 2m deep which is full of salt water KG=9.044m. calculate vessel's GM after the tank is bilged if her initial Even keel draft was 8.0m.

Q. 3 A deep tank bulkhead 12m broad has the following equally spaced vertical Ordinates 3.0, 5.8, 7.5, 5.8 and 3.0m. the tank conditions SW to a sndg of 10m. Calculate thrust on bulkhead and COP w.r.t top of bulkhead.

Q. 4 Sketch and describe mid ship section of a cellular container ship .

Q. 5 a) What are the Intact Stability requirements?
b) Write short notes on Torsional Stress on ships.

Q. 6 Explain "Factor of Subdivision" and " Criteria Service Numeri". How are both related to "Floodable Length" and "Permissible Length" of passenger ships with respect to subdivision requirements as per SOLAS 74 as amended.

Q. 7 Differentiate between enclosed spaces and excluded spaces as per International Tonnage Convention 1969. Explain how exclusion from measurement can be availed for a space that is open at one end.

Q. 8 Sketch and describe the following:
i) Sheer plan ii) Half breadth plan
iii) Body plan iv) Write a short note on management of a steel stockyard?

Q. 9 a) Describe the procedure to determine the ship stability by means of rolling Period test.
b) What are the limitations of Rolling Period Test?

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FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

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Q. 1 a) M. V. Hindship at a draft of F: 7.23 m, A: 8.79 m, KG: 7.42 m, FSM: 1732 tm turns in a circle of radius 380 m at a speed of 13.2 Kts. Calculate the angle of heel produced. (15 marks)

b) M. V. 'Hindship' is floating at a Hydrostatic draft of 8.8 m has, zero GM. Calculate the list produced if a weight of two tonnes already on board is shifted transversely through a horizontal distance of 2.45 meters. Assume the ship to be wall sided at the water line. (10 marks)

Q. 2 A box shaped vessel of L: 190 m and B: 25 m at Even Keel draft of 8 m with KG: 5.5m has a forward compartment 15m in length with a cargo of permeability 70%. Calculate draft F & A if that compartment is bilged. (25 marks)

Q. 3 a) A beam of length 'l' and weight 'w' per unit length is supported at its ends. Draw SF and BM diagram of the beam. (13 marks)

b) A triangular collision bulkhead adjacent to FPK tank is 15 m broad at the top and 12 m deep. The FPK tank contains ballast of R.D. 1.015. Calculate thrust on bulkhead and position of Centre of Pressure below top of the bulkhead when sounding in tank is 8 m. (12 marks)

Q. 4 *a) Sketch and label Mid-ship section of a Hatch coverless Cellular container ship.* (15 marks)

b) Discuss the advantages and disadvantages of such ship over a normal container ship. (10 marks)

Q. 5 *Describe the IMO weather criteria for severe wind and rolling as required by code of intact stability.* (25 marks)

Q. 6 a) *What do you understand by the term 'Subdivision Load lines'? Why it is necessary? Explain.* (13 marks)

b) Explain the procedure of calculating 'Permissible Length'. Where and how do we use this? (12 marks)

Q. 7 Discuss the "Conditions of Assignment" as per International convention on Load Lines as amended. (25 marks)

Q. 8 a) Describe the stress/strain graph & explain the relationship between stress and strain in a metal. (10 marks)

b) What are advantages and disadvantages of using Aluminum in ship building? (15 marks)

Q. 9 Describe the Inclining test to be carried out on a vessel under the following headings: (i) Purpose (ii) Procedure (iii) Precautions (25 marks)

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GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 A undivided DB tank of length 18m has following ½ ordinates of waterline at equal intervals measured from forward bulkhead:
2.0, 2.8, 3.9, 5.2, 6.7, 8.0, 10.1m respectively.
F.O. of RD 0.9 is loaded to a sounding of 0.8m in the tank. Assume the tank to be wall-sided.
Determine the KG fluid in the final condition if initial displacement was 20,000Ts and KG=10m.

Q. 2 A box shaped vessel 160mX18m is floating in S.W. at an even keel draft of 6.4m. A forward hold of length 25m whose aft bulkhead is 40m aft of FP is bilged. If the permeability of the hold is 80% and KG of vessel was 4.7m determine F & A draft in final condition?

Q. 3 A box shaped vessel 30m X 8m floats in SW with ore of S.F: 0.67 m^3/T stored to a height of 4m at the mid length and sloping uniformly to nil at sides. The vessel then floats in FW at an even keel draft of 4m. Draw SF & BM diagram for the vessel.

Q. 4 a) Sketch and label mid-ship section of a double hull oil tanker.
b) Discuss the advantage and disadvantage of such construction over single hull tankers.

Q. 5 Write short notes on the following:
a) Calculation of approximate GM by rolling period of the ship.
b) Parametric rolling & how to avoid it
c) Synchronous rolling

Q. 6 Explain "Factor of Subdivision" and "Criteria Service Numeral". How do both relate to "Floodable Length" and "Permissible Length" of passenger ships with respect to Subdivision requirements as per SOLAS 74 as amended?

Q. 7 a) Differentiate between a Type "A" and Type "B – 100" ships as per International Load line Convention 1966 as amended.
b) With respect to International Tonnage Convention 1969 as amended, give two examples of Excluded space.

Q. 8 a) Describe the sequence of events which take place in a modern Shipyard while building a ship.
b) With the aid of sketch, describe the procedure of impact test conducted on a metal.

Q. 9 When inclining tests are required on cargo and passenger ships? Describe the procedure of such tests and state the precautions necessary?

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May'13

GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

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TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

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2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 A Cantilever 6 meters long carries a concentrated load of 45 KN at its free end and also uniformly distributed load of 20KN/meter over its entire length. Find the SF and BM at the wall and draw the SF/BM diagram?

Q. 2 A box shaped vessel of length 120 m, breadth 25m is floating at an even keel draft of 6m. KG of the vessel is 7m. It has a mid-ship compartment of 20m in length extending from side to side with its forward bulkhead amidships. The permeability is 70%. The compartment contains a watertight flat at a height of 6.3m above the keel. Calculate the drafts forward and Aft and GM_T if that compartment is bilged below the watertight flat.

Q. 3 M. V. Hindship was floating with all compartments empty except as follows:
No. 2 (P&S) DB tanks full with water ballast
No. 1 DB tank contained 100 tonnes of H. F. O. (FSM at SG 1.0 (T/M) = 419 tm). An inclining experiment was conducted in this condition. A weight of 10 tonnes Kg. 10.2m shifted transversely through a distance of 17.6m caused a deflection of 8.3 cms in a plumb line 8.5 m in length. Calculate the GM (solid) and the KG of the light ship.

Q. 4 Sketch and label the mid-ship section of Ro-Ro vessel.

Q. 5 What was the traditional method of building a ship? In what ways is prefabrication different from earlier method? What are the advantages of prefabrication?

Q. 6 Describe step by step the procedures for computing the summer free board of 'Type B' ship.

Q. 7 a) Why large ships tend to roll heavier in following seas.
b) Explain parametric rolling.

Q. 8 a) Sketch and describe sheer plan and body plan.
b) Describe with the help of neat diagrams three examples of excluded spaces as per International Tonnage Convention 1969 as amended.

Q. 9 Define the following with respect to chapter II / 2 of SOLAS 74 as amended.

a) Central Control Station
b) 'C' class divisions
c) Service spaces
d) Main vertical zones.

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GOVERNMENT OF INDIA

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4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 M.V. Hindship was floating with all compartments empty except as follows:
No.2 (P & S) DB tanks full with water ballast.
No.1 DB tank contained 100 tonnes of H.F.O. (FSM at SG 1.0(t/m) = 419)
An inclining experiment was conducted in this condition. A weight of 10 tonnes Kg. 10.2 m shifted transversely thorough a distance of 17.6m, caused a deflection of 8.3 cms in a plumb line 8.5 m in length. Calculate the GM (solid) and the KG of the light ship.

Q. 2 A vessel of length 80m breadth 18m is floating at draft of 4.6m in water of relative density 1.020. A compartment 10m long 18m broad with its forward bulkhead 30m forward of mid-ship contains homogeneous cargo of permeability 60%. It has water tight flat 1.2m above keel. Calculate the drafts forward and aft if this compartment is bilged above the water tight flat.

Q. 3 A box shaped barge 100m long 15m broad floating in FW at even keel draft of 5m is loaded with bulk cargo level stowed in the five equal length holds as follows: Nos. 1 and 5 1400t each, Nos. 2 and 4 1200t each and No.3 1500t. Draw the SF and BM curves for the barge.

Q. 4 Draw the mid-ship section of large double-hull crude oil tanker.

Q. 5 a) Explain how a rolling period test is taken. What is the relationship between GM_T and rolling period? What precautions must be observed when using this formula?
b) Find the still water period of roll for a ship when the radius of gyration is 8m and meta-centric height is 0.8m.

Q. 6 Write short note on the following:
a) Functional requirements of fire protection and detection
b) "A" class division
c) Sprinkler type fixed fire extinguishing system

Q. 7 Describe the checks which will be carried out during the load line renewal survey.

Q. 8 Explain the following with respect to properties and treatment of steel:
a) Malleability b) Ductility c) Elasticity
d) Annealing e) Hardening

Q. 9 Enumerate the precautions to be taken against capsizing and intact & damage stability criteria for passenger and cargo ships as per IMO Intact Stability Code 2008.

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Q. 1 M.V. Hindship in DW of RD 1.012 is at a draft of F: 7.5m, A: 8.5m. Calculate the total quantity of cargo to be loaded and its location with respect to AP so that when in SW she is at her winter load line and also trimmed by 0.6m by stern.

Q. 2 A box shaped vessel 190m long and 25m wide at even keel draft of 8m KG: 5.5m has a fwd compartment 15m in length with a permeability 65%. Calculate draft F & A if that compartment is bilged.

Q. 3 The vertical ordinates of a bulkhead 12m wide at tank top are 4.0m, 5.5m, 7.2m, 5.5m and 4.0m. Calculate the thrust on the bulkhead and location of its Centre of Pressure from the base of the tank if the tank is filled with water of density 1.015 to a sounding of 9.5m.

Q. 4 Sketch and label the mid-ship section of membrane type LNG Carrier.

Q. 5 a) Derive an expression for angle of heel of a vessel during turning.
b) A passenger vessel of length 220m, Displacement 21,000MT, Draft 10m, KG 8.0m and KM 8.8m, has a service speed of 18 knots. Does she satisfy the intact stability criteria regarding heel due to turning.

Q. 6 a) With respect to subdivision of ships briefly explain about the Required subdivision index R_s and Attained subdivision index A.
b) Write short notes on "A" class divisions, "B" class divisions and "C" class divisions of ships as per SOLAS 1974 as amended.

Q. 7 Describe step by step the procedures for computing the summer freeboard of "Type A" ship.

Q. 8 a) Describe the activities that are carried out in a shipyard drawing offices during construction of new ship.
b) Define Stress-Strain curve of Mild steel

Q. 9 Describe the principle and necessity for carrying out an "Inclining Test" on a newly built vessel.

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D'SOUZA LAWRENCE FEB/2012

GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

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4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 A box shaped barge of length 60m has four identical compartments. Holds 1 and 4 have 300 tonnes each and holds 2 & 3 have 120 tons each. The displacement of the light barge is 480 tonnes. Draw the SF & BM diagram on a suitable scale.

Q. 2 A box-shaped vessel 120m long 20m broad is at an even keel draft of 6.6m. It has a fore end compartment 14m long extending the full width above a DB tank 1.6m high. The compartment is filled with homogenous cargo (p=70%). The compartment is bilged above the DB tank. Find the final drafts if the initial KG = 5.2m (p= permeability)

Q. 3 M. V. HINDSHIP at a draught of F/6.40m, A/7.15m, is at an angle of loll of 7°. Assuming she is 'wall sided', calculate her KG if her FSM is 1650 tm. Also find her GM at the Angle of Loll.

Q. 4 Sketch and label mid-ship section of membrane type LNG tankers.

Q. 5 With reference to the International convention on Load lines 1966 define:
a) i) Length (L) ii) Freeboard Deck iii) Superstructure
b) What are the Conditions of Assignment of freeboard for 'Scuppers, Inlets and Discharges'?

Q. 6 Describe with the help of a neat diagram the following tests:
a) Tensile Test b) Bend Test c) Hardness Test

Q. 7 Write short notes on the following:
a) Stiff and tender ship b) A-60 Class division
c) Shift of C.G. due to loading of heavy lift by ship's crane
d) Sprinkler type fixed fire extinguishing system

Q. 8 a) Explain the erection sequence in shipyard practice in ship construction.
b) Describe 'severe wind and weather heeling criteria' as per Intact stability code.

Q. 9 a) State the precautions that should be taken during Inclining experiments.
b) Define the following: i) Floodable Length ii) Factor of subdivision.

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MAY 2012.

GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 M. V. Hindship floating at draft F: 8.90m A: 9.10m in water of RD 1.015. Space available in No. 2 TDK & No. 5 U.TDK. Determine the distribution of cargo to be loaded in these spaces so that vessel is trimmed 25 cms by stern when she goes in open sea in summer zone. Determine vessels F & A drafts in Dock water & at sea.

Q. 2 A box shaped vessel 50m X 12m is divided into four compartments of equal length. When loaded, with homogeneous cargo level stowed as follows: No. 1 and No. 4 = 125t each, No. 2 & No. 3 = 180t each, the vessel floats in SW at Even Keel draft of 3m.
Draw SF/BM diagram for the vessel.

Q. 3 A deep tank bulkhead 10m deep has following equally spaced horizontal ordinates commencing from top. Tank contains SW to a Sounding of 12 mts. Calculate thrust and position of COP with respect to top of bulkhead.
8.0m, 7.5m, 6.8m, 5.8m, 4.5m

Q. 4 Sketch & label the mid-ship section of a Spherical type LNG Carrier and enumerate the special features of these types of ships.

Q. 5 Discuss the following:
a) Forced rolling
b) Synchronous rolling
c) Why large ships tend to roll heavier in following seas?

Q. 6 Define and distinguish clearly between " Permissible Length" and "Floodable Length" of a passenger ship with respect to "Subdivision Requirements" under SOLAS Convention. Which one of the above will be more, explain with reasons.

Q. 7 a) Differentiate between a Type "A" and "B-100" ships as per International Load Line Conventions 1966 as amended.
b) With respect to International Tonnage Convention 1969 as amended, give two examples of Excluded space.

Q. 8 What are the advantages and disadvantages of Aluminum in ship building? Explain the process of connecting an aluminum superstructure to steel deck and hull of the ship.

Q. 9 Write Short notes on:
a) CAD / CAM in ship building.
b) Standard Fire Test
c) Inclining Experiment

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GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1,2,3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q1. M.V. HINDSHIP is floating at a displacement of 15150 tonnes in water of R.D. 1.012.
She is at an angle of loll of 9°. Her FSM is 1250 tm. Assuming she is wall sided, calculate her KG and also find her GM_T at angle of loll.

Q2. A homogenous log of wood is of R.D. 0.5, length 12 meters and of square cross section 1m x 1m. When two equal uniform loads, each 3m long and 1m broad, are placed on the log along it's length extending for 3 meters from each end, log floats at an even keel draught of 0.8m in fresh water with it's axis parallel to the water line.
Draw the S.F. & B.M. diagrams of the log, stating their maximum values and the points along the beam's length where they occur.

Q3. A pontoon consists of two large cylinders floating in water of R.D. 1-025 with their axis perpendicular to the water line & joined at the top by a wooden deck. Diameter of each cylinder is 4m and distance between cylinders, centre to centre, is 5 meters. Pontoon is floating at an even keel draught of 4 meters and has a light KG of 3.6 meters. Sea water is taken in each cylinder to a height of 2 metre & a load of 2 tonnes (Kg 15 meters) is placed on deck 2 meters from the centre line. Calculate the list produced.

Q4. Sketch and label the mid-ship section of a spherical type LNG carrier and enumerate the special features of these types of ships.

Q5. Describe various grades of steel used for construction of a modern vessel. Where are these put to use?

Q6. Masters of very large container vessels, such as Post Panamax vessels, have complained that they have encountered very severe rolling with heavy seas from the bows or quarters, at times losing large number of containers overboard. Discuss the factors responsible for such large rolling & remedial action required to prevent it.

Q7. With the help of suitable sketch explain the following :-
a) Sheer plan
b) Half breadth plan
c) Body plan

Q8. Discuss the role of Computer in respect of ship construction?

Q9. a) Differentiate between type "A" and type "B – 100" ship as per international load line convention 1966.
b) With respect to international tonnage convention 1969, explain the term of "Excluded space" with examples.

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GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – III)

06 Aug 2012

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 M.V. 'Hindship' was floating with all compartments empty except as follows:-
No. 2 (P & S) DB tanks full with water ballast.
No. 1 DB tank contained 100 tonnes of H.F.O.
An inclining experiment was conducted in this condition. A weight of 10 tonnes Kg. 10.2 m, shifted transversely through a distance of 17.6 m, caused a deflection of 9 cms in a plumb line 10 m in length. Calculate the GM (solid) and the KG of the light ship.

Q. 2 A box shaped vessel 160 m X 18 m floating at an even keel draft of 6.4m. A forward compartment 25m long is having cargo of permeability 80%. This compartment is extending from side to side and tank's COG is 27.5m forward of mid-ship. KG = 4.7m.
Find the draft F & A if this compartment gets bilged, above the DB tank of height 1.4m.

Q. 3 A box shaped vessel 30m X 8m floats in SW with ore of S.F: 0.667 m^3/t stored to a height of 4m at the ends sloping uniformly to nil at middle length. The vessel then floats in FW at an even keel draft of 4m. Draw SF & BM diagram for the vessel.

SF/BM

Q. 4 a) Sketch and label Mid-ship section of a Hatch coverless Cellular container ship
b) Discuss the advantage and disadvantages of such ship over a normal container ship.

Q. 5 a) Describe the IMO weather criteria against wind and wave as required by Code of Intact Stability.
b) What do you understand by "Torsional Moment"? How do you calculate the Torsional Moment in a container ship? How significant is Torsional Stress in a container ship.

Q. 6 With the help of suitable sketches describe:
a) The differences between 'A-60' and 'A-0' class fire division
b) The requirements for a 'trunk way' passing through an A-class division.

Q. 7 Describe the corrections which are made to the basic tabular freeboard of a type-B vessel under the International Load Line Convention.

Q. 8 a) Describe the sequence of events which take place in a modern Shipyard while building a ship.
b) With the aid of sketch, describe the procedure of impact test conducted on a metal.

Q. 9 Write short notes on the following:
a) Gross Tonnage
b) Net Tonnage.
c) Effect of increasing beam on GZ curve
d) Sub-division Loadline

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GOVERNMENT OF INDIA

FIRST MATE OF A FOKEIGN GOING SHIP (PHASE – II)

FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)

PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS **PASS MARKS: 100** **MAX. MARKS: 200**

NOTES:

1. **Question No. 1, 2, 3 & 4 are compulsory. Attempt any FOUR from the remaining questions.**
2. **All questions carry equal marks i.e. 25 marks each.**
3. **Non-programmable single memory scientific calculator is permitted.**
4. **Wherever applicable sketches should be drawn to support the answer.**

Q. 1 A box – shaped barge, 32 m long and 5 m broad, is empty and afloat on an even keel. It has four identical holds and its light displacement is 120 t. Bulk cargo is then loaded and trimmed level as follows: No. 1:124 t, No. 2:216t, No. 3:134t and No. 4:225t. The final drafts are 4m fwd and 6m aft. Draw the SF and BM curves to scale.

Q. 2 A deep tank bulkhead 10m deep has following equally spaced horizontal ordinates commencing from top: 8.0, 7.5, 6.8, 5.8, 4.5m. Tank contains SW to a sounding of 11m. Calculate the thrust and position of COP with respect to top of bulkhead.

Q. 3 M. V. Hindship floating at a draft of F: 5.73m, A: 6.42m, is at an angle of loll of 4°, FS moment 1563 tm. Assuming the ship to be wall sided, calculate her KG.

Q. 4 Sketch and label mid-ship section of double hull oil tanker.

Q. 5 a) What are the basic principles involved in fire integrity of ships.
b) Briefly explain standard fire test, 'A' class divisions and 'B' class divisions.

Q. 6 Describe the principle and necessity of carrying out an "Inclining Test" on a newly build vessel. What are the precautions to observe when carrying out this test?

Q. 7 a) With the help of a block diagram explain the general layout of a shipyard and co-operation between various departments.
b) What are the various tests carried out for ship building steel.

Q. 8 a) Differentiate between Type "A" and Type "B – 100" ships as per International Loadline Convention 1966 as amended.
b) With respect to International Tonnage Convention 1969 as amended, give two examples of Excluded space.

Q. 9 a) What do you understand by the term 'Subdivision Load Lines? Why it is necessary – explain?
b) Explain the procedure of calculating 'Permissible Length'. Where and how do we use this?

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GOVERNMENT OF INDIA

FIRST MATE OF A FOREIGN GOING SHIP (PHASE II)

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PAPER: NAVAL ARCHITECTURE PAPER - II

TIME: 3 HOURS PASS MARKS: 100 MAX. MARKS: 100

NOTES:

1. (Question No. 1, 2, 3 & 4 are compulsory) Attempt any FOUR from the remaining questions.
2. All questions carry equal marks i.e. 25 marks each.
3. Non-programmable simple summary scientific calculator is permitted.
4. Wherever applicable sketches should be drawn to support the answer.

Q. 1 A uniform beam 'AB' 20m long weighting 34 Kg/m run is supported on two level platforms at the ends. One levelled platform extends for 4 meters from end 'A'. The other levelled platform extends for 2 meters from end 'B'.
Draw the S. F & B. M. diagrams of the beam and calculate the point where B.M has a maximum value.

Q. 2 M. V. Hindship was floating with all compartments empty except as follows:
a) No. 2 DB (P) & (S) tanks full of water ballast
b) No. 1 DB tank contained 100 tons of FO.
An inclining experiment was conducted in this condition. A weight of 10 Tons, KG 10.2 metres, shifted transversely through a distance of 17.6 metres caused the deflection of 8.3 cms in a plumb line of 8.5 metres in length. Calculate the GM (solid) and KG of the lightship.

Q. 3 The half ordinates of vessel's water plane area spaced 25m apart are: 0.4, 14.5, 26.6, 34.0, 37.0, 37.3, 37.1, 35.8, 28.8 & 6.0 meters respectively, commencing from forward end.
If the SW displacement of the vessel up to that water plane is 150,000 T, calculate transverse BM and longitudinal BM.

Q. 4 Sketch a Mid-ship section of a Double Hull Tanker.

Q. 5 Discuss the "Conditions of Assignment" as per International convention on Load Lines as amended

Q. 6 a) Describe body plan, sheer plan, half breadth plan and their uses.
b) What parts of a ship counteract sagging, hogging, racking and grounding stresses?

Q. 7 State the conditions which produce parametric rolling and discuss the prevention and dangers of heavy rolling.

Q. 8 With respect to the subdivision of passenger ships explain the followings:
a) Floodable Length
b) Permissible Length
c) Sub-division Load-line

Q. 9 a) Describe the Damage Stability Criteria of passenger ships
b) International convention on Tonnage Measurement of ships was adopted in 1969. When did this convention come into force and what was the corresponding ship force criteria? To which type of ships this Convention does not apply?

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