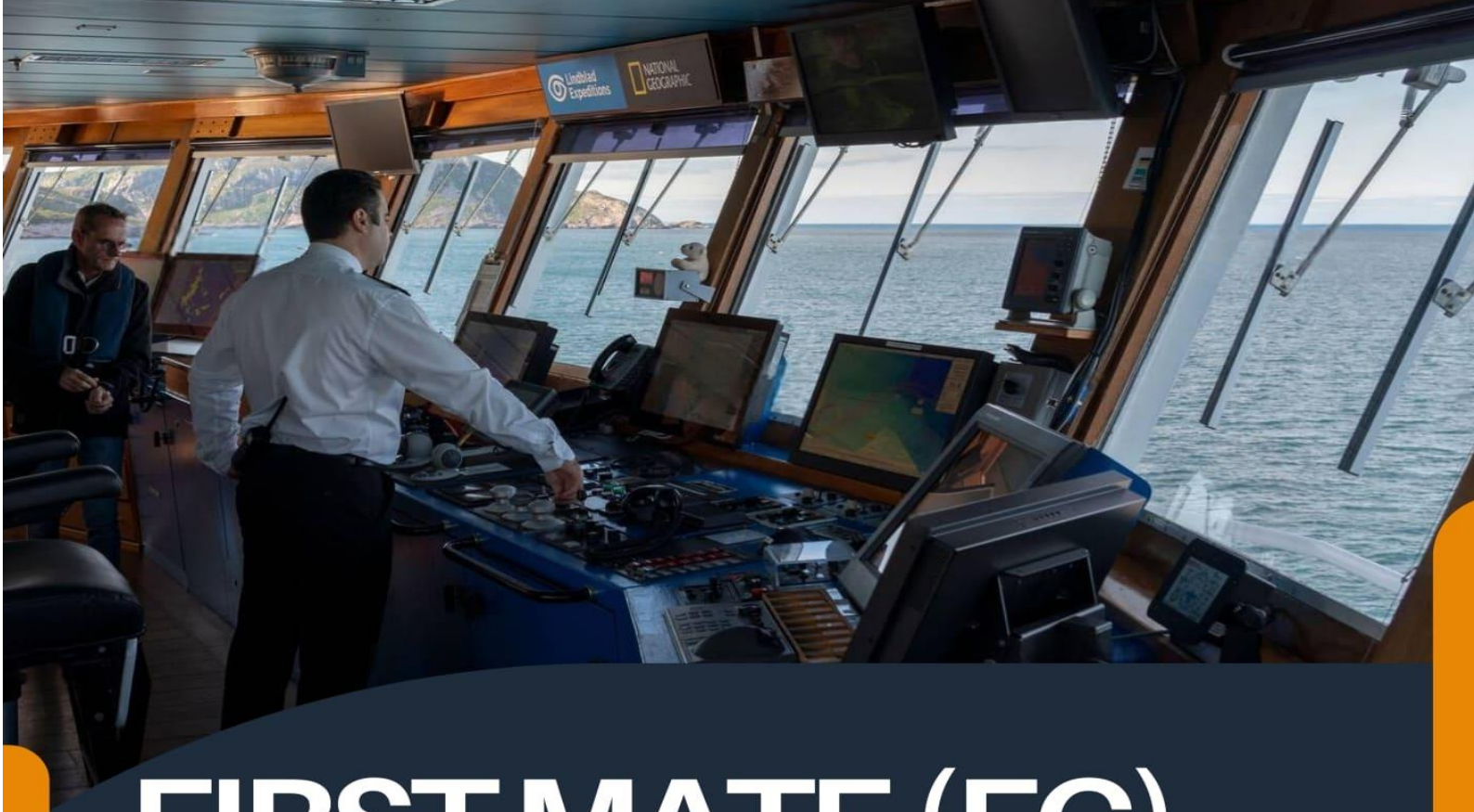

FIRST MATE (FG) PHASE- I WRITTEN :

NAVAL -ARCHITECTURE (FG)

FOR INDIAN COMPETENCY EXAM

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Date: - 3rd Jan-2023

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – I)
FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)
PAPER: - NAVAL ARCHITECTURE PAPER – I

Notes:
1. All questions in Part A are compulsory and carry 30 marks each.
2. Attempt any four out of five from Part B (Each question carries 20 marks).
3. Whenever applicable sketches should be drawn to support the answer.

PART – A

Q.1 M.V. Hindship sailed from port from drafts F 8.800 m and A 9.200 m resp. with KG 7.850 m and FSM 1950 TM. On her voyage she grounded on an isolated rock, without damage to her hull. The drafts then were observed to be F 8.300 m and A 9.300 m. Determine:
i) The position w.r.t. AP where the grounding occurred
ii) Virtual GM of the ship in this condition
iii) Rise in tide required to refloat the vessel.
Click Here to See the Answer

Q.2 The water plane areas of a ship from for drafts mentioned are as follows: 5m: 6380, 4m: 6320, 3m: 6255, 2m: 6090, 1m: 5885, 1m: 5885, 0.5m: 5740, 0:5560. Find Displacement and KB at 5m draft.
Click Here to See the Answer

Q.3 A ship has displacement 15000 MT, KG = 7.0 M,
HEEL 0 15 30 45 60
GZ 0 0.38 1.0 1.41 1.2
The vessel has loaded to this displacement but the KG is found to be 6.8m. Draw the amended GZ curve and estimate the dynamical stability at 60O.
Click Here to See the Answer

Q.4 a) What are the different functions of a watertight bulkheads?
b) How these bulkheads are attached to the sides, top and bottom of the ships structure?
Click Here to See the Answer

PART – B

Q.5 Transverse cross sectional Area of ship of length 40 m is a triangle with Apex down. The base and depth of this triangle are 12 m and 9 m respectively. The ship is floating in Fresh water to a draft of 6 m and has KG of 5m. She loads 600 Ts of cargo kg 10 m. Determine the GMT in final condition if the FSM of the ship was 156 TM.

Click Here to See the Answer

Q.6 Describe the SOLAS requirements for a transverse watertight bulkhead of a cargo ship.
(a) Minimum number
(b) Location
(c) Initial tests
Click Here to See the Answer

Q.7 For which type of ship is "The Enhanced system of survey" compulsory? Briefly describe the system.
Click Here to See the Answer

Q.8 a) Using diagrams, explain the defects in wielding and how they are tested.
b) State how these defects can be minimized by good welding practices.
Click Here to See the Answer

Q.9 Describe how corrosion is controlled on board the ship under following headings:
a) Protective Coating
b) Cathodic Protection
Click Here to See the Answer

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Date: - 3rd April-2023

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PAPER: - NAVAL ARCHITECTURE PAPER – I

Notes:
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2. Attempt any four out of five from Part B (Each question carries 20 marks).
3. Whenever applicable sketches should be drawn to support the answer.

PART – A

Q.1 M.V. Hindship Displacement 12927 T, K.G. 7.850 m, FSM 1290 TM, is trimmed 0.70m by the stern. She has to be dry-docked. Calculate:
i) Virtual GM of the vessel when her keel takes the blocks all along the length of the vessel.
ii) Drafts F and A when she sits overall on the blocks.
Click Here to See the Answer

Q.2 A vessel of L 148 m, LCF 70 m, draft forward 8.00 m, draft aft 9.80m, TPC 32, MCTC = 264 lightly grounds on gently sloping seabed. Soundings taken at that instant showed forward depth as 8.00 m and aft depth as
10.9 m. Find the draft after tide falls by a) 30 cm b) 2.00 m.
Click Here to See the Answer

Q.3 M.V. 'Hindship' berthed in a dock where RD of water is 1.007, at a draft of F: 7.87 m, A 8.32 m, KG 7.45 m, FSM 970 mt. She discharged 410 t of cargo from 2 TD, A 60 t case is shifted from deck. Kg 14.7 m, LCg 58.6 m to No. 2 Hold. 110 t water kg 2.77 m, LCg 16.23 m was received in No. 8 (P & S) tanks, filling them completely.
Calculate the draft F & A at which she would sail from the dock.
Click Here to See the Answer

Q.4 a) Sketch and label Bow door (side opening) of a RORO Ferry.
b) Describe SOLAS regulations for minimum number of watertight bulkheads to be placed in a ship
Click Here to See the Answer

PART – B

Q.5 With reference to the International Code for the Carriage of Grain in bulk explain:
a) Intact stability criteria as applicable to ships carrying grain in bulk
b) Volumetric heeling moments and its effect on stability.

Click Here to See the Answer

Q.6 a) Describe testing requirements of main W/T compartments on cargo ships.
b) Write short notes on:
i) Water tight
ii) Weather tight
iii) Oil tight
Click Here to See the Answer

Q.7 a) Explain what is 'Close up inspection' and 'Critical areas' with reference to Enhanced Survey programs.
Describe the contents of "Documents File".
b) Write short notes on Condition Assessment Scheme (CAS)?
Click Here to See the Answer

Q.8 a) List various types of welding.
b) Write short notes on weld faults?
Click Here to See the Answer

Q.9 a) Sketch and describe Impressed Current Cathodic Protection system used on ships.
b) Compare the merits and demerits of Cathodic protection system by sacrificial anodes and ICCP system.
Click Here to See the Answer

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Paper-1 Date: - 14th July-2023

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – I)
FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)
PAPER: - NAVAL ARCHITECTURE PAPER – I

Notes:
1. All questions in Part A are compulsory and carry 30 marks each.
2. Attempt any four out of five from Part B (Each question carries 20 marks).
3. Whenever applicable sketches should be drawn to support the answer.

PART – A

Q.1 The waterplace area of the ship commencing from the load waterline to keel spaced 1m apart are as follows:
Area 800 760 700 600 450 10m2
Midway between the lowest two waterplace the area is 180m2. Find the displacement and KB in SW.
Click Here to See the Answer

Q.2 A ship of displacement 27000T, LBP = 170m, LCF=82m, LCB=90m. TPC = 29.8, MCTC = 162 is floating in SW at drafts F 8.720 m & A 9.0 m. Determine the F & A drafts of the ship when she moves to D.W. of R.D. 1.004T/M3.
Click Here to See the Answer

Q.3 M.V. 'Hindship' displacement 16160 T, KG 7.850 m, FSM 2420 Tm to be dry docked. If on taking blocks overall the Residual GM (F) is to be 0.20m, determine maximum trim with which she will enter dry dock. Also state arrival drafts F & A.
Click Here to See the Answer

Q.4 a) State the SOLAS requirements for collision bulkhead.
b) With sketch of a corrugated bulkhead, show its connection with the shell Plating and deck.
Click Here to See the Answer

PART – B

Q.5 Describe the effect of the following on GZ curve of a vessel.
a) Increase of beam b) Increase of freeboard c) Vertical upward shift of vessels centre of gravity.
Click Here to See the Answer

Q.6 a) Sketch and describe hydraulic closing Watertight door.
b) List and explain SOLAS requirements of watertight doors of cargo ships.
Click Here to See the Answer

Q.7 a) What is the main advantages of harmonized system of ship's surveys (HSSS).
b) Describe the procedure for preparing the vessel for (SAFCON) safety construction renewal survey.
Click Here to See the Answer

Q.8 a) Write brief note on butt, lap and fillet weld with help of suitable diagrams.
b) Write note on:
i) Tungsten inert gas welding
ii) Thermit welding
Click Here to See the Answer

Q.9 a) What is corrosion? How many types of corrosion are there? Explain bi metallic (Galvanic corrosion).
b) Explain ICCP with help of a neat sketch.
Click Here to See the Answer

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Paper-2 Date: - 14th July-2023

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – I)
FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)
PAPER: - NAVAL ARCHITECTURE PAPER – I

Notes:
1. All questions in Part A are compulsory and carry 30 marks each.
2. Attempt any four out of five from Part B (Each question carries 20 marks).
3. Whenever applicable sketches should be drawn to support the answer.

PART – A

Q.1 A ship has a displacement of 9100 T, LBP of 120 m and even-keel draft of 7 m in FW of density of 1.000 t/m3. From her hydrostatic tables it was found that:
MCTCSW is 130 t m/cm. TPCSW is 17.3 T, LCB is 2m forward of amidships and LCF is 1.0m aft of amidships. Calculate the new end drafts when this vessel moves into water having a density of 1.02 t/m3.
Click Here to See the Answer

Q.2 The half breadth of a transverse watertight bulkhead 14.2m high, at 2.2m intervals from the top, are 10.6, 10, 9.3, 8.3, 7.1, 5.7 & 3.8m. Below the lowest semi-ordinates is a rectangular appendage 7.6m broad and 1m
high. Find the centroid of the bulkhead above the bottom.
Click Here to See the Answer

Q.3 A ship with lightship displacement 1,700 tonnes, KG 3.5m is loaded with 1,800 tonnes of cargo at Kg 3.8m. KM after loading is 3.8m while KN values are as follows:
Angle of Heel Displacement (tonnes) 10O 20O 30O 40O 60O 75O
3,000 0.75 1.50 2.16 2.84 3.19 3.26
4,000 0.77 1.54 2.20 2.92 3.25 3.26
Plot the GZ curve and show if the ship conforms to IMO stability criteria?
Click Here to See the Answer

Q.4 Explain why the values of trim and metacentric height in the freely afloat condition are important when considering the suitability of a vessel for dry-docking.
Click Here to See the Answer

PART – B

Q.5 Sketch and label a Power operated Horizontal Sliding watertight door. Describe their testing procedures as per SOLAS.
Click Here to See the Answer

Q.6 Discuss the effect of change in Beam and Freeboard on the GZ curve of the ship.
Click Here to See the Answer

Q.7 a) How the flag states ensure that their rules and regulations are effectively enforced on the ships registered with them?
b) What is Enhanced Special Survey?
Click Here to See the Answer

Q.8 Describe the faults that can be found in welds and describe the methods of testing of these faults.
Click Here to See the Answer

Q.9 a) Explain corrosion cell with regards to galvanic corrosion.
b) Sketch and describe a Impressed current cathodic protection system (ICCP).
Click Here to See the Answer

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Paper-1 Date: - 3rd Oct-2023

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – I)
FUNCTION: CONTROLLING THE OPERATION OF THE SHIP AND CARE FOR PERSONS ON BOARD (Management Level)
PAPER: - NAVAL ARCHITECTURE PAPER – I

Notes:
1. All questions in Part A are compulsory and carry 30 marks each.
2. Attempt any four out of five from Part B (Each question carries 20 marks).
3. Whenever applicable sketches should be drawn to support the answer.

PART – A

Q.1. The transverse cross section areas in m2 within a ship of length 120m, in water of RD 1.020 from fwd are: 100 200 230 275 250 230.
Between the first 2 ordinates from fwd, there are 2 more cross section areas of 125 and 175 m2 so that all 4 of them are spaced equally. Forward of 1st ordinate there is an appendage of vol. 600m3. Its length 10m and centroid 5m from its fwd end. Calculate the displacement of the vessel and her LCB.
Click Here to See the Answer

Q.2. A box-shaped vessel 150m long, 24m broad and 9m deep, has a mean draft in salt water of 6m and its trimmed 1m by the stern, KG 8.4m. State whether it is safe to drydock this vessel in this condition or not, and give reasons for your answer.
Click Here to See the Answer

Q.3. M.V. 'Hindship' completed loading with draft fwd 6m and aft 7m in water of density 1.005. She is bound for a port in DW of density 1.020. Assuming negligible consumption of bunkers and fresh water determine her drafts in port of density 1.020.
Click Here to See the Answer

Q.4. Sketch and label a collision bulkhead. State requirements regarding positioning and piercing allowed of collision bulkhead as per SOLAS.
Click Here to See the Answer

PART – B

Q.5 Explain with suitable sketches the change in trim of the vessel when she goes from water of lesser density to water of higher density provided a) LCF > LCB b) LCF < LCB.
Click Here to See the Answer

Q.6 What is an enhance survey (ESP) program? With reference to ESP describe
i) substantial corrosion
ii) close-up inspection

iii) critical areas
Click Here to See the Answer

Q.7 a) List out the various items to be opened and examined in dry dock as part of classification society surveys.
b) How would you prepare your vessel for load line survey.
Click Here to See the Answer

Q.8 a) Explain manual metal arc welding, with precautions to take.
b) Describe with sketches various types of defects that could be found in welded joints and what are the remedies.
Click Here to See the Answer

Q.9 a) Describe different types of corrosion taking place on board ships.
b) Compare sacrificial anode protection to Impressed Current cathodic protection ICCP.
Click Here to See the Answer

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PART – A

Q.1 A ship in upright conditions, having displacement 15000t and KG 7.0m, FSM 400 tm, following GZ value
were obtained:
Heel (deg.) 0 15 30 45 60
GZ (m) 0 .38 1.0 1.41 1.2 Vessel now takes 200t of ballast in top side tank, kg 9.0m and 5.0m to port of centerline. FSM in final condition is 900 tm. If the KN values remain unchanged after ballasting. Calculate the resultant list with the help of statical stability curve.
Click Here to See the Answer

Q.2 A ship of L = 140m, W = 16000t, LCF = 72m, MCTC =190 tm, FSM =137 tm, KM = 8.2m, KG = 7.2m, TPC = 24t, draft Fwd = 6.70m, Aft = 8.85m grounds lightly on an isolated rock. The drafts now are found to be fwd 5.90m and aft 9.30m. Calculate the virtual GM and the rise of tide required to refloat the vessel.
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Q.3 M.V. Hindship floating in RD 1.020 at even keel draft of 7.0 m. She has to discharge 1000 t of cargo. Calculate the position with respect to aft perpendicular, from where the weight should be discharged so that she would be trimmed 1.0 m by the stern on completion. Also, calculate the final drafts forward and aft.
Click Here to See the Answer

Q.4 a) Draw the horizontal sliding power operated watertight door fitted on a ship.
b) Enumerate the SOLAS requirements for these doors on ships.
Click Here to See the Answer

PART – B

Q.5 Draw and discuss the effect on stability of ship due to increased beam and freeboard.
Click Here to See the Answer

Q.6 a) Why does a vessel have small stern trim at the time of Dry docking.
b) How will you dry dock a loaded ship.
Click Here to See the Answer

Q.7 Discuss the main features of ESP while explaining the requirements for inspection and surveys carried out on double hull oil tankers.
Click Here to See the Answer

Q.8 Describe four types of welding defects and preventive measures.
Click Here to See the Answer

Q.9 a) Describe the components of marine paint and their importance.
b) How will you calculate the wetted surface area for painting.
Click Here to See the Answer

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