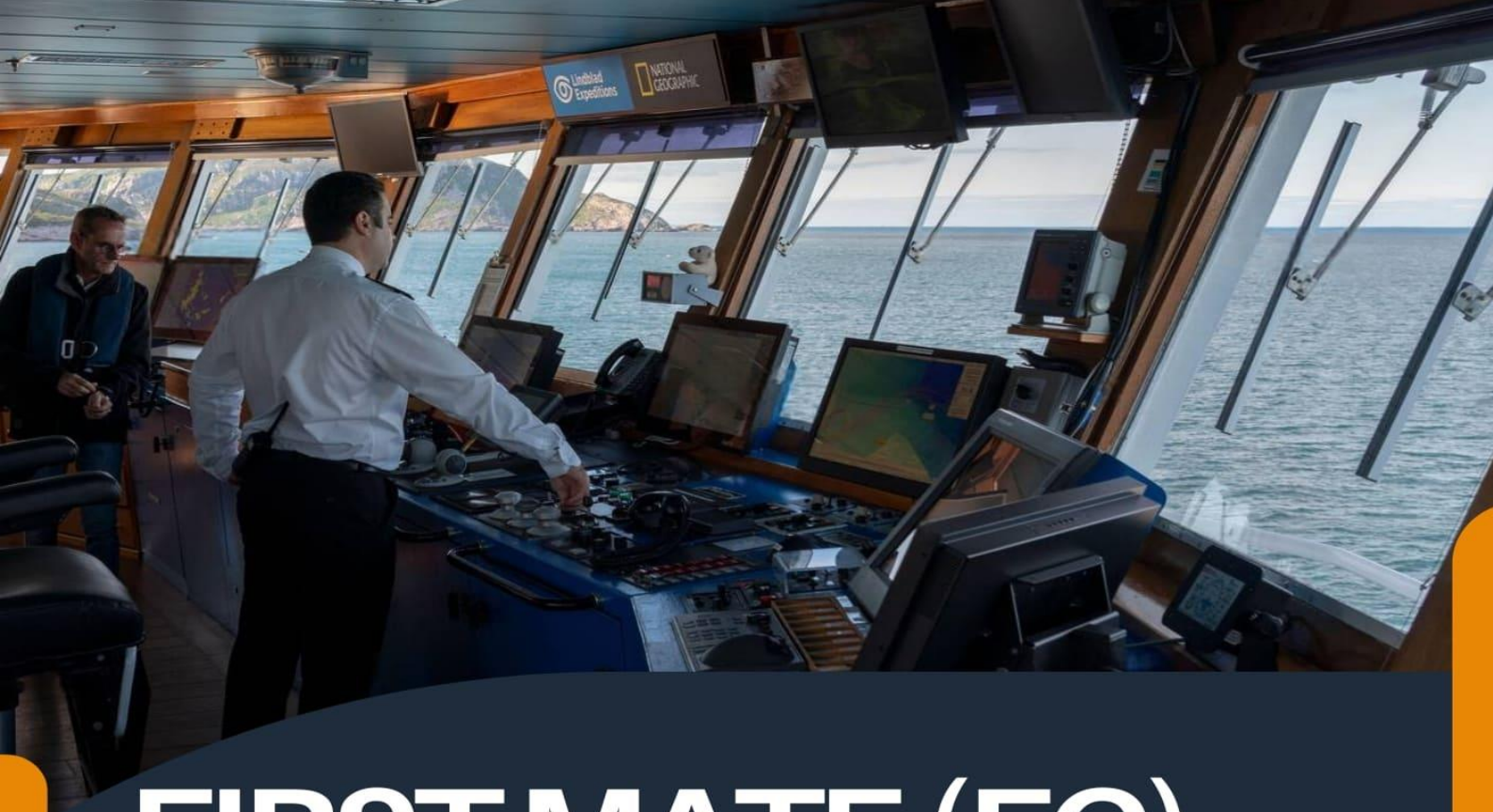

FIRST MATE (FG) PHASE- I WRITTEN :

NAVAL -ARCHITECTURE (FG)

FOR INDIAN COMPETENCY EXAM

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Paper 1 Date: - 9th Jan-2024

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 of length 200m, Beam 32m, draft Fwd: 6.05m, Aft 6.75m is to be dry docked. CF = 3m aft of midship, MCTC 400 tm, KM = 8.45m, KG = 7.8m, TPC = 29t. Calculate her residual GM and drafts Fwd and Aft when the trim has reduced to 10 cms.
Click Here to See the Answer

Q.2. The water plane areas of a ship for drafts mentioned are as follows: 6m: 6825, 5m: 6410, 4m: 6300, 3m: 6225, 2m: 6000, 1m: 5844, 0.5m: 5705, 0: 5560. Find W and KB at 5m draft.
Click Here to See the Answer

Q.3. M.V. 'Hindship' in D.W. of density 1.010 is at drafts F 7.60m and A 7.92m. She has to load 420 T of cargo. Calculate the position w.r.t. AP where to load the cargo so that she would be trimmed 0.80m by stern in D.W.
Also, state her drafts Fwd and Aft in S.W. in final condition.
Click Here to See the Answer

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

PART – B

Q.5 How do the following parameters affect the GZ curve:-
a) Beam b) Freeboard
Click Here to See the Answer

Q.6 a) Compare the advantages and disadvantages of plain and corrugated bulkheads.
b) List the SOLAS requirements for power operated watertight doors on passenger ships.
Click Here to See the Answer

Q.7 a) List the advantages of the Harmonised System of Survey and Certification.
b) Compare between Condition Assessment Program and Condition Assessment scheme.
Click Here to See the Answer

Q.8 List your preparations for Safety Equipment Renewal Survey?
Click Here to See the Answer

Q.9 Describe a typical paint scheme for:
a) Main deck including fittings b) Superstructure
c) DB tanks internal d) Forepeak tank.
Click Here to See the Answer

Paper 2 Date: - 9th Jan-2024

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's water-plane is 80m long. The breadths commencing from forward are as following: 0, 3.05, 7.10, 9.40, 10.2, 10.36, 10.30, 10.00, 8.84, 5.75 and 0.0 m respectively. The space between the first three and the last three ordinates is half of that between the other ordinates. Calculate the area of the water- plane and the position of the center of flotation from aft.
Click Here to See the Answer

Q.2 A ship of 22000 t displacement is 160m long. MCTC 280, water plane area 3060m2, center of buoyancy 1m aft of midships and center of flotation 4 m aft of midships. It floats in water of 1.007 t/m3 at draughts of 8.15m forward and 8.75m aft. Calculate the new draughts if the vessel moves into sea water of 1.026 t/m3.
Click Here to See the Answer

Q.3 M.V. Hindship sailed from port in condition No. 8 soon after departure the grounded on an isolated rock, without damage to her hull. The drafts then were observed to be F 5.90m, A 9.30m. Calculate the following: -
i) The upthrust provided by the rock.
ii) The position with respect to AP, where the grounding occurred.
Click Here to See the Answer

Q.4 Draw and label all parts of a transverse plane watertight bulkhead showing its attachment to sides and tank top.
Click Here to See the Answer

PART – B

Q.5 What are Cross Curves of Stability. How are they used in stability. Calculations by a Chief mate of a vessel.

Click Here to See the Answer

Q.6 Describe the systems for indication and monitoring of bow door operation on board Ro-Ro ships.
Click Here to See the Answer

Q.7 i) What is an Enhanced Survey Program (ESP)?
ii) List the surveys carried under the HSSC and explain the scope of the Annual Survey?
Click Here to See the Answer

Q.8 List the causes and remedies for the following type of weld defects: -
i) Lack of fusion
ii) Incomplete penetration
iii) Undercutting What is the purpose of flux in welding?
Click Here to See the Answer

Q.9 i) What is the objective of surface preparation prior to painting? List the methods of surface preparation?
ii) With the help of a neat diagram, explain the ICCP method of corrosion prevention on board ships.
Click Here to See the Answer

Paper 1 Date: - 1st April-2024

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

Q.2. Transverse cross-sectional areas of the ship from keel to the waterline measured from AP at 12m equal interval are as follows:
600 m2, 800 m2, 1200 m2, 1400 m2, 1200 m2, 600 m2, 300 m2 and 50 m2. Forward of the forward most bulkhead is appendage whose volume is 160 m3 and its centroid is 4m forward of the bulk head. Determine the displacement and LCB of the ship in this condition.
Click Here to See the Answer

Q.3. A ship with lightship displacement 1700 T, KG 3.5m, is loaded with 1800 T of cargo at KG 3.8m, KM after loading is 3.8m while KN values are as follows:
Angle of Heel
Displacement (T) 10O 20O 30O 40O 60O 75O
3000 0.75 1.50 2.16 2.84 3.19 3.26
4000 0.77 1.54 2.20 2.92 3.25 3.26
Plot the GZ curve and show if the ship confirms to IMO stability criteria?
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 ship.
Click Here to See the Answer

PART – B

Q.5 Discuss the effect of change in Beam and Freeboard on the GZ curve of the ship.
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) Watertight
ii) Weather tight
iii) Oil tight
Click Here to See the Answer

Q.7 Describe the faults that can be found in welds and describes the methods of testing of these faults.
Click Here to See the Answer

Q.8 Enumerate various types of surveys and draw a diagrammatic arrangement of various surveys as required by harmonic system of surveys and certification.
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 on Cathodic protection system by sacrificial modes and ICCP system.
Click Here to See the Answer

Paper 2 Date: - 1st April-2024

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 of length 100m, half breadths of the ship's waterplane from aft are: 0.0, 3.3, 4.5, 4.8, 4.5, 3.6, 2.7 & 1.5m. Half breadth between the first two from aft is 2m. At the forward end is an appendage in way of the bulbous bow 4.4m long. Its area is 20m2 and its centroid 1.4m from forward, find the area of waterplane and COF.
Click Here to See the Answer

Q.2 A vessel of displacement 29000 t, LBP 185m, KM 11.50, KG 10.95. Draft Fwd 8.00m, Aft 9.38m, LCF 89.5m, MCTC 410 tm, TPC 29.5 t/cm. The depth of water in the deck is initially 10m. Find the effective GM and drafts Fwd and Aft after the water level has fallen by 1.35m.
Click Here to See the Answer

Q.3 M.V. Hindship, displacement 9348 T, KG 8.623 m, FSM 935Tm is to be dry-docked. When she sits overall on the blocks the residual GM (F) is to be not less than 0.15 m. Determine:
a) Maximum Trim with which vessel can enter the Dry-dock.
b) Drafts F and A with which the vessel will enter Dry-dock.
Click Here to See the Answer

Q.4 Draw and label a ramp of Ro-Ro vessel and its effect on ship's stability.
Click Here to See the Answer

PART – B

Q.5 Describe the stability to be satisfied by vessels carrying Grain cargo in bulk so required by International Code for Safe Carriage of Grain in Bulk.
Click Here to See the Answer

Q.6 Write short notes on:

a) Condition Assessment Scheme (CAS).
b) Condition Assessment Program (CAP).
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 a) With the help of a diagram, explain what is a corrosion cell.
b) Describe with the help of a sketch an impressed current Cathodic Protection System.
Click Here to See the Answer

AM Paper Date: - 9th July-2024

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, floating at drafts of F 7.7 m and A 7.9 m, sustains danger in an end on collision and has to lift the bow to reduce the draft forward to 6.7 m. The ship is about to enter a port in which the maximum permissible draft is 8.3m. To do this it is decided to discharge cargo from No. 1 hold (centre of gravity 75 m forward of amidships) and No. 4 hold (centre of gravity 45 m of amidships). MCTC 200 tonnes m, TPC 15 tonnes. Centre of flotation is amidships. Find the minimum amount of cargo to discharge from each hold.
Click Here to See the Answer

Q.2. A ship 90 metres long is floating on an even keel at 6m draft in SW. The half ordinates of water plane, commencing from forward, are as follows:
0, 4.88, 6.71, 7.31, 7.01, 6.40 and 0.9 m respectively.
The half-ordinates 7.5 metres from bow and stern are 2.13 m and 3.35 m respectively. Find the area of the water-plane and the change in draft if 150 tonnes of cargo is loaded vertically over the centre of flotation. Find the position of the centre of flotation.
Click Here to See the Answer

Q.3. A vessel displacing 14000 tonnes enters dry-dock with a clearance of 0.50m over the blocks. Drafts while entering dry-dock are 5.35 forward, 6.77m aft, MCTC 120, TPC 22 tonne, LCF 4.00 m aft of mid-ships, length 150m, KG 6.25M, KM 6.40m. Assume the hydrostatic data to remain constant.
Determine:
a) The drop in water level required before the vessel takes the blocks forward and aft.
b) The GM at the instant of taking the blocks.
c) The further drop in water before the GM reduces to zero.
Click Here to See the Answer

Q.4. Explain with neat sketches effect on GZ values because of
a) Vertical shift
b) Transverse shift of cargo on-board a ship

PART – B

Q.5 a) Explain the SOLAS regulations of piercing of Collision Bulkhead.
b) Sketch and label a transverse corrugated watertight bulkhead.
Click Here to See the Answer

Q.6 Discuss the effect of change in density of water on the Draft and Trim.
Click Here to See the Answer

Q.7 a) Explain process of preparing for Safety equipment survey of your ship.
b) Explain the need for vessels to undergo CAP survey.
Click Here to See the Answer

Q.8 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

Q.9 With the help of sketches, write short notes on:
a) Types of welds.
b) Edge preparation of plates for welding
c) Tack welding
d) Faults in welding.
Click Here to See the Answer

PM Paper Date: - 9th July-2024

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 displacing 9500 t and trimmed 0.80 m by stern is to be dry-docked for bottom inspection.
KG = 7.92 m, FSM= 1600 tm. Calculate:
a) The GM (F) of the vessel before entering the dry-dock.
b) The virtual GM of the vessel when her heel taken blocks all along the length of the vessel.
Click Here to See the Answer

Q.2 The water plan areas of a ship from Forward drafts mentioned are as follows: 5m: 6380, 4m: 6320, 3m: 6255, 2m: 6090, 1m: 5885, 0.5m: 5740, 0:5560. Find the displacement and KB at 5 m 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 watertight bulkheads?
b) How these bulkheads are attached to the sides, top and bottom of the ship's structure?
Click Here to See the Answer

PART – B

Q.5 For which type of ship is "The Enhanced system of survey" compulsory? Briefly describe the system.
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 Describe the process of gas wielding, with the help of a neat diagrams.
Click Here to See the Answer

Q.8 With reference to the International Code for the Carriage of Grain in bulk explain:
a) Intact Stability criteria as applicable to ships carrying in grain in bulk.
b) Volumetric heeling moments and its effects on stability.
Click Here to See the Answer

Q.9 i) What is the objective of surface preparation prior to painting? List the methods of surface preparation?
ii) With the help of a neat diagram, explain the ICCP method of corrosion prevention on board ships.
Click Here to See the Answer

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AM Paper Date: - 1st Oct-2024

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

Notes:
1. All questions in Part A are compulsory and carry 30 marks each.
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PART – A

Q.1. A ship, floating at drafts of F 7.7 m and A 7.9 m, sustains damage in an end on collision and has to lift the bow to reduce the draft forward to 6.7 m. The ship is about to enter a port in which the maximum permissible draft is 8.3m. To do this it is decided to discharge cargo from No. 1 hold (Cog 75 m For'd of amidships) and No. 4 hold (CoG 45 m aft of amidships). MCTC 200 tonnes m, TPC 15 tonnes. Centre of flotation is amidships. Find the minimum amount of cargo to discharge from each hold.
Click Here to See the Answer

Q.2. M.V. 'Pilot', is loaded up ready for departure, KG is 6.55m, FSM 1350 Tm, with a displacement of 9,000 T. From the Cross curves of stability, the KN values are as:
HEEL 0° 15° 30° 45° 60° 75° 90°
KN 0 1.98 4.10 5.92 6.82 6.98 6.58
Construct the Statical stability curve for this condition and determine the following range of Stability. Change of above range when transverse upsetting moment of 2250 Tm is caused Moment of statical stability at 5° Heel.
The maximum GZ and Angle at which it occurs
Dynamical stability at 45°
Click Here to See the Answer

Q.3. A box shaped vessel 180m long, 28m broad and 6m draft even keel, KG 6.0m. Cargo of 1200 Ts is loaded with LCG of 80m and KG 4.5m. Find the draft forward and aft after loading.
Click Here to See the Answer

Q.4 With neat sketches, discuss the effect of Change in Density of the water in which ship is floating on the Trim.
Click Here to See the Answer

PART – B

Q.5) Explain: a) Critical Period b) Critical Instant c) Declivity
Click Here to See the Answer

Q.6 a) Explain SOLAS regulations of piercing of Collison Bulkhead.

b) Sketch and label a transverse corrugated watertight bulkhead.
Click Here to See the Answer

Q.7 a) Explain process of preparing for Safety equipment survey of your ship.
b) Explain the need for vessels to undergo CAP Survey.
Click Here to See the Answer

Q.8 a) Explain corrosion cell with regards to galvanic corrosion.
b) Sketch and describe an Impressed Current Cathodic Protection System (ICCP).
Click Here to See the Answer

Q.9 Describe the faults that can be found in welds and describe the methods of testing of these faults.
Click Here to See the Answer

PM Paper Date: - 1st Oct-2024

FIRST MATE OF A FOREIGN GOING SHIP (PHASE – I)
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PART – A

Q.1 M. V. Hindship sailed from port in condition No. 8 soon after departure she grounded on an isolated rock, without damage to her hull. The drafts then were observed to be F 5.90m, A 9.30m. Calculate the following:
i) The upthrust provided by the rock
ii) The position with respect to AP, where the grounding occurred.
Click Here to See the Answer

Q.2 A vessel of L 148 m, LCF 70 m, Draft forward 8.00m, 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 10.9m. 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: 7.87m, A 8.32m, KG 7.45m. FSM 970 mt. She discharged 410 t of cargo from 2TD. A 60 t case is shifted from deck, Kg 14.7m, LCg 58.6m to No. 2 Hold. 110 t water kg 2.77m, LCg 16.23m 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 Draw and label all parts of a transverse plane watertight bulkhead showing its attachments to sides and tank top.
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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) Write short notes on:
i) Water tight
ii) Weather tight
iii) Oil tight
b) Describe testing requirements of main W/T compartments on cargo ships.
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 List the causes and remedies for the following types of weld defects:-
i) Lack of fusion
ii) Incomplete penetration and
iii) Undercutting What is the purpose of flux in welding?
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Click Here to See the Answer