Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – June 2023

Programme Name: B Sc (NS)

Semester: V

Subject Code: UG21T4502

Subject Name: Naval Architecture Paper-I

Date: 07.06.2023 Max Marks: 70

Duration: 03 Hrs Pass Marks: 35

General Instructions

(i) All Sections (A, B & C) are to be attempted.
(ii) Options, if any, are specified in the respective section.

Section A

Answer the following 10 Questions of 1 mark each (Fill in the blanks)

1. The formula for the Second Moment Area of a rectangle about one of its sides is **I = ----------**
2. As per the theorem of parallel axes: I_{GG} is the moment of an area "A" about an axis "GG" passing through its geometric centre, and "ZZ" is an axis parallel to "GG" at distance "d", then, I_{ZZ} = ----------
3. The ----------of a space is the percentage of the volume of the space which may be occupied by seawater if the space is flooded.
4. In dry-docking the ship, the critical instant happens ----------.
5. In general terms, the centre of pressure is located ---------- the centroid since pressure increases with depth.
6. ----------is said to occur when the ingress of water takes place into the vessel from a point below the waterline, such that the water is free to flow in and out of the vessel.
7. When a ship is making headway in waves, the tendency of steel hull plating to flex in and out is termed as ----------.
8. The algebraic sum of the vertical forces at any section of a beam to the right or left of the section is known as ----------.
9. As per SOLAS Bulk Carriers of ---------meter in length and upwards shall be fitted with a loading instrument capable of providing information on hull girder shear forces and bending moments
10. The purpose of the Inclining experiment is to find the ---------- of the ship.

Section B

Answer the following in about 50 words.

11. State the measures taken to withstand racking stresses. (2)
12. What are the 3 main stresses acting on a ship? (2)
13. Define the Permeability of a space/compartment. (2)
14. Define the Longitudinal strength of a ship. (2)
15. State the importance of positive metacentric height during drydocking. (2)

Section C

Answer all 05 questions.

16. An oil tank bulkhead 12 m broad, and 8 m deep has SW in the tank. Calculate the thrust and centre of pressure with respect to the bottom of the bulkhead when the tank is filled with fresh water up to a sounding of

a) 6 m and (5)

b) 11 m. (5)

17. a)A box-shaped vessel 200 m long and 25 m wide floats at an even keel draft of 9m in saltwater. The aftermost compartment 20m long and 25 m wide, which was empty, gets bilged. Find the new drafts forward and aft. (7)

b) Write down any 3 effects of increasing the freeboard on the ship's stability(3)

18. a)A ship's displacement of 7000 t has a waterplane area of length 150 m. The half-breadths measured at equal intervals commencing from aft are 2.97, 6.15, 7.84, 8.48, 8.06, 7.21, 5.72, 3.6 and 0 m respectively.

-Calculate the waterplane area, (2)
-Calculate the waterplane coefficient, (2)
-Calculate TPC in saltwater, (2)

b)Why is it important to have a small trim while drydocking? (4)

19a. A ship displacing 7000 t is being dry-docked. Her drafts are F=6.0 m, and A=6.5 m. She has a KG of 6.6 m. Calculate the effective GM when the vessel is flat on the blocks if KM then is 7.0 m and LCF 60 m. MCTC 120 t-m. (5)

b. Explain the parameters required for initialising the approved loadicator. (5)

20. a)A light beam 6 m long is supported at ends A and B. A mass of 12.232 Kg is hung at point C, 2 m from end A. Draw the BM diagrams to scale. (5)

b) Chief officer directs you to prepare passenger ship for inclining experiment .Explain how will you conduct this experiment. (5)

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