Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Naval Architecture – I

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. Explain Simpsons Rule for 3 ordinates. **(10 Marks)**

b. The half ordinates of a water plane 180 m long are as follows:

Section	AP	$\frac{1}{2}$	1	2	3	4	5	6	7	8	9	$9\frac{1}{2}$	FP
$\frac{1}{2}$ ord	0	5.0	8.0	10.5	12.5	13.5	13.5	12.5	11.0	7.5	3.0	1.0	0 m

Calculate :
i) Area of waterplane.
ii) Distance of centroid from midships.
iii) Second moment of area of waterplane about a transverse axis through centroid.
(10 Marks)

2 a. Define DWT, GT, NT, TPC. **(08 Marks)**

b. A ship 140 m long and 18 m beam floats at a drought of 9 m. The immersed cross-sectional areas at equal intervals are 5, 60, 116, 145, 152, 153, 151, 142, 85 and 0 m² respectively.
Calculate : i) Displacement   ii) Block cefficient   iii) Midshipsection area coefficient
iv) Prismatic coefficient. **(12 Marks)**

3 a. Explain wetted surface area and its relation with similar figures. **(12 Marks)**

b. A ship of 120 m long displaces 11000 tonne and has a wetted surface area of 2500 m². Calculate the displacement and wetted surface area of a 6 m model of ship. **(08 Marks)**

4 a. Explain inclining experiment and define, i) Transverse metacentre   ii) Righting lever iii) Righting moment   iv) Centre of gravity. **(12 Marks)**

b. A vessel of 10,000 tonne displacement has a second moment of area of waterplane about centerline of $60 \times 10^3 \, \text{m}^4$. The centre of buoyancy is 2.75 m above the keel. The following are disposition of masses on board the ship.
4000 tonne 6.30 m above keel.
2000 tonne 7.50 m above keel.
4000 tonne 9.15 m above keel
Calculate the metacentric height. **(08 Marks)**

PART – B

5 a. What is free surface effect and methods to reduce it, how it will affect on GM. **(10 Marks)**

b. A ship of 12500 tonne displacement and 15 m beam has a metacentric height of 1.10 m. A mass of 80 tonne is fitted from its position in centre of the lower hold by one of ships derricks and placed on quay 2 m from ships side. The ship heels to a maximum angle of 3.5°, when mass is being moved.
i) Does the GM alter during the operation?
ii) Calculate height of derrick head above the original centre of gravity of the mass.
(10 Marks)

6 a. Explain change in mean draught due to change in density. **(10 Marks)**
b. Explain change in trim due to change in density. **(10 Marks)**

7 a. Explain about docking and docking plan. **(10 Marks)**
b. Write notes on loss of stability due to grounding. **(10 Marks)**

8 a. Write notes on types of resistance. **(12 Marks)**
b. A plate drawn through fresh water at 3 m/s has a frictional resistance of 12 N/m^2. Estimate the power required to overcome the frictional resistance of a ship at 12 knots if the wetted surface area is 3300 m^2 and index of speed is 1 – 9. **(08 Marks)**

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