BT-MRE-V-12.15-1094 Reg.No. | | | | | | | | |

C

B.Tech. Degree V Semester Examination in Marine Engineering December 2015

MRE 1507 NAVAL ARCHITECTURE - I

Time : 3 Hours Maximum Marks : 100

$(5 \times 20 = 100)$

I. (a) Neatly sketch the profile of a modern cargo ship showing various functional regions. What do you understand by 'three island type', 'raised quarter deck' and 'shelter deck type' ships? (10)

(b) Describe the design features of crude oil carriers and chemical carriers. (10)

OR

II. (a) How do you classify commercial vessels? (10)

(b) Explain any five commercial vessels types and their design features. (10)

III. (a) A ship has the following main dimensions and other data. LBP = 131m, beam = 17.4 m, draft = 7.7 m, displacement = 13500 t, load water plane area = 1850 m^2, midship section area = 125 m^2. Calculate: (10)

C_B , C_p, C_M and C_W

(b) A ship has a displacement of 5000t in the light condition with its VCG 6 m above keel. Cargo of 1000 t, 200 t, 5000 t and 3000 t are loaded with their VCGs 0.95 m, 1.1 m, 5.5 m and 9.6 m above keel respectively. Find new displacement and the new VCG. Subsequently, the 3000 t cargo loaded earlier is unloaded. Find the resulting displacement and the new VCG. (10)

OR

IV. (a) A ship length 175 m has the following half ordinates in meters: (10)

Station	0	1	2	3	4	5	6	7	8	9	10
$\frac{1}{2}y$	1.1	7.8	12.1	13.4	13.9	14	13.8	13.5	11.9	7.2	0
Calculate the moment of inertia of water plane about centerline.											

(b) A ship of length 190 m has the following sectional areas, $A_s[m^2]$: (10)

Station	0	1	2	3	4	5	6	7	8	9	10
A_s	5	118	233	291	303	304	304	302	283	171	0
Calculate the displacement and LCB.											

(P.T.O.)

V. (a) Distinguish between angle of list and loll. Two vessels float with an angle. If one among them has a list and the other a loll, device an experiment by which we can distinguish them. (10)

(b) A catamaran is made from two watertight cylinders of 2 m diameter and 6 m length each, joined together. The centres are separated by 4 m. Water level is at the diameter of the cylinders. Calculate the transverse and longitudinal metacentric radius. (10)

OR

VI. (a) What is the purpose of an inclining experiment? Explain the procedure to achieve this. (10)

(b) A ship 5000 t displacement has a rectangular double bottom tank 9 m wide and 12 m long, half full of sea water. Calculate the virtual reduction in metacentric height due to the free surface effect. Suggest a method to reduce this effect. (10)

VII. (a) A ship 120 m long floats at draft 5.5 m forward and 5.8 m aft. If $MCT_{1cm} = 80t - m$, $TPC = 13$ and LCF = 2.5 m forward of midship, calculate new drafts when cargo of 110 t is added 24 m aft of midships. (10)

(b) Comment on the stability while docking and grounding. What precautions are taken while docking? (10)

OR

VIII. (a) A ship of 15000 t displacement has a water plane area of 1950 m^2. It moves from harbor water of density 1.005 t/m^3 to sea water of density 1.025 t/m^3. Calculate change in mean draft. (10)

(b) Define floodable length, permeability, factor of subdivision and criterion of service. (10)

IX. (a) Explain admiralty coefficient and fuel coefficient. What are their uses? A ship of 14000t displacement has a fuel coefficient of 63000. Calculate the fuel consumption per day at 14.5 kn. (10)

(b) Distinguish between frictional and residuary resistance. State the factors affecting them. A ship has a wetter surface area of 3000m^2. Calculate the power required to overcome frictional resistance at 16 kn using Froude's formula. ($n = 2.0, f = 0.4$) (10)

OR

X. (a) Explain various components of resistance. What is Froude's law of comparison? (10)

(b) What is effective power? A 6000 t destroyer develops a total power of 44.74 MW at 30 knots. Assuming that the effective power is 50 per cent of this total power, calculate the resistance of its naked hull. (10)

***