Indian Maritime University,

(A Central University , Govt Of India)

End Semester Examinations - June 2024

B Tech (Marine Engineering)

Naval Architecture II

Subject Code: UG11T3605

Date 15.06.2024 Maximum Marks 70

Time : 3 hours Pass Marks : 35

Part A – 10 MCQs *(10 X 01 Mark). Tick the right answer.*

1.(i) The energy in a wave of height "h" is proportional to.

(a) h (b) h^3 (c) h ^0.5 (d) h^2

(ii) If the propeller is running at "n" revs per second, then the Thrust produced by the propeller will be proportional to.

(a) n (b) n^3 (c) n^ 0.5 (d) n^2

(iii) If the propeller has an effective disc area of A, then the Thrust produced by the propeller will be proportional to.

(a) A (b) A^3 (c) A^0.5 (d) A^2

(iv) Cavitation in propellers is found to be more common in

(a) Arctic region (b) Antarctic region (c) Tropical region (d)none of the above

(v) High speed patrol ships generally have

(a) large rudders (b) small rudders (c) no rudders (d) none of the above.

(vi) The ITTC Model-ship correlation line method of Ship Resistance calculation is based on

(a) Froude's Number (b) Reynold's Number (c) Mach Number (d) Weber Number

(vii) Ocean Waves, as observed have

(a) sharper crests than troughs (b) crests and troughs of equal sharpness

(c) sharper troughs than crests (d) none of the above.

(viii) Among Sea trials of Ships, the Zig-Zag Manouver is also known as

(a) Newton's Manouver (b) Kemp's Manouver (c) Young's Manouver (d) None of the above

(ix) When two geometrically similar ships are run at the same Froude Number, they are said to be running at

(a) Corresponding Speed (b) Critical Speed (c) Matching Speed (d) None of the above

(x) Which of the following is not a Simple Harmonic Motion

(a) Rolling (b) Pitching (c) Heaving (d) Surging

***Part B** – 5 .Write Short Notes on the following. (05 X 02 Marks)*

2. (i) Irregular Waves

(ii) Six Degrees of freedom of a ship

(iii) ITTC

(iv) Voith Schneider Propeller

(v) Augment of Resistance.

***Part C** – 7 Long Questions - Answer Any 5 (05 X 10 Marks)*

(3)

(a)List out the various sea trials carried out in full scale for a newly built ship to check its manouverability. (5)

(b) Describe the "Turning Circle Trial" in detail. (5)

(4) A 6 meter long model of a ship has a wetted surface area of 7 m2, and when towed in Fresh water at 3 knots, has a total resistance of 35 Newton. Calculate the effective power of the ship, 120 m long, at its corresponding speed. n=1.825, f from formula, SCF=1.15 (10)

(5) A ship 150 m long and 19 m beam floats at a draught of 8 meters and has a block co-efficient of 0.68;

(a) If the Admiralty co-efficient is 600, calculate the shaft power required at 18 knots. (5)

(b) If the speed is now increased to 21 knots, and in this speed range resistance varies as speed^3, find the new shaft power. (5)

(6) What are the various methods of ship roll stabilization utilized on board ships. Describe them in brief along with suitable sketches where applicable. (10)

(7) How are waves formed on the Ocean. Which are the variables that influence the formation of a fully developed sea. (10)

(8)

(a) When a ship executes a complete turning circle, the ship is observed to heel to one side. Explain why this happens and with the help of a diagram show which way the ship will heel as a result of the interplay of forces and moments, while the ship is taking a turn. (5)

(b) A ship travelling at 15 knots turns with a radius of 350 meters when the rudder is put hard over. The centre of Gravity is 7 m above the keel, the transverse Metacentre is 7.45 m above the keel and the centre of Buoyancy is 3 m above the keel. If the centripetal force is assumed to act at the centre of Buoyancy , calculate the angle of heel when turning. The rudder force may be ignored. (5)

(9)

(a) Define "Blade Area Ratio" and "Disc Area Ratio" in case of a marine propeller. The Developed Area of the Actual blades of a marine propeller of 5 meter diameter is given as 15 m2 (without the boss area) and 16.5 m2 (inclusive of the boss area). Calculate the Blade Area Ratio and Disc Area ratio applicable in this instance. (5)

(b) A propeller of 4 m pitch has an efficiency of 67% when turning at 125 RPM. The real slip is 36 % and the delivered power is 2800 KW. Calculate the Thrust of the propeller. (5)