

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – June 2023
Programme Name: M Tech (NAOE)
Semester: III
Subject Code: PG11E2301
Subject Name: ADVANCED MARINE CRAFTS

Date: 30.05.2023

Max Marks: 60

Duration: 03 Hrs

Pass Marks: 30

Section A:

10 MCQs of 01 Mark Each = 10 Marks

1. state whether the following is true or false:

In catamarans, High transverse stability due to the space between hulls and GM, the transverse metacentric height will be about ten times higher than a monohull ship. True or false?

- A) True
- B) False

2. Planing surfaces are more efficient:

- A) when they have high wetted beam/length ratio
- B) when they have Low wetted beam/length ratio
- C) when they have Zero wetted beam/length ratio
- D) Above all true

3. A craft at slow speed operates in displacement mode.

- A) True
- B) False

4. An ACV is a craft supported by a mechanically generated air cushion, which lifts the craft by air pressure acting on the bottom of the craft.

5. Advanced Spray rail system is provided to reduce _____

6. Higher froude number requires

- A) High stability
- B) More power
- C) Higher efficiency
- D) Low cost

7. ACVs, SES, and Hydrofoil craft (HYC) all break free from the water surface at cruise speed to reduce wave generation.

8. ACV can operate on water only & SES can operate on different types of surfaces. State whether is it true or false

- A) True
- B) False

9. A hull moving through the water will have several drag forces acting on it. The two principal forces are from:

- A) friction and surface wave making
- B) Speed and friction
- C) Surface wave making and speed
- D) None

10. Seaworthiness is a most important feature in the HPMV family in addition to the high-speed requirement.

Section B:

5 out of 7 Questions of 8 Marks Each = 40 Marks

11.

(a) What are the different drag components of an ACV? Explain about each component. [4Marks]

(b) What are the hydrodynamic advantages of using twin hulls (catamaran) for high speed crafts? [4Marks]

12.

(a) Explain about some Hull Characteristics which affect Planing Performance. [4Marks]

(b). What are the different Planing Hull Series available? [4Marks]

13. Discuss the advantages and disadvantages of controllable pitch propellers? [8Marks]

14. List and discuss marine materials used for constructing high performance crafts with neat sketches of various composites. [8Marks]

15. Explain the working of an M-craft, highlighting its main features with the help of suitable sketches. [8Marks]

16. Discuss WIG high-speed craft design considerations? [8Marks]

17. What is cavitation? How does it affect the performance of a propeller?

Section C:

1 out of 3 Questions of 10 Marks Each = 10 Marks

18.

(a) Derive the expression for the drag on a flat planing surface. [3Marks]

(b) When is a planing hull said to be in equilibrium? With the help of a neat sketch, write down the general equations for equilibrium of a planing craft. Derive the equilibrium equation for the case when the thrust axis is parallel to the keel. [7Marks]

19. Explain:

(a) What are the design considerations taken into account while designing propellers and propulsion fans for Air Cushion Vehicles? [5Marks]

(b) Discuss the working principle behind a hydrofoil craft. What could be a limiting case to its performance? [5Marks]

20. What are Hybrid crafts? List the different concepts of Hybrid craft and explain in detail the characteristics of any four crafts with neat sketches. [10Marks]

