Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – December 2024

Programme Name: DNS

Semester: 1

Subject Code: UD11T6103

Subject Name: PHYSICS

Date: 11.12.2024 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 respective section.

Section A(01 x 10 = 10 marks)

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. A couple consists of a pair of forces that are
A) Equal in magnitude B) Opposite in direction C) Perpendicular to the distance between them D) All of these

2. The flow is laminar when Reynolds number (Re) is
A) less than or equal to 2000 B) between 2000 and 4000 C) Equal to 4000 D) Greater than 4000

3. Echo Sounder works on the principle of _____ of sound waves.
A) Refraction B) Reflection C) Diffraction D) Scattering

4. The amount of thermal energy needed to trigger a phase change without altering the substance's temperature is _____.
A) Sensible heat B) Specific heat C) Latent heat D) None of these

5. Which type of radio wave propagation is considered for line-of-sight (LOS) communication?
A) Space Wave B) Ground Wave C) Sky Wave D) Surface Wave

6. Which of the following uses the principle of Total Internal Reflection?
A) Periscope B) Azimuthal mirror C) Mirage D) All of these

7. Ohm's law is not applicable in which of the following elements?
A) Non-linear B) Linear C) Bilateral D) Resistive

8. The coils are tightly coupled when the value of Coupling Coefficient is _____.
A) 0 B) 0.5 C) 1 D) 100

9. RADAR stands for _____.
A) Risk Detection and Ranging B) Radio Detection and Ranging
C) Real Detection and Ranging D) Random Detection and Ranging

10. The process of recovering message from the modulated carrier is known as _____.
A) Modulation B) Amplification C) Rectification D) Demodulation

Section B

Five Questions of 02 Marks each

11. State the law of floatation.
12. Define Doppler effect.
13. Define Total Internal Reflection.
14. State Joule's law of heating.
15. Define transducer and its uses.

Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

16.a) State Archimedes principle. How can Archimedes' principle be applied in designing ships and submarines? (7)

b) A rock of mass 12 kg is lifted to a height of 50 meters. Calculate the gravitational potential energy gained by the rock. (3)

17.a) What are the three mechanisms of heat transfer? (7)

b) A sound source emitting a frequency of 400 Hz is moving towards a stationary observer at a speed of 15 m/s. If the observer is moving towards the source at a speed of 10 m/s and the speed of sound is 340 m/s, what frequency does the observer hear? (3)

18.a) What is a hatch cover? Why are hatch covers important on ships? (7)

b) A research vessel uses an echo sounder and records a depth of 1200 m. If the speed of sound in water is 1450 m/s, how long does it take for the echo to return? (3)

19.Explain the skywave and space wave propagation of radio waves in detail. (10)

20.a) How does total internal reflection work in optical fibers? What are some practical applications of total internal reflection? (7)

b) How much heat is required to melt 200 g of ice at 0°C into water at 0°C? (The latent heat of fusion of ice is L_f=334 J/g). (3)

21.a) State ohms law. Can Ohm's Law be applied to both AC and DC circuits? (7)

b) A battery with an emf of 12V has an internal resistance of 1 Ω. If the battery is connected to a load resistance of 3 Ω, calculate the current flowing through the circuit. (3)

22.a) Explain with neat block diagram the working of Radio transmitter and receiver. (7)

b) An antenna has a power input of 120 W and radiates 50 W in a specific direction. Calculate the antenna gain. (3)