

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – June 2024
Programme Name: Diploma in Nautical Science
Semester: I
Subject Code: UD11T5102
Subject Name: Applied Sciences

Date: 29.05.2024

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

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

1. A homogeneous solid sphere has mass of 20 kg. Its radius of gyration about a diameter is 10 cm, moment of inertia will be
(a) 0.2 kg/m^2 (b) $0.2 \text{ kg}^2 \text{ cm}$ (c) 0.2 g cm^2 (d) 0.2 kg m^2
2. The time period of simple pendulum at mean surface of the earth for the pendulum length of 1 m is nearly
(a) 2 sec (b) 1 sec (c) 3 sec (d) 20 sec
3. If the equation of SHM is $Y = a \sin (2\pi nt + a)$, then its initial phase is
(a) $2\pi n$ (b) 0 (c) a (d) $2\pi nt + a$
4. 1°C temperature corresponds to
(a) 11.8 F (b) 22.8 F (c) 33.8 F (d) 44.8 F
5. An Ultrasonic wave is sent from a ship towards the bottom of the sea. It is found that the time interval between the sending and receiving of the

wave is 3.2 sec. What is the depth of the sea, if the velocity of sound in the seawater is 1400 m/sec?

- (a) 1400 m (b) 2240 m (c) 8960 m (d) 1240 m

6. In the case of water and turpentine as a medium, the mass density of an optically denser medium is ----- the mass density of optically rarer medium?

- (a) greater than (b) lesser than (c) equal to (d) None

7. An electric current of 10 A is the same as _____.

- (a) 10 J/C (b) 10 V/C (c) 10 C/sec (d) 10 W/sec

8. Resistivity of a wire depends on _____.

- (a) length of wire (b) cross section area
(c) material (d) all of the mentioned

9. What is the strength of magnetic field known as _____

- (a) flux (b) density
(c) magnetic strength (d) magnetic flux density

10. Outside the magnet, magnetic Field lines move from _____

- (a) north to south (b) south to north
(c) west to east (d) east to west

Section B

Five Questions of 02 Marks each

(5X2=10)

11. State Parallel Axis Theorem
12. Define SHM.
13. State the phenomenon for total internal reflection to takes place.
14. Define Voltage and Power.
15. State Faraday's law of electromagnetic induction.

Section C

Answer any five from the following seven Questions.

(5X10=50)

16. a) Explain the two fundamental properties of Gyroscope. (7)

b) A Lamp load of 1000Ω resistance is connected across the DC supply of 25 V. What is the power absorbed in lamp and what amount of heat will be released in 10 sec. (3)

17.a) homogenous solid sphere has a mass of 20kg. Its radius of gyration about a diameter is 10 cm. Find its Moment of Inertia, angular momentum and kinetic energy, when it is rotating about a diameter at 120 r.p.m. (3)

b) State ohm's law and discuss its limitations and application.(7)

18.a) Calculate the coil inductance when a current of 4 A in a coil of 800 turns produces a flux of 5 mWb linking with the coil. (3)

b) State the principle and explain the construction and working of AC Generator. (7)

19.a) Determine period of a 1m pendulum at the mean surface of the earth. If these pendulums are taken to the mean surface of the moon where $g=1.67\text{m/s}^2$, determine the period. (5)

b) Explain the Anomalous expansion of water. How is it useful for aquatic life? (5)

20.a) Explain the characteristics of sound with examples. (5)

b) Define Damped oscillation and Resonance. (5)

21.a) Discuss the construction and working of Optical fibre with the help of a diagram. (5)

b) Write a short note on Radio receivers. (5)

22.a) An object 10cm high is placed on the axis & 10cm from the pole of a concave mirror of focal length 15 cm, find the nature and position of the image. (4)

b) Write a short note on Transducers. (6)

TMM