Indian Maritime University

(A Central University, Govt of India)

Mar/Apr'26 SE

Programme Name: DNS

Semester: I

Subject Code: UD11T6103

Subject Name: PHYSICS

Date: 14.03.2026	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 of 01 Mark each – Choose the correct answer as applicable.

1. Which of the following describes the principle underlying gyroscope's operation

a) Pascal's law
b) Archimedes principle
c) conservation of energy
d) conservation of angular momentum

2. Find out the energy in a fluid involved in the Bernoulli's theorem

a) pressure energy
b) potential energy
c) kinetic energy
d) all the above

3. Pick out the property of transverse wave

a) consists of compressions and refractions
b) change in density throughout the medium
c) the particles of the medium vibrate at right angles to the direction of wave propagation
d) all the above

4. The audible range of sound for an average human being is

a) 2Hz – 20Hz
b) 20Hz – 200Hz
c) 20Hz – 2000Hz
d) 20Hz – 20,000Hz

5. Of these rays, which one is not an electromagnetic wave?

a) gamma rays b) X rays
c) beta rays d) heat rays

6. The phenomenon of splitting of a beam of white light into its constituent colours on passing through the prism is ----------.

a) reflection b) refraction
c) dispersion d) diffraction

7. Ohm's law is not applicable for

a) non ohmic conductors b) nonlinear elements
c) unilateral devices d) all the above

8. Lenz's law is used to find out

a) magnitude of induced emf b) direction of induced emf
c) both a and b d) magnitude of opposition energy offered

9. The recreation of non-electrical form of message signal is carried by

a) transmitter b) receiver
c) channel d) amplifier

10. In a venturimeter, the pressure recovery in the fluid flow direction occurs in the ----------.

a) inlet section b) convergent section
c) cylindrical throat d) divergent section

Section B

Answer all Questions. **(5 X 2 Marks = 10 Marks)**

11. Define the term "Gyro inertia".
12. State Charles's law.
13. What is the purpose of the two mirrors in a sextant?
14. What is static electricity?
15. List out the operations involved in the transmitter of a communication device.

Section C

Answer any 05 questions out of 07 questions. (5X10 Marks = 50 Marks)

16. a) State Pascal's Law. Explain how it is useful for the operation of hydraulic lift. **(7 Marks)**

b) A thin metal ring of diameter 0.8m and mass 1 Kg starts from the rest and rolls down on inclined plane. Its linear velocity on reaching the foot

of the plane is 4 m/s. Calculate the moment of inertia of the ring and the kinetic energy of rotation of that instant. **(3 marks)**

17. a) What is buoyant force? State the laws of flotation. **(4 Marks)**

b) Using a clear block diagram, describe how reflection is used in echo sounder for depth measurement. **(6 Marks)**

18. a) Discuss the following instances of relative motion between the source and the listener by stating Doppler's effect.
i) source is approaching a stationary listener
ii) listener approaching a stationary source
iii) both source and listener are moving away from each other
(7 Marks)

b) Determine how much heat is gained by 70g of mercury when its temperature rises from 23^0C to 55^0C. Given that the specific heat capacity of mercury is 1.39 J / g^{0}C. **(3 Marks)**

19. a) Describe various modes of radio wave propagation with neat sketch. **(7 Marks)**

b) Calculate the critical angle for the glass water interface if the refractive indices of the glass and water are 5/3 and 4/3 respectively. **(3 Marks)**

20. a) A 50W, 220V rated lamp is connected in series with 40W, 200V rated lamp across 230V supply. Calculate the current taken, voltage across each lamp, power given by the lamps. Assume that the resistance of the lamps remains constant. **(3 Marks)**

b) State and explain Kirchhoff's laws by relating with their fundamental principles. **(7 Marks)**

21. a) Two identical coils A and B of 900 turns each lie in parallel planes. A current of 4A in coil A produces 0.4mwb of flux in it. The coupling coefficient between the coils is 0.7. Determine the self-inductances and the mutual inductance of the arrangement. **(3 Marks)**

b) Discuss the features of Yagi uda antenna in detail. **(7 Marks)**

22. a) Explain the working of RADAR transmitter and receiver with neat sketch. **(7 Marks)**

b) What is thermistor? Mention the feature of NTC thermistor with graphical representation. **(3 Marks)**