

INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)
End Semester Examination Dec 2019/Jan 2020
DNS - Diploma in Nautical Science
Semester -I
UD11T3102 - Applied Sciences

Date: 10.12.2019

Max Marks: 70

Time: 2 Hours

Pass Marks: 35

Part– A (Physics) (4 x 10 = 40)

Answer any four out of the following five questions.

- Q.1 a) Define moment of inertia and state theorem of parallel axis for calculating moment of inertia of a rotating body. (5 marks)
- b) If a ship moving northwest at 15 knots and a second ship moving due east at a speed of 7 knots. Determine the magnitude and direction of the second ship with respect to the first ship. (5 marks)
- Q.2 a) Discuss principle, construction and working of a liquid-in-glass thermometer. (5 marks)
- b) What mass of ice at 0°C will be required to cool 900g of water from 35°C to 10°C? Assume that all ice melts. Specific heat capacity of water is 4.2 J/g/°C, latent heat of fusion of ice is 336 J/g. (5 marks)
- Q.3 a) Discuss the horizontal spring system executing simple harmonic motion (SHM) in detail. (5 marks)
- b) A particle of mass 0.8kg is executing SHM with amplitude of 1m and periodic time of 11/7s. Calculate the velocity and kinetic energy of the particle at the instant when displacement is 0.6m. (5 marks)
- Q.4 a) What are the factors affecting the velocity of sound in seawater, and how? (5 marks)
- b) A train passes a person standing beside the track, at a speed of 30m/s. The frequency of its whistle is 2000Hz. What will be the frequency of the whistle, heard by the person as, i) the train approaches and as ii) the train recedes? (5 marks)
- Q.5 a) Explain total internal reflection (TIR) and one of its applications in detail. (5 marks)
- b) An object is placed at a distance of 6m from a convex mirror of focal length 12cm. Where shall the image be formed and what will be its magnification? (5 marks)

Part – B (Electricity and Electronics)

Answer any three out of the following four questions.

- Q.6 a) Define resistance of a conductor. What are the factors affecting it? What is the effect of temperature on resistance? (5 marks)
- b) A magnetic field is produced by a coil of 300 turns, wound on a closed iron ring. The ring has a cross-section of 20m^2 , mean length 120 cm. The permeability of iron is 800. If the current, flowing through the coil is 10A, find the energy stored in the magnetic field. (5 marks)
- Q.7 a) Define capacitance of a capacitor. Derive expressions for the resultant capacitance of a combination of capacitors, in i) series and ii) parallel. (5 marks)
- b) Discuss principle and construction of a DC generator in detail, with the help of a neat and labeled diagram. (5 marks)
- Q.8 a) What is a transformer? Explain its principle, construction and different types. (5 marks)
- b) Explain how a galvanometer can be transformed into an ammeter and into a voltmeter. (5 marks)
- Q.9 Write note on **any two** of the following: (5 x 2 = 10 marks)
- a) Sky wave propagation
 - b) Radio transmitters
 - c) Transducers (with example)