

INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)
END SEMESTER EXAMINATIONS-DECEMBER 2018
B.Sc. (Nautical Science)
Semester-I
Nautical Physics (UG21T4103)

Date: 02.01.2019
Time: 3 Hrs

Maximum Marks: 70
Pass Marks: 35

Note: Question No.1 is compulsory

Answer any 6 questions from remaining 8 questions (each of 10 Marks).

Scientific Calculator is permitted if required.

Q1. Give Short Answers. (5×2 = 10 marks)

- (a) Give statement and formula for first law of thermodynamics.
- (b) Define critical angle.
- (c) State the formula for Doppler effect when observer is moving towards stationary source.
- (d) State Newton's law of gravitation.
- (e) Define cohesive and adhesive force.

Q2. (a) What is hygrometer? State the principle, construction and working of wet and dry hygrometer. (5 marks)

(b) What mass of ice at 0° C must be added to 100 g of water at 17° C to lower the temperature to 0° C? (Specific heat capacity of water is 4.2J/g and latent heat of ice is 340J/g). (5 marks)

Q3.(a) With the help of neat diagram explain the working of prism Binocular. (5 marks)

(b) A glass lens with focal length +10 cm in air and refractive index 1.5 is immersed in water. Calculate its focal length in water. (μ of water is 1.33). (5 marks)

Q4. (a) Explain the concept of Echo sounder. (5 marks)

(b) A Boat approaching to a port with siren at a frequency of 1125 Hz. Determine frequency that would heard by a pilot on port when about is moving towards the port at the speed of 29m/s and when a boat moves away from the port with same speed. Show the illustration also.(speed of sound=343 m/s).(5 marks)

Q5.(a) Explain the terms mechanical advantage, velocity ratio and efficiency of machine. Derive relation between them. (5 marks)

(b) Determine linear velocity of a solid cylinder of mass 3 Kg when it is rolling on a horizontal surface with total kinetic energy of 14.06 J. (5 marks)

Q6. What do you understand by streamline and turbulent flow of liquids? Give two applications of Bernoulli's theorem. (10 marks)

Q7. (a) Explain the concept of refrigerator and Define coefficient of performance. (5 marks)

(b) What is LASER? With the help of diagram explain the construction of He-Ne laser. (5 marks)

Q8. (a) What is atmospheric pressure? State the formula for determination of atmospheric pressure. What is value of atmospheric pressure in mmHg. (5 marks)

(b) What is significance of Reynolds number? For cylindrical pipes, Reynolds number is nearly 2000. If the diameter of a pipe is 2 cm and water flows through it, determine the critical speed of the flow. (η for water is 10^{-3} N s/m² and ρ for water is 1×10^3 Kg/m³) (5 marks)

Q9.(a) Define angle of dip, Variation, Total field intensity of earth magnetism. (5 marks)

(b) Calculate the total field of the earth at a place where the value of angle of dip is 30° and Earth's horizontal component $H = 0.48$ gauss. (5 marks)

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