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INDIAN MARITIME UNIVERSITY
(A Central University Government of India)
END SEMESTER EXAMINATIONS- JUNE 2019
DIPLOMA IN NAUTICAL SCIENCE
SEMESTER - I
APPLIED SCIENCES (UD11T1102)

Date: 25-06-2019

Max. Marks: 70

Time: 02 hours

Pass Marks: 25

Instructions:

- (i) This question paper consist of two sections.
- (ii) Use separate answer sheets for each section.

SECTION 'A' (Physics)

Answer any 7 questions from following 9 questions [7×5 = 35]

1. State Newton's second law of motion and obtain the relationship between force, mass and acceleration. State SI unit of force and its dimension. (5 Marks)
2. State and prove theorem of Parallel axis. (5 Marks)
3. A piece of metal 400 g is heated to 100°C and then quickly transferred to a copper calorimeter of mass 200 g and of specific heat capacity 380 J/kg°C containing 250 g of water at 25°C. The final temperature is found to be 40°C. Find the specific heat capacity of the metal. Specific heat capacity for water is 4200 J/kg°C. (5 Marks)
4. What is anomalous expansion of water? How it is useful? (5 Marks)
5. Explain damped and undamped oscillation. (5 Marks)
6. Two trains travelling in opposite directions on parallel tracks at 100 kmph each, cross each other. One of them is whistling a note of frequency 800 Hz. Find the apparent pitch as heard by the passenger in the other train.
 - (a) Before they cross each other
 - (b) After they cross each otherVelocity of sound is 340 m/s. (5 Marks)
7. Mention differences between Transverse & Longitudinal Waves. (5 Marks)
8. When an object is kept at a distance of 30 cm from a convex mirror, image is formed at 10 cm from the mirror. If the object distance is doubled where will the image be? (5 Marks)
9. Write short notes on prism binoculars. (5 Marks)

SECTION 'B' (Chemistry)

All questions are mandatory [35 Marks]

1. Solve following questions:
 - (a) What are quantum numbers? State the four quantum numbers. (3 Marks)
 - (b) Define isotopes, isobars and isotones (3 Marks)
 2. Give any three characteristics of d-block element. (3 Marks)
 3. Define Melting point and Boiling point. Explain effect of 'Pressure' and 'Molecular Weight' on Melting point or Boiling point. (6 Marks)
 4. A 100-ft³ volume of nitrogen at 27 °C and 15 lb/in² is compressed to fill a tank that is initially empty and has a volume of 5 ft³. If the final temperature of the nitrogen is 17 °C, what is the absolute pressure in the tank? (3 Marks)
 5. Define the following terms:
 - (a) Biochemical Oxygen Demand (BOD)
 - (b) Chemical Oxygen Demand (COD) (4 Marks)
 6. An organic compound containing 40% carbon, 6.66% hydrogen, 53.34% oxygen if the vapour density is 90. Calculate the molecular formula of compound. (4 Marks)
 7. Complete the following reactions: (3 Marks)
 - (a) $2\text{C}_2\text{H}_5\text{OH} + 2\text{Na}$
 - (b) $\text{C}_2\text{H}_5\text{OH} + \text{CH}_3\text{COCl}$
 - (c) $\text{CH}_4 + \frac{1}{2} \text{O}_2$
 8. Explain briefly Greenhouse effect. (3 Marks)
 9. Explain briefly general preparation of Alcohols (3 Marks)
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