INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

End Semester Examination Dec 2019/Jan 2020

DNS - Diploma in Nautical Science

Semester -I

UD11T2102- Applied Sciences

Date: 10.12.2019 **Max Marks: 70**

Time: 2 Hours **Pass Marks: 25**

Note: Solve any four questions from Section A and any three questions from Section B. All questions carries equal marks.

PART – A

1. a) State the theorem of parallel axis and perpendicular axis. (5 marks)

   b) At what height above the earth will be acceleration due to gravity by one-fourth of that on the surface of the earth? (5 marks)

2. a) State Newton's first, second and third law of motion. (5 marks)

   b) A constant retarding force of 60N is applied to a body of mass 20 kg moving initially with a speed of 18m/s. How long does the body take to stop? (5 marks)

3. a) Explain the different modes of heat transfer. (5 marks)

   b) Calculate the amount of heat required to raise the temperature of 50g of copper from 10 degree to 60degree C. The specific heat capacity of copper is 0.39J/g ^{o} C. (5 marks)

4. a) What is Anomalous expansion of water ? How is it useful to aquatic life? (5 marks)

   b) How much ice at 0^{o}C should be added to 250 g of water so as to reduce its temperature from 35 ^{o}C to 25 ^{o}C. Latent heat of ice is 3360 J/g and specific heat of water is 4.2 J/g ^{o}C (5 marks)

5. a) Define damped, forced oscillations and frequency. (5Marks)

   b) A simple pendulum swings 4 oscillations in the same time as another 0.48m longer swings 3 oscillations. Determine their lengths.

   (5Marks)

PART - B

6. a) Define Doppler effect in sound. Discuss two cases when the listener is stationary and source is in motion. (5Marks)

   b) A stationary car sounds its horn. A child rides away from it at the rate of 2m/s. If the horn sounds a note of frequency 300 Hz, what frequency does the child hear? Assume velocity of sound to be 340m/s. (5Marks)

7. a) Explain the different parameters which effect the velocity of sound in air. (5Marks)

   b) A sound intensity of about 1.2 W/m^2 can produce pain in the ear. What is its equivalent in decibels? (5Marks)

8. a) Explain the working of Optical fibre with the help of diagram. (5Marks)

   b) Calculate the critical angle for a glass-water interface if the refractive indices of glass and water are 3/2 and 4/3 respectively. (5Marks)

9. a) Define critical angle and explain the phenomenon of total internal reflection. (5Marks)

   b) An object is placed at a distance of 20 cm from the pole of a concave mirror. If the focal length of the mirror is 10cm, find the nature and position of the image. (5Marks)

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