INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

December 2016 End Semester Examinations
Diploma in Nautical Science - First Semester (2015 batch onwards)

Applied Sciences (UD11T3102)

Date : 15.12.2016 **Maximum Marks: 70**
Time: 2 Hrs **Pass Marks : 35**

Note : Answer any four question from section A, any two from section B and any 1 from section C.

SECTION –A

(Physics)

1. a) Derive the expression of processional frequency of gyroscope. (5)
   b) A boat moves at a steady speed of 8 m/s. if the water resistance of the motion of the boat is 2000N calculate the power of the engine. (5)

2. a) Explain the basic refrigeration cycle. (5)
   b) The density of mercury is 13.6 g cm^{-3} at 0°Cand if its coefficient of cubical expansion is 1.82 x 10^{-4} °C. Calculate the density of mercury at 50 °C. (5)

3. a) Explain:
      i) Free and forced vibrations
      ii) Damped and undamped oscillations (5)

   b) The equation of an oscillating particle is given by $x = 2 \sin (\pi t/2 + \pi/4)$ where x is in cm and t is in seconds. Find (i) period of the oscillation (ii) maximum velocity (iii) maximum acceleration (iv) Initial displacement. (5)

4) a) Explain how different factors affect the velocity of sound in air. (5)

   b) A locomotive approaches and passes a person standing beside the track at 30 m/s. Its whistle is emitting a note of frequency 2000Hz.What frequency will the person hear
      i) As the train approaches
      ii) As it recedes? (5)

5) a) What is mirage? Explain mirage on land and at sea. (5)

   b) Monochromatic light of wavelength 600 nm is incident from air on a glass surface. What are the wavelength, frequency and speed of the refracted light?
   take μ of glass as 1.5 (5)

SECTION-B
(Electricity

6. (a) Explain working principle of DC generator with neat sketch. (4)
   (b) Explain effect of temperature on resistance. (3)
   (c) Calculate the highest speed at which alternator can operate for the frequency of 50 Hz and 60 Hz. (3)

7. (a) Explain working principle of galvanometer with neat sketch. (4)
   (b) Give comparison between core and shell type transformers. (3)
   (c) List out three dangers of electricity and explain any one. (3)

8. (a) What is MMF produced when 10A is passed through a conductor having 12 turns. (3)
   (b) List out various methods to control static electricity and explain any one. (4)
   (c) Explain limitations of Ohm's law. (3)

SECTION-C
(Electronics)

9. (a) Explain pulse radar with neat sketch (5)
   (b) What is fading and how it could be avoided. (5)

10. (a) List out various temperature sensors and explain any one. (5)
    (b) Explain super heterodyne receiver with neat sketch. (5)

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