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B.Sc. (NAUTICAL SCIENCE)

Term-End Examination

June, 2011

BNA-012 : APPLIED SCIENCE

Time : 2 hours *Maximum Marks : 70*

Note : (i) *This question paper consists of two sections.*
Section A and Section B.

(ii) *Use of non-programmable scientific calculator is allowed.*

(iii) *Attempt all questions.*

SECTION - A

1. Attempt *all* parts : 5x1=5

   (a) Dioptre is the unit of _____.

   (b) What is the audible range of average human ear ?

   (c) Latent heat of fusion of ice is _____.

   (d) Acceleration due to gravity below the earth surface _____ as the depth increases.

   (e) Give one example of Simple Harmonic Motion.

2. Attempt *any two* parts : 2x5=10

   (a) Explain Doppler effect in detail ?

(b) Light enters from air to glass having refractive index 1.50. What is the speed of light in the glass ? The speed of light in vacuum is 3×10^8 m/s.

(c) Define :
   (i) Black body radiation.
   (ii) Coefficient of real and apparent expansion.

3. Attempt *any two* parts :   2x5=10
   (a) What is the length of a simple pendulum which ticks seconds ?
   (b) When 0.15 kg of ice at 0°C is mixed with 0.30 kg of water at 50°C in a container, the resulting temperature is 6.7°C. Calculate the heat of fusion of ice. Given $S_{water} = 4186$ J kg^{-1} K^{-1}.
   (c) Define :
       (i) Work   (ii) Torque

4. Attempt *any two* parts :   2x5=10
   (a) Explain the formation of image in convex lens using ray diagram.
   (b) Mass of an object is 10 kg. What is its weight on the earth ?
   (c) A ship sends out ultrasound that returns from the seabed and is detected after 3.42 s. If the speed of ultrasound through sea water is 1531 m/s, what is the distance of the seabed from the ship ?

SECTION - B

5. Attempt *all* parts :   1x5=5

    (a) Atomic number of oxygen is _____

    (b) Name the type of bond which involves lone pair of electrons.

    (c) Name two gaseous air pollutants.

    (d) Give the reaction of methane with oxygen.

    (e) Dimethyl ketone is commonly known as _____.

6. Attempt *any two* parts :   2x5=10

    (a) Explain greenhouse effect.

    (b) What are the sources and uses of aromatic hydrocarbons ?

    (c) Define :

        (i)   Vapour pressure

        (ii) Volatile and non - volatile cargoes.

7. Attempt *any two* parts :   2x5=10

    (a) What are quantum numbers ? Give all possible values of l, m and s for n = 3.

    (b) Define exothermic and endothermic reactions with examples.

    (c) Give two properties and applications of Ethanol.

8. Attempt *any two* parts :   2x5=10

(a) Why carbon monoxide is considered very toxic air pollutant ?

(b) What are the hazards associated with sour crude oil containing hydrogen sulphide ?

(c) Give the I. U. P. A. C name of the following compounds.

(i) $CH_3 - CH - CH_2 - CH_3$
           $|$
          Cl

(ii) $CH_3 - CH_2 - CH - CH_2 - COOH$
                    $|$
                   OH

(iii) $CH_3 - CH - CH_2 - CH - CH_3$
           $|$ $|$
          OH Cl

(iv) $CH_3 - CH_2 - CH_2 - CHO$

(v) $CH_3 - O - CH_2 - CH_3$

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