

B.Sc. (NAUTICAL SCIENCE)

Term-End Examination

June, 2010

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) Why do stars twinkle on a clear night ?
 - (b) Name any two types of the wave motions.
 - (c) What is the unit of force in cgs system ?
 - (d) What are the three modes of transference of heat ?
 - (e) The time period of simple pendulum is given by _____.

2. Attempt *any two* parts : 2x5=10
 - (a) With the help of ray diagram, show the construction and working of a telescope.
 - (b) Explain Doppler effect in light. Give its two applications.

- (c) The heart of a man pumps 4 litre blood per minute at a pressure of 130 mm of Hg. Taking the density of mercury as 13.6 g/cm^3 , calculate the power of the heart.

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

- (a) Define :
- (i) Co-efficient of real expansion.
 - (ii) Conduction.
- (b) Define weight, gravitational force and gravity.
- (c) When light goes from a certain substances into air, the critical angle is 30° . What is the refractive index of the substance ?

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

- (a) Define Couple. Give properties and expression for moment of couple.
- (b) A metal rod of length 50 cm and diameter 2 cm is covered with a non-conducting substance, one of its end is maintained at 100° C , while the other end terminates in a vessel containing ice. It is found that 23.5 gm of ice are melted in 10 min. Calculate k for the metal. ($L = 80 \text{ cal/gm}$).
- (c) Obtain an expression for the velocity of sound in a gas using Newton's formula and Laplace correction. What is the effect of temperature on the velocity of sound in air ?

SECTION - B

5. Attempt *all* parts : **5x1=5**
- (a) What is the temperature in kelvin and pressure in milli bar at S. T. P. ?
 - (b) The reaction in which heat is evolved is called _____.
 - (c) The temperature below which wax, diesel or fatty acids form a cloudy appearance is called _____.
 - (d) Give one example each of volatile and non-volatile cargoes.
 - (e) Name any four heavy metals which are water pollutant.
6. Attempt *any two* parts : **2x5=10**
- (a) What are air pollutants ? Explain the toxic effect of CO.
 - (b) Give two properties and two applications of ethyl alcohol.
 - (c) What is meant by chemical bonding ? Explain the bonding in NaCl.
7. Attempt *any two* parts : **2x5=10**
- (a) Give the construction and the reactions involved in a storage cell.

- (b) (i) Give three uses of acetylene
- (ii) Define upper and lower flammable limits.
- (c) Differentiate between :
 - (i) Physical and chemical changes.
 - (ii) Oxidation and reduction reactions.

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

- (a) What are the sources and uses of aromatic hydrocarbons ?
 - (b) 15.2 litres of a gas are collected at 21° C and at a pressure of 868 mm of Hg. Calculate the volume of the gas at S. T. P.
 - (c) Write I.U.P.A.C as well as common names of the following compounds.
 - (i) CH_3CHO
 - (ii) CH_3COCH_3
 - (iii) $\text{CH}_3\text{CH}_2\text{OH}$
 - (iv) CHCl_3
 - (v) CH_4
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