

Total No. of Questions : 12] [Total No. of Printed Pages : 4

[3761]-107

F. E. (Semester - II) Examination - 2010

APPLIED SCIENCE - II

(June 2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions :

- (1) Answer **three** questions from section I and **three** questions from Section II.
- (2) Answers to the **two sections** should be written in **separate books**.
- (3) Black figures to the right indicate full marks.
- (4) Neat diagrams must be drawn wherever necessary.
- (5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- (6) Assume suitable data, if necessary.

Constants : $h = 6.63 \times 10^{-34}$ J.s.
 $c = 3 \times 10^8$ m/s.
 $m_e = 9.1 \times 10^{-31}$ kg
 $m_p = 1.67 \times 10^{-27}$ kg
 $e = 1.6 \times 10^{-19}$ C



SECTION - I

- Q.1) (A) Write a note on Proximate Analysis of Coal. [07]
- (B) What is Rocket Propellant ? Explain different types of Propellants used in Rocket. [06]
- (C) Observations in the Boy's gas calorimeter experiment on a gaseous fuel are given below, find the G.C.V. and N.C.V. of the Fuel.

Volume of Gas burnt (STP) = 0.08 m^3

Mass of Cooling Water used = 29.5 kg

Rise in temperature of circulating water = 9.1°C

Mass of steam condensed = 0.04 kg [04]

OR

Q.2) (A) Describe how the calorific value of a solid fuel is determined using Bomb calorimeter. [07]

(B) A sample of coal requires 20% excess air for complete combustion. Calculate weight of air for 250 gm of the coal, if its composition is C = 81%, H = 4%, N = 1.5%, S = 1.2%, O = 3%, ash = 9.3%. [06]

(C) Write the Chemical Reactions for :

(1) Production of Hydrogen gas by steam reforming of hydrocarbons.

(2) Production of Biodiesel. [04]

Q.3) (A) Explain the factors affecting the Corrosion. [07]

(B) Explain electrochemical corrosion in acidic and basic medium. [06]

(C) Explain cathodic protection of metals. [04]

OR

Q.4) (A) Define corrosion. Explain Atmospheric corrosion by Oxygen for Sodium, Aluminium and Silver. [07]

(B) Explain corrosion of Zinc coated steel and Tin coated steel. Which is more protective ? Why ? [06]

(C) Describe electroplating of metals. [04]

Q.5) (A) What is alkalinity of water ? State the types of alkalinities. How alkalinity in a water sample is determined ? [06]

(B) Explain :

(1) Supercooled water and metastable equilibrium in water system.

(2) Triple Point in Water System. [06]

(C) Find the number of phases and number of components in the following :

(1) Solution of Sodium Chloride in Water

(2) Mixture of N₂ and O₂ Gases [04]

OR

