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

APPLIED SCIENCE - II

(CHEMISTRY)

(2008 Pattern)

Time : 2 Hours]

[Max. Marks : 50

Instructions :

- (1) All questions are compulsory.
- (2) Black figures to the right indicate full marks.
- (3) Neat diagrams must be drawn wherever necessary.
- (4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- (5) Assume suitable data, if necessary.

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- Q.1) (A) Explain different types of Calorific Values of Fuel. How it can be determined by using Boy's Gas Calorimeter. [07]
- (B) Explain Octane Number and Cetane Number of Fuel. [06]
- (C) One gram of coal sample was burnt in oxygen. Carbon Dioxide was absorbed in KOH and water vapour in  $\text{CaCl}_2$ . The increase in weight of KOH and  $\text{CaCl}_2$  was 3.157 and 0.504 gm respectively. Determine %C and %H in the sample. [04]

OR

- Q.2) (A) Explain in brief the process with diagram for distillation of Crude Petroleum. Give composition, boiling range and uses of any three fractions obtained. [07]
- (B) Give composition, properties and applications of :
- (a) CNG
  - (b) LNG [06]

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- (C) Volumetric Analysis of Producer Gas is  $H_2 = 20\%$ ,  $CO = 22\%$ ,  $N_2 = 50\%$ ,  $CH_4 = 2\%$ ,  $CO_2 = 6\%$ .

Find volume of air required for complete combustion of  $1m^3$  of gas. [04]

- Q.3)** (A) Explain mechanism of corrosion by oxygen with respect to Mg, Au, Cr and Mo metals and state Pilling - Bedworth Rule. [07]
- (B) Explain  $H_2$  Evolution and  $O_2$  Absorption Mechanism. [06]
- (C) Why Anodic Coatings are better than Cathodic Coatings ? [04]

OR

- Q.4)** (A) Discuss various factors affecting Corrosion. [07]
- (B) Explain Galvanic Corrosion with the help of Galvanic Series. [06]
- (C) Write a note on Electroplating. [04]

- Q.5)** (A) What are the causes, disadvantages and prevention of Scales and Sludges in Boiler ? [06]
- (B) In water system, name phases in equilibrium at the following conditions :
- (i)  $-273^\circ C$
  - (ii)  $0.0075^\circ C$  and 4.58 mm pressure
  - (iii)  $374^\circ C$  and 218.5 atm. pressure
  - (iv)  $0^\circ C$  and 1 atm. pressure [06]
- (C) A water sample is not alkaline to phenolphthalein. However, 100 ml of the sample on titration with N/50 HCl required 16.9 ml to obtain end point using methyl orange as indicator. What are the types and amount of alkalinity present in the sample ? [04]

OR

- Q.6) (A) What is Hardness of Water ? Give reasons behind it and explain EDTA Method for the determination of Hardness of Water. [06]
- (B) State Gibb's Phase Rule. Explain the terms involved in it. What are the limitations of Phase Rule ? [06]
- (C) Write a note on Caustic Embrittlement. [04]
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