(Please write your Roll No. immediately)

Roll No.....

First/Mid Term Examination
September, 2017

1st Semester (B. Tech.)
Paper Code: ETCH 113
Time: 1: 30 hr.

Sub: Applied Chemistry
Max. Marks: 30

Note: Attempt any three Questions including Question No.1 which is compulsory

1(a) Explain why the fusion curve of ice has a negative slope whereas the sublimation curve has a positive slope in the phase diagram?
(b) Write condensed phase rule and explain why it is used for two component systems.
(c) Calculate the mass and volume of air needed for the combustion of 1 kg of carbon.
(d) 1.56 g of the coal was kjeldahlized and NH_3 gas thus evolved was absorbed in 50.0 mL of 0.1 N H_2SO_4. After absorption, the excess (residual) acid required 6.25 mL of 0.1 N NaOH for exact neutralization. Calculate the percentage of N in the coal sample.
(e) A sample of coal was found to have the following percentage composition:
C = 75 %; H = 5.2 %; O = 12.1 %; N = 3.2 and ash = 4.5 %
Calculate the HCV and LCV of the coal sample. **[2 × 5]**

2(a) How would you determine the calorific value of a coal by Bomb Calorimeter? Explain with the help of a neat diagram.
(b) Describe the Otto-Hoffman's process for preparing coke and mention the by-products recovered in the process. **[5+5]**

3 Differentiate between (any two of) the following:
a) Fixed bed Catalytic Cracking and Moving bed Catalytic Cracking
b) Liquid phase thermal cracking and vapour phase thermal cracking
c) Octane number and Cetane number **[5+5]**

4 (a) Draw and discuss the phase diagram of lead-silver system. Discuss practical application of this system.
(b) Give a labeled phase diagram of water system and discuss the importance of Triple point. **[5+5]**