

SCHOOL OF ADVANCED SCIENCES

CAT – I, Winter Semester 2016-17

B. Tech. (Common to All branches)

Course name	: Engineering Chemistry	Duration	: 90 min.
Course Code	: CHY1001	Max. Marks	: 50 marks
Class Numbers	: 4926, 4927, 4932, 4928, 4941, 4931	Slot	: D1+TD1
Faculties Name	: Prof. Sasikumar S, Prof. Sumathi S, Prof. Madhvesh Pathak, Prof. Ravikanth K, Prof. Rajagopal D, Prof. Prabhakaran D		

Answer ALL the Questions
(10 X 5 = 50 Marks)

- Identify an appropriate instrument that can be deployed to estimate the gross calorific value (GCV) of Kerosene oil. Based on your prediction, explain the principle and working of that instrument, and also deduce the formulae for the calculating the GCV.
- The following data is obtained in a bomb calorimeter experiment: (i) weight of the crucible = 4.29 g, (ii) weight of the crucible + fuel = 5.68 g, (iii) water equivalent of the calorimeter = 650 g; (iv) water taken in the calorimeter = 270 g; (v) rise in temperature = 2.3°C; (vi) cooling correction = 0.015°C; (vii) acids correction = 1.4 calories, and (viii) fuse wire correction = 0.4 calories. Calculate the GCV of the fuel sample. If the fuel contains 7.2% hydrogen, then determine the net calorific value (NCV).
- Explain the procedure followed for the proximate analysis of a coal sample.
- Define the terms: (i) Octane number and (ii) Cetane number. State their significance towards the engine performance (knocking) based on chemical structure of the fuel employed.
- A fuel is found to have the composition of C = 83%, H = 9%, O = 4%, S = 2%, and remaining ash. Calculate the minimum quantity of air (*in terms of weight*) required for the complete combustion of 1 kg of coal sample.
- Classify the following polymers by their (i) mode of polymerization, (ii) nature of the monomer, (iii) structure of the polymer, and (iv) intermolecular forces. Justify your classification: (a) PVC, (b) ABS and (c) Bakelite.
- Illustrate the polymerization method of a material that is widely used in the preparation of non-stick cookware and in the fabrication of microwave-compatible containers.
- Differentiate physical and chemical properties of thermoplastics and thermosetting plastics with appropriate examples.
- State and explain the appropriate plastic moulding technique in manufacturing following items: (i) PVC sheet roll and (ii) Electric circuit breaker.
- Explain the terms: "Conducting polymers" and "Biodegradable polymers". State their classifications (individually) in terms of their conducting and degradability methods.

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