Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (CHE-N)/SEM-6/CHE-605E/2011

2011

PETROCHEMICAL TECHNOLOGY

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Synthesis gas is a mixture of

a) $N_2 + O_2$ b) $CO_2 + O_2$

c) $CO + H_2$ d) $CH_4 + CO$.

ii) The catalyst used in Fischer-Tropsch synthesis is

a) Cobalt-thorium oxide b) Cu-Zn-Cr

c) $AlCl_3$ d) Ag_2O.

iii) The main aim of cracking is to produce

a) Gasoline b) Lube oil

c) Coke d) Diesel.

iv) The catalyst used in high temperature shift conversion reaction during steam reforming of natural gas is

a) Fe_2O_3 b) Cu-Zn-Cr combination

c) Ni d) CO-MO complex.

v) Sweetening of petroleum product means the removal of

a) Water

b) Sulpher and its compounds

c) Organic impurities

d) Wax.

vi) Cumene (isopropyl benzene) is made by

a) Oxidation of naphthalene

b) polymerization of a mixture

c) Propylene alkylation of benzene

d) None of these.

vii) The reaction mechanism in production of isopropanol by propylene hydration is

a) Carbonium ion

b) Carbanion

c) Free radical

d) Any other mechanism.

viii) The ratio of $CH_4 : O_2$ used for methanol production by oxidation is

a) 1 : 1 b) 4 : 1

c) 9 : 1 d) 3 : 2.

ix) Polyvinyl chloride is

a) thermosetting plastic b) thermoplastic

c) a fibrous material d) chemically active.

x) SBR is a

a) Rubber b) Plastic

c) fibre d) detergent.

xi) Xylene is a

a) Diolefene b) Aromatic

c) Paraffin d) *n*-paraffin.

xii) Acrylonitrile can be obtained from

a) propylene oxide b) isopropyl alcohol

c) propylene d) isoprene.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. a) What are the different feedstocks used for the production of petrochemicals ?

b) What are the chemical impurities present in the petrochemical feedstock ? 2 + 3

3. a) What is Fischer-Tropsch process ? Write down the main importance of the process.

b) Why do you think that Fischer-Tropsch synthesis is relevant in these days of oil crisis ?

4. a) What is the utility of synthesis gas ? Mention different ways of synthesis gas production in India.

b) Synthesis gas production by partial oxidation of fuel oil requires high pressure operation and absence of air. 3 + 2

5. a) What are the important by-products available from a petrochemical industry ?

   b) Discuss the importance of the chemical catalysts being widely used in petrochemical industry. 2 + 3

6. What do you mean by vulcanization of rubber ? Show with chemical reaction how rubber can be vulcanized. 1 + 4

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. With the help of flow diagram, discuss manufacturing procedure of HDPE form ethylene. Which medium would you choose for this polymerization ? LLDPE rather than HDPE is preferred polymer in industry. Discuss. 10 + 2 + 3

8. Write down the mechanisms of polymerization. Describe the addition polymerization and condensation polymerization processes in detail. 5 + 10

9. a) Describe the production of glycerin from propylene.

   b) What are the processes for production of styrene from Benzene ? 8 + 7

10. Write down the flow diagram to describe the detail process of production of detergent from Kerosene.

11. Write short notes on the following : 3 × 5

    a) Separation techniques of aromatic feed stocks.

    b) Manufacturing process of butanol by OXO-synthesis.

    c) Fillers and binders in detergents.