Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (CHE-NEW)/SEM-6/CHE-605E/2010

2010

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 × 1 = 10

   i) The major use of Butadiene is

      a) as a plasticizer

      b) in the manufacture of synthetic rubber

      c) as an anti-skinning agent in paints

      d) none of these.

   ii) Ziegler process

      a) produces HDPE

      b) produces LDPE

      c) uses no catalyst

      d) employs very high pressure.

iii) Ethylene oxide is used mostly in the manufacture of

a) ethyl alcohol b) ethylidine chloride

c) ethyle chloride d) ethylene glycol.

iv) Naphtha cracking for the production of various starting materials of petrochemicals employs

a) Ni based catalyst

b) high temperature with high space velocity

c) molybdenum based catalyst

d) low temperature to maximize yield of ethylene.

v) Acrylonitrile can be obtained from

a) propylene oxide b) isopropyl alcohol

c) propylene d) isoprene.

vi) Sohio processs is associated with production of

a) butadiene b) propylene oxide

c) polypropylene d) acrylonitrile.

vii) Reaction of ethylene glycol and dimethyl terephthalate produces

a) Nylon-6 b) Decron

c) Polyester d) PVC.

viii) Caprolactum is produced from

a) phenol b) naphthalene

c) benzene d) pyridine.

ix) Polyvinyl chloride is a

a) thermosetting plastic b) thermoplastic

c) fibrous material d) chemically active.

x) Aryl benzene sulphonate (ABS) is a

a) detergent

b) plasticizer for unsaturated polyester

c) starting material for synthesis of glycerin

d) cooling ingredient for photographic film.

xi) Viscosity index improver like (polystyrene) is added to lubricant to
   a) reduce its viscosity
   b) increase its viscosity
   c) reduce variation of viscosity with temperature
   d) increase variation of viscosity with temperature.

xii) Which of the following is naphthene ?
   a) Butadiene b) Butene
   c) Cyclohexane d) Acetylene.

GROUP – B

(Short Answer Type Questions)

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

2. Both CO and CO_2 or their mixture may be used as the feed for production of methanol. Which of these three would you select as the feed and why ? Explain with justification.

3. If ethane replaces naphtha as the feed for cracking, what would be the product mix ? Show a possible flow diagram of different products of ethane cracking. 2 + 3

4. a) What is the feed for 2-ethyl hexanol by Oxo-synthesis ? Write down the reaction steps from feed to the product. 1 + 2

   b) State the principle of preparation of vinyl acetate monomer from ethylene. 2

5. Write three main reactions involved in naphtha reformation. What catalyst is used for the process ? What are the bases on which catalyst is selected ? 2 + 1 + 2

6. How is *p*-xylene separated from other xylenes ? Explain how its production is maximised from metaxylene. What are its major uses ? 2 + 2 + 1

GROUP – C

(Long Answer Type Questions)

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

7. Describe the preparation of methanol starting from steam reforming of naphtha with a neat flow diagram. Write the chemical reactions involved in this process. What are the major uses of methanol. 10 + 2 + 3

8. Draw a simple flow diagram from the production of vinyl chloride by the balanced process. Compare this process with the oxychlorination process. 10 + 5

9. a) What is the major use of Ethylene glycol ?

   b) Discuss manufacturing process of ethylene glycol starting from ethylene oxide.

   c) Show how you would separate the mixture of MEG, DEG and TEG from a mixture of these three ? 2 + 7 + 6

10. a) Explain the production of polybutadiene rubber with simple flow diagram.

    b) What are *Cis* and *Trans* polymers of polybutadiene rubber ? Write their formulae. 10 + (3 + 2)

11. a) How is acrylonitrile produced ? Explain with a simplified flow diagram. Write the reaction equations.

    b) Write the by-products formed from Acrylonitrile process. Give uses of all these materials. (8 + 2) + (3 + 2)