AU–59

B.Sc. Part—I (Semester—II) Examination

2S : PETROCHEMICAL SCIENCE

Time : Three Hours] [Maximum Marks : 80

Note :—(1) Question Number 1 is compulsory.

(2) Discuss the reaction mechanism wherever necessary.

(3) Diagrams and chemical equations should be given wherever necessary.

(4) Illustrate your answers with neat sketches wherever necessary.

(5) Use pen of blue/black ink/refill only for writing the answer book.

1. (A) Fill in the blanks :— ½×4=2

(i) _____ are compounds or elements recovered or derived from petroleum or natural gas.

(ii) Unsaturated hydrocarbons having two double bonds in the molecule are called _____ or simply dienes.

(iii) _____ is the first and the lightest member of the petroleum hydrocarbons.

(iv) The most important source of _____ is the steam-cracking of hydrocarbon feedstock.

(B) Choose the correct alternative :— ½×4=2

(i) In India second petrochemical industry was started by —

(a) Reliance Industries (b) NOCIL

(c) IPCL (d) Union Carbide

(ii) Saturated open chain hydrocarbons are known as _____.

(a) olefins (b) paraffins

(c) aromatics (d) naphthenes

(iii) The naphtha reforming process is highly _____.

(a) Exothermic reaction (b) Complex reaction

(c) Acidic reaction (d) Endothermic reaction

(iv) The main source of important feedstock for petrochemicals today is _____.

(a) Coal (b) Molasses

(c) Crude oil (d) Biomass.

(C) Answer in one sentence :— 1×4=4

(i) What is the mole ratio of hydrogen and carbon monoxide for methanol synthesis ?

(ii) What is the largest market of methanol ?

(iii) What is the advantage of oxo synthesis process ?

(iv) What is the best feedstock for naphtha production ?

2 (a) What was the request of Government of India to French Institute of Petroleum ? 2

(b) Name the major technologies available to gas based fertilizer units. What is the goal of these technologies ? 4

(c) What led to the birth of synthetic organic materials as substitutes for natural essential commodities ? 6

OR

3 (p) What is the role of Trans National Corporation (TNC) in the Indian Petrochemical Industry ? 2

(q) Discuss the utility of Hazira-Bijapur-Jagdishpur gas pipeline. 4

(r) For what purpose the committee headed by Prof. G.P. Kane was set up by Govt. of India ? Discuss the highlights of this committee report. 6

4. (a) What are the most common impurities present in petroleum gases ? 2

(b) Mention the most desirable properties of liquid dessicants used for commercial dehydration process. 4

(c) Generally the feedstock for petrochemicals are classified on the basis of existing form. Discuss this with suitable examples. 6

OR

5. (p) Name the most common impurities present in crude oil. 2

(q) Name the various solid dessicants used for water vapour removal from petroleum gases alongwith their water removal capacity. 4

(r) What are the various solvents that can be used for the removal of hydrogen sulfide from petroleum gases ? Also mention their relative capacity to remove hydrogen sulfide from petroleum gases. 6

6. Any thermally cracked or catalytically reformed stock contains at least 18% of toluene. This toluene is separated by azeotropic distillation. Discuss this process in detail with neat sketch of flow diagram. 12

OR

7. Styrene is obtained as a by-product during cracking of naphtha for ethylene and it constitutes about 4 to 6%. Discuss the separation of styrene from this fraction by extractive distillation in detail with neat sketch of flow diagram and process parameters involved. 12

8. (a) Name the various feedstocks that can be used for steam reforming process. 4

(b) "Increase in molecular weight of feedstock increases the reactivity rapidly", in steam reforming process. Explain. 8

OR

9. (p) What are the various main and subsidiary reactions that occur during steam reforming process ? 4

(q) Discuss the role of steam-hydrocarbon ratio in steam reforming process in detail. 8

10. Discuss the production of synthesis gas via partial oxidation process in detail with neat sketch of flow diagram, chemistry and process parameters involved. 12

OR

11. (p) Describe the Lurgi process in detail for the production of synthesis gas. 6

(q) Coal gasification process is based on the reaction of coal in the form of coke with steam and oxygen (air). Mention the reactions involved in this process along with their heat requirements. 6

12. (a) Syngas appears to have bright future in the production of both bulk and fine chemicals. Name some of the syngas based technologies. 4

(b) Discuss the process developed by "ICI" for the production of methanol in detail. 8

OR

13. (p) Mention the various uses of synthesis gas. 4

(q) Name the various chemicals based on carbon monoxide along with the chemical reactions involved. 8