

**B.Sc. Part-II Semester-III Examination**  
**PETROCHEMICAL SCIENCE**

Time : Three Hours]

[Maximum Marks : 80

- N.B. :-** (1) Question No. 1 is compulsory and carries 8 marks.  
 (2) Remaining six questions carry 12 marks each.  
 (3) Give chemical equations and draw diagrams wherever necessary.  
 (4) Use of calculator is permitted.

1. (a) Fill in the blanks with appropriate words : 2
- (i) The fuel oil yield \_\_\_\_\_ as the temperature in vis breaking increases.  
 (ii) \_\_\_\_\_ is the chemical used for butadiene synthesis in non petroleum route.  
 (iii) Slurry oil is the product obtained from \_\_\_\_\_ unit.  
 (iv) Ethylene is mainly used in production of \_\_\_\_\_.
- (b) Choose the correct alternative : 2
- (i) Splitter is the type of :  
 (a) Extraction unit (b) Distillation unit  
 (c) Dehydration unit (d) Furnace type unit
- (ii) KSF is nothing but  
 (a) Kilometer Second force (b) Kilogram Second Force  
 (c) Kinetic Severity Function (d) Kinetic Severity Force
- (iii) One of the undesirable reactions in catalytic reforming is :  
 (a) Isomerisation (b) Dehydrogenation  
 (c) Hydrogenation (d) Dealkylation
- (iv) Isoprene is also known as :  
 (a) 2 chlorobutadiene (b) 2 Methylbutadiene  
 (c) n-butadiene (d) Cyclopentadiene.
- (c) Answer the following in **one** sentence each : 4
- (i) Why the reactor temperature increases day by day in platforming process ?  
 (ii) Why the first unit after furnace in steam naphtha cracking process is fuel oil distillation column.  
 (iii) Which one is the only petroleum base route for butadiene synthesis in India ?  
 (iv) Which is the major process for propylene synthesis in USA ?

2. (a) Which technique has to be accepted to reduce the coke deposition in thermal cracking process ? 5  
 (b) Discuss the time-temperature relationship in thermal cracking with suitable example. 7
- OR**
3. Discuss the main reactions involved in thermal cracking with suitable examples. 12  
 4. What are the various important process parameters to be considered in steam cracking process ? Discuss each in brief. 12
- OR**
5. Draw and discuss the process flow of steam cracking of naphtha with various unit operations involved. 12  
 6. Discuss the importance of methyl shift, olefin addition and hydride transfer steps in catalytic cracking. Write the chemistry involved with suitable example. 12
- OR**
7. Which precautions has to be taken if residual material is to be used as a feed for catalytic cracking process ? Hence discuss the feed preparation technique for FCCU in brief. 12  
 8. (a) What are the different velocities involved in FCCU ? Which is more commonly adopted ? Why ? 4  
 (b) Why waste heat boiler is associated with fluid catalytic cracking process ? Hence draw the complete process flow for fluidised bed catalytic cracking unit 8
- OR**
9. What is the need of steam stripping in FCCU regenerator ? Hence draw and discuss the regenerator adopted in FCCU. 12  
 10. What is extractive distillation ? Discuss the extractive distillation for separation of butadiene in brief. 12
- OR**
11. How will you obtain butadiene from ethyl alcohol ? Give the chemistry of two step and single step process with reaction conditions and catalyst involved. Which one is commercially accepted ? 12  
 12. (a) What are the various sources for aromatic hydrocarbons ? 3  
 (b) To achieve benzene separation which extension will you suggest for udex process ? Describe the same in brief. 9
- OR**
13. Discuss the separation of styrene from c<sub>7</sub> fraction in brief. 12