Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (CHE)/SEM-1/CHE-5C/2010-11

2010-11

PETROLEUM REFINERY ENGINEERING

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.

Answer any *five* questions. 5 × 14 = 70

1. a) Write the characteristics of crude oil composition.

   b) What is the motivation behind the shifting of focuses from oil to gas ?

   c) Write a short note on crude oil treatment and storage. 3 + 3 + 8

2. a) Draw the sketch of CDU and VDU with all accessories and also discuss the merits and demerits of different reflux arrangements in CDU.

b) Compare between fixed bed reactor and moving bed reactor.

c) Write the important factors for catalyst selection. 8 + 3 + 3

3. a) How many techniques you may suggest to minimize the catalyst deactivation ?

b) What are adverse conditions that may arise due to catalyst deactivation ?

c) Write the process parameters which significantly influence catalyst deactivation. 5 + 5 + 4

4. a) Write the objective of fluid coking operation along with process flow-sheet.

b) Write a short note on soaker type visbreaking operation.

c) What is the objective of reforming process ?

d) Why is the reforming process getting importance in modern refinery ? 5 + 4 + 2 + 3

5. a) Design a process flow-sheet of FCC unit based on process requirement.

   b) Construct a comparative presentation of coking, catalytic cracking, visbreaking, hydrovisbreaking, hydrocracking and hydrotreating in a temperature (°C) *vs* pressure (bar) plot based on their process conditions. 8 + 6

6. Write short notes on the following : 5 + 5 + 4

   a) Sintering of catalyst

   b) Hydroprocessing

   c) Cetane number.

7. a) Write the definition of fire point, flash point, aniline point, smoke point, pour point, cloud point, grease point and viscosity index.

   b) Why cetane number and octane number are important for diesel oil and petroleum respectively. 8 + 6

8. a) Why does diesel and petrol car give maximum mileage between 40 to 60 km/h speed ?

b) Why are °API gravity and viscosity index important parameter for liquid and instead of specific gravity and viscosity ?

c) What are the precautions to be taken during liquid oil storage and transportation ?

d) 'A oil sample shows very high aniline point.' What does it mean ? 5 + 3 + 3 + 3