GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII (OLD) - EXAMINATION - SUMMER 2017

Subject Code:180502

Subject Name: Petroleum Refining & Petrochemicals

Time:10:30 AM to 01:00 PM

Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) The following processes are widely used in petroleum refining. 07 State the main purposes of these processes. What are their feedstocks? State the possible desirable and undesirable chemical reactions that take place during these processes and their possible chemical reactions: a) Catalytic Reforming, b) Hydrocracking, c)Alkylation, d) Catalytic Cracking.
 - (b) The terms hydrotreating, hydroprocessing, hydrocracking and 07 hydrodesulfurization are used rather loosely in petroleum refinery industry. Define clearly these terms.
- Q.2 (a) Define/explain the following terms in context with petroleum 07 refining. (Use illustration/examples/correlations etc. wherever possible).

(i) Sour crude (ii) API Gravity (iii) Viscosity index (iv) Smoke point (v) Aniline point (vi) Octane number (vii) Correlation index

(b) State the desirable characteristics and important tests of diesel and kerosene. Discuss various additives of diesel along with their purposes.

OR

- (b) Discuss lead doctoring of gasoline with the reactions and flow diagram. Do you know any other sweetening operations for gasoline?
- Q.3 (a) Cite evidences in favor of biogenic origin of petroleum. Explain the 07 impact of sulfur compounds in crude with examples.
 - (b) Briefly explain how the presence of paraffin, aromatics, naphthenes 07 and wax affect the quality of lube oils. (In terms of viscosity, viscosity index, pour point etc.)

OR

- **Q.3** (a) Answer the following:
 - i) A straight-run kerosene which does not meet specification needs to be upgraded. It is suggested to be extracted with liquid sulfur-di-oxide. State with reasons what changes would you expect in the aniline point, molecular weight and the refractive index?
 - ii) Give examples of physical and chemical removal of aromatics for improvement of smoke point of a crude fraction.

Date:29/04/2017

03+04

- (**b**) Answer the following:
 - i) Compare the performances of phenol and furfural for the solvent treatment of lubes. (Four points)
 - ii) What are the purposes of dehydration and desalting of crude oils? (Three points)
- Q.4 (a) Discuss the principles and scopes of atmospheric and vacuum distillation in refinery operations.
 - (b) Discuss methanol manufacturing process with a flow diagram. State07 the uses of methanol. State any special feature of the methanol synthesis reactor.

OR

- Q.4 (a) Compare LDPE and HDPE. Discuss the manufacturing process of UDPE. 07
 - (b) Discuss with a flow diagram the manufacturing of ethylene glycol. 07 What are its uses?
- Q.5 (a) Describe manufacturing of vinyl acetate with a neat flow sheet 07 along with its uses.
 - (b) Discuss the dehydrogenation of ethyl benzene to manufacture 07 styrene with a neat flow sheet. State the industrial uses of styrene.

OR

- Q.5 (a) What are the different routes of manufacturing of ethylene? Explain 07 anyone with a diagram.
 - (b) Draw a schematic showing different petrochemicals that can be synthesized from ethylene. Show the important reactions also.

04 + 03

07