

**III B.Tech I Semester Regular Examinations, November 2005**  
**ENERGY ENGINEERING**  
**(Chemical Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) Explain the significance of coal constituents based on proximate analysis.  
(b) Explain the significance of coal constituents based on ultimate analysis. [8+8]
2. (a) Discuss and differentiate thermal and catalytic cracking processes.  
(b) How is hydrocracking different from catalytic reforming. [8+8]
3. (a) What is meant by sweetening.  
(b) Explain in detail how natural gas is sweetened. [8+8]
4. Describe a typical solar air heater with a neat schematic. Explain the principle and working. Give the applications of solar air heaters. [16]
5. (a) Explain the difference between fixed dome type and floating dome type biogas plant  
(b) Illustrate the dome type biogas plant with a neat sketch. [8+8]
6. Explain low temperature system and high temperature system in thermal energy storage. [8+8]
7. What is phase change material? Explain the various types of phase change material. Explain how phase change materials can store and release energy. [16]
8. Discuss the various functional elements of solid waste management. [16]

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1. (a) Compare and contrast dry process and wet process for coal washing.  
(b) Differentiate in-situ theory and drift theory supporting origin of coal. [8+8]
2. In a dual practice of catalytic reforming, instead of one reactor, why more reactors are used? Discuss with reference to catalyst load, presentage of platinum, operating temperature and pressure and extent of conversion in differed reactors. [16]
3. (a) Write about the important tests carried out for diesels?  
(b) Discuss the signification of these tests, application point of view? [8+8]
4. What is a photovoltaic cell? Discuss about its important features. Explain about the types and functioning of any one type in detail. [16]
5. Write short notes on:
  - (a) Nuclear fission
  - (b) Chain Reaction
  - (c) Moderators
  - (d) Reactor Control [4+4+4+4]
6. Explain briefly the kinetic energy storage. [16]
7. Explain the following: -
  - (a) Minimum wind velocity for wind energy harnessing.
  - (b) Minimum tide height for tapping tidal energy. [8+8]
8. Discuss the environmental disasters associated with indiscriminate handling of solid wastes. [16]

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1. (a) Explain in general about coal classification.  
(b) Write short notes on following coal classification procedures
  - i. Regnault-Gruner
  - ii. Frazer
  - iii. Seyler.[4+12]
2. (a) State various catalyst systems practiced in industrial catalytic reforming.  
(b) Differentiate regenerative and non-regenerative platforming processes. [8+8]
3. (a) Bring out the differences between refinery gases, natural gas and LPG.  
(b) Give the classification of natural gases according to "Sulfur" content, condensable hydrocarbon content. [8+8]
4. (a) Explain green house effect with a neat schematic.  
(b) Describe a flat plate collector with a neat schematic. Write about the classification of flat plate collectors based on the type of heat transfer fluid used. [8+8]
5. Write in detail the merits and demerits of wind energy. [16]
6. Explain briefly the mechanism of secondary batteries as storage of chemical energy. [16]
7. Explain the various construction details of water storage system. [16]
8. Discuss the environmental disasters associated with indiscriminate handling of solid wastes. [16]

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1. (a) Write in detail about ultimate analysis of coal?  
(b) Discuss the two theories supporting the formation of coal? [10+6]
2. (a) What is stabilization of crude?  
(b) Why dehydration and desalting of crude is necessary?  
(c) State the physico-chemical aspects involved in any of these operations [6+6+4]
3. What is Merox process? Explain the process for sweetening of light petroleum fractions. [16]
4. (a) Explain green house effect with a neat schematic.  
(b) Describe a flat plate collector with a neat schematic. Write about the classification of flat plate collectors based on the type of heat transfer fluid used. [8+8]
5. (a) What are the applications of Hydrogen fuel?  
(b) Write notes on storage and transportation of Hydrogen. [8+8]
6. Explain briefly the mechanism of secondary batteries as storage of chemical energy. [16]
7. Explain the site selection consideration for setting up a wind farm. [16]
8. How do you dispose coal wastes, petroleum wastes and hospital waste? [16]

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