



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech/CHE(N)/SEM-3/ES-302/2012-13

2012

ENERGY TECHNOLOGY

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.

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :
 $10 \times 1 = 10$

- i) Washing of coal is done to
 - a) remove the inherent impurities
 - b) remove the adhering impurities
 - c) reduce the ash content
 - d) both (a) and (c).

- ii) Caking index of coal is a measure of its
 - a) abrasability
 - b) reactivity
 - c) agglutinating (binding) propeties
 - d) porosity.



- iii) Solar cells convert sunlight directly into energy.
- a) Thermal b) Electrical
c) Mechanical d) Chemical.
- iv) Anti-knocking characteristic of gasoline is indicated by
- a) Diesel index b) Cetane number
c) Octane number d) Flash point.
- v) Aniline point is highest for
- a) Iso-paraffins b) Aromatics
c) Olefines d) *n*-paraffins.
- vi) Oduring agent in LPG is
- a) Methane b) Propane
c) Ethyl mercaptan d) All of these.
- vii) Catalyst used in catalytic reforming is
- a) Platinum b) TiO₂
c) Silica-alumina d) Iron.
- viii) Bio-gas production is an decomposition of organic wastes.
- a) aerobic b) anaerobic
c) both (a) and (b) d) none of these.
- ix) Blue gas is nothing but
- a) Producer gas b) Blast furnace gas
c) Water gas d) Hydrogen.



- x) LPG contain
- a) propane and pentane
 - b) butane and propane
 - c) butane and methane
 - d) none of these.
- xi) Control rods are used in nuclear reactor to
- a) protect the moderator
 - b) control the pressure vessel
 - c) slow down the fast fission neutron
 - d) absorb extra neutron in the reactor.
- xii) Which of the following is a moderating material used in nuclear reactor ?
- a) Graphite
 - b) Cadmium
 - c) Zircalloy (an alloy of zirconium and aluminium)
 - d) stainless steel.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Explain with the help of a flowsheet how you can utilize the waste heat during the production of coke from coke oven process.
3. "Coke produced by low temperature carbonization of coal are more reactive". Justify the statement.
4. What are the advantages of fluidized bed catalytic cracking process over fixed bed catalytic cracking process ?
5. Why is reforming done in petroleum refinery ? Discuss various reforming reactions with the help of chemical formula.
6. What do you mean by stand alone and building integrated system for the use of photovoltaic cell ?



GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) An Indian washery uses a coal of 21.0% ash content. If the clean product has an ash content of 18.7%, the sinks have an ash content of 41.2% and theoretical recovery is 91.6%, compute the performance of the washery.
- b) What is the working principle of Baum jig washer ?
- c) What is by-product of slot type coke oven ? How recovery of by-product from coke oven gas is being performed ? $3 + 6 + 6$
8. a) Briefly describe the classification & composition of Petroleum.
- b) Discuss the steps of crude oil distillation along with a process flow sheet and also the common fractions from crude petroleum with their boiling point range. $5 + 10$
9. Discuss the steps of crude oil distillation along with a process flow sheet.
10. a) Define the following properties of petroleum oils :
- i) Pour point ii) Octane number
- iii) Aniline point iv) Aviation fuel power number
- v) Cloud point.
- b) Narrate briefly the method used for the production of olefines from Naphtha.
- c) Draw the Fischer-Tropsch process flow chart for producing liquid fuel from coal. $5 + 5 + 5$
11. What are the several characteristic features of a solar collector ? Why transparent covers are used in a flat collector ? Describe the working principle of a solar pond. What are the resources for geothermal energy ? $4 + 2 + 6 + 3$