

IV B.Tech II Semester Supplementary Examinations, April/May 2005
CHEMICAL ENGINEERING PLANT DESIGN & ECONOMICS
(Chemical Engineering)

Time: 3 hours**Max Marks: 70**

Answer any FIVE Questions
All Questions carry equal marks

1. Synthesis gas may be prepared by a continuous, non catalytic conversion of any hydrocarbon by means of controlled partial combustion in a fire-bride lined reactor. The hydrocarbon and oxidant (oxygen or air) are separately pre heated and charged to the reactor. Before entering the reaction zone the tow feed stocks are intimately mixed in a combustion chamber. The heat produced by combustion part of the hydrocarbon pyrolyzes remaining hydrocarbons into gas and a small amount of carbon in reaction zone. The reactor efficient then passes through a waste heat boiler, a water-wash carbon-removal unit, and a water cooler-scrubber. Carbon is recovered in equipment of simple design in a firm which can be used as fuel or in ordinary carbon products.
Prepare a simplified equipment flow sheet in the process, with temperatures-and pressure.
2. In terms of plant location, what are the important factors that should be considered? Discuss.
3. Write about the following with regard to estimation of total product cost
 - (a) Fixed charges.
 - (b) Plant overheads.
4. For total yearly payments of Rs. 5000 for 10 years, compare the compound amount accumulated at the end of 10 years if the payments are
 - (a) end-of-year,
 - (b) weekly and
 - (c) continuous.The effective (annual) interest is 20 percent and payments are uniform.
5.
 - (a) What do you understand by negative taxable income? How is it used in the calculation of income tax? Explain
 - (b) Define the term 'excess profit tax'. When and why is it levied? Discuss it in detail.
6.
 - (a) What is sinking fund method for the determination of depreciation?
 - (b) Derive an equation for asset value of equipment after few years of use by the application of sinking fund method.
 - (c) Compare sinking fund method with straight-line method.

7. Explain profitability, profitability standards and methods for profitability evaluation.
8. It is planned to concentrate 15,000 Kg/hr of a liquor containing 25 percent solids to a concentration of 50 per cent solids. A single evaporator body suitable for this purpose costs Rs.40,000 exclusive of pumps and other accessories common to any number of effects. Fixed charges are Rs.3000 per annum and steam costs Rs.2 per 1000 Kg. Assume 0.8 N kg evaporation per kg of steam where N is the number of effects. The evaporator is to operate 24 hr. per day and 300 days per year. How many effects should be used?
