Paper Code: ECH 702	Roll No.									

B.Tech.

(SEM. VII) THEORY EXAMINATION 2015-16

PLANT DESIGN & ECONOMICS

Time: 3 Hours Total Marks: 100

Note:- Attempt **all** questions. Assume suitable data (if required**).**

1. Attempt any **four** parts of the following: **(5x4=20)**
   - (a) What are the essential items those are included in the flow sheet preparation? How do you go for equipment numbering?
   - (b) Discuss different steps reaching towards final plant site selection.
   - (c) What are the legal aspects of safety in plant design?
   - (d) Write different components of start-up costs.
   - (e) What is plant layout? How it is prepared?
   - (f) Write a short note on start up of a new plant.
2. Attempt any **four** parts of the followings: **(5x4=20)**
   - (a) Explain the time value of money and equivalence.
   - (b) How is present worth determined? What is discrete single payment present worth factor?
   - (c) Write any two methods for determining depreciation.
   - (d) Find the effective rate of return if money at 8 percent per year is compounded (i) monthly (ii) continuously.
   - (e) The original cost of a property is Rs. 30,000 and it is depreciated by a 6 percent sinking-fund method. What is the annual depreciation charge if the book value of the property after 10 years is the same as if it had been depreciated at Rs. 2,500 / year by the straight line method?
   - (f) What are the major insurance requirements for manufacturing concerns?
3. Attempt any **two** parts of the followings: **(10x2=20)**
   - (a) How is capital investment estimated? Make a brief breakdown of fixed capital investment for a chemical process.
   - (b) For net sales of a company amounting to Rs. 600,000 annually, when the fixed costs are Rs. 350,000 and the direct costs are 35 percent of the net sales rupees:
     (i) What is the break-even-point in terms of sales rupees?
     (ii) What sales are required for a profit of Rs. 80,000?
   - (c) Discuss the general procedure for determining optimum conditions with one variable and two or more variables.
4. Attempt any **two** parts of the followings: **(10x2=20)**
   - (a) List the major fields which should be considered for plant safety and discuss the responsibilities of the design engineer in each one.
   - (b) Write short notes on:
     (i) Equity (ii) Patents (iii) Proprietorship (iv) Debit (v) Total income
   - (c) Discuss about the intangible and practical considerations in optimum design.
5. Attempt any **two** parts of the followings: **(10x2=20)**
   - (a) Write notes on any two of the following:
     (i) Optimum design of heat exchanger
     (ii) Techno-economic feasibility report
     (iii) Determination of distillation column diameter and height.
   - (b) Why are taxes levied? Discuss about property tax, excise tax and income tax.
   - (c) A cleanout costs Rs. 3,000 and causes 10 hour downtime. The allocable operating cost is Rs. 1,500 per hour : 5,00,000 kg/day for 250 days per year must be evaporated

from a 280.m^2 area. The latent heat of vaporization is 2.3×10^3 kJ/kg and the driving force is 28 K. Find the optimum time for operation before recleaning.