Paper Code: CH-702	**Roll No.**									

B. Tech
SEVENTH SEMESTER EXAMINATION, 2016-17
PLANT DESIGN & ECONOMICS

[Time: 3 Hours] [Total Marks: 100]

Note: - Attempt all questions. Assume suitable data, if required. All question carry equal marks.

1. Attempt any *four* parts of the following: - **(5x4=20)**

(a) What is plant layout? How it is prepared?
(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) Write a short note on start up of a new plant.
(f) What are the essential items those are included in the flow sheet preparation? How do you go for equipment numbering?

2. Attempt any *four* parts of the followings: - **(5x4=20)**

(a) Write any two methods for determining depreciation.

(b) How is present worth determined? What is discrete single payment present worth factor?
(c) Explain the time value of money and equivalence.

(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) Discuss about the intangible and practical considerations in optimum design.

(b) Write short notes on:
(i) Equity (ii) Patents (iii) Proprietorship (iv) Debit and credit (v) Total income

(c) List the major fields which should be considered for plant safety and discuss the responsibilities of the design engineer in each one.

5. Attempt any *two* parts of the followings:- **(10x2=20)**

(a) Write notes on following:
(i) Optimum design of heat exchanger
(ii) Techno-economic feasibility report

(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 re-cleaning.