Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

VII SEMESTER B.TECH. (CHEMICAL ENGINEERING)

END SEMESTER EXAMINATIONS, NOVEMBER 2017

SUBJECT: PROJECT ENGINEERING [CHE 4023]

REVISED CREDIT SYSTEM

(23/11/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer ALL the questions.
- Missing data may be suitable assumed.

Estimate **the Fixed capital investment, Working Capital and the Total Capital Investment** required to set up a Chemical process plant with the following major equipment given in the table. Consider the year of construction to be 2017. Also consider the cost of piping to be 13% of fixed capital equipment

Equipment / size	Number	Year of purchase of similar equipment / (Marshall and Swift Index)	Price of the equipment in the year mentioned in column 3 per unit	Original size of similar equipment considered	exponent
Shell and Tube Heat Exchanger, floating head (30 m^3)	3	2015 (2224.3)	779790	40 m^3	0.6
Centrifugal pump (12 m^3)	4	2010 (1587)	77946	9 m^3	0.33
SS Reactor (3 m^3)	2	2014 (2067.9)	194866	1.4 m^3	0.56
Evaporator (30 m^2)	1	2013 (1926.7)	450000	20 m^2	0.54

1 **10**

2A How is Pump sizing performed? Explain the hydraulic resistance. **7**

2B What are the various codes and standards to be followed for selection of Material of Construction? **3**

3A Explain the sources, evaluation and control of exposure hazards in a process industry **6**

3B Discuss the operational difficulties associated with Compressors 4

4A. What are the numerous factors to be considered for Plant Location selection? 6

4B Write a note on Instruments used to measure temperature in a Process Industry 4

5 Consider a reactor-distillation column system given below. Take ΔT_{min} to be 10°C 10

Stream number	Description	Supply Temp °C	Target Temp °C	Heat capacity rate, CP kJ/s. °C
1	Reactor feed	20	160	50
2	Reactor effluent	120	260	55
3	Bottom product	280	60	30
4	Overhead product	180	20	40

a. Find the minimum utility requirements
b. Find the feasible matches above and below pinch
c. Draw the hot and cold composite curves