Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. END SEMESTER EXAMINATIONS NOV 2018

SUBJECT: PROJECT ENGINEERING

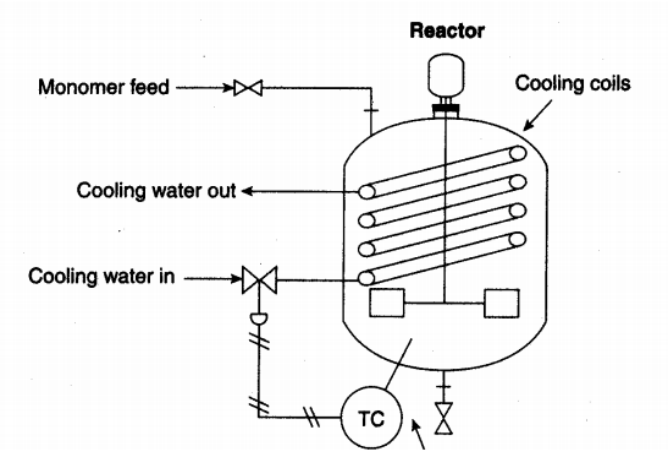
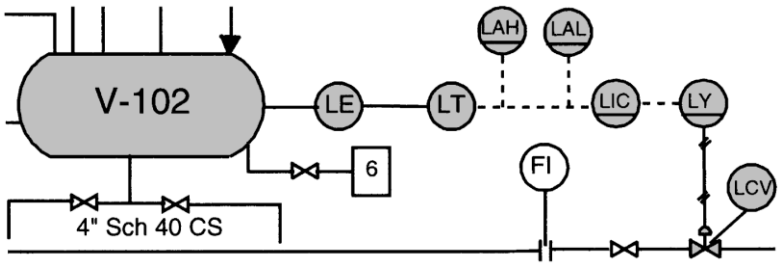
PE IV [CHE 4023]

REVISED CREDIT SYSTEM
(27/11/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	Write a short note on different types of plant layouts with suitable examples.	**04**
1B.	Consider an exothermic reaction controlled by cooling water. Using study nodes as the cooling coil with process parameters as flow and temperature, perform a HAZOP study tabulating possible causes and possible consequences. 	**03**
1C.	Explain each of the components in the P&ID given below: 	**03**

2A.	Construct a stream table for each component in a HDA process. $C_6H_5CH_3 + H_2 \longrightarrow C_6H_6 + CH_4$ $2C_6H_6 \rightleftharpoons C_{12}H_{10} + H_2$	**08**
2B.	Differentiate maximum and optimum yield with a suitable example.	**02**
3A.	The following are the data for HDA process: Heat of reaction = -21530 Btu/mol Toluene; Production rate of Benzene = 265 mol/h; Selectivity = 0.98; Per pass conversion = 75% Reactor effluent: Benzene = 265 mol/h; Unreacted toluene = 91 mol/h; Diphenyl = 4 mol/h; Make-up gas = 496 mol/h; Recycle gas = 3371 mol/h. Justify whether the reactor can be operated adiabatically or isothermally by assuming that the reactants enter at 1150°F and the temperature limit for HDA process is 1150°F-1300°F.	**07**
3B.	The original cost of an equipment is $1000 and the period of recovery is 5 years. Calculate the book value and depreciation using Modified accelerated cost recovery system	**03**
4A.	A company makes two types of products, A and B. These products are produced during a 40-hour work week and then shipped out at the end of the week. They require 20 and 5 kg of raw material per kg of product, respectively, and the company has access to 10,000 kg of raw material per week. Only one product can be created at a time with a production times for each of 0.05 and 0.15 hrs, respectively. The plant can only store 550 kg of total product per week. Finally, the company makes profits of $45 and $30 on each unit of A and B, respectively. Set up the linear programming problem to maximize profit and solve it graphically.	**06**
4B.	Write a short note on non-ferrous metals used in process industries with their merits and demerits.	**04**
5A.	Write a short note on types of capital cost effectiveness with probable error, purpose and level of engineering required.	**05**
5B.	Estimate the fixed capital investment for a 1500 ton/day ammonia plant using the turnover ratio method. The current gross selling price of ammonia is $150/ton. The plant will operate at 95% stream time for 365 days/year. Given: turnover ratio is 0.65 for ammonia plant.	**02**
5C.	Write a short note on cumulative cash position with a schematic representation assuming that the depreciation is linear over 20 years of operation.	**03**

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