

Q.P. Code :17108

[Time: Three Hours]

[Marks:80]

Please check whether you have got the right question paper.

- N.B:
1. Question No. 1 is compulsory.
 2. Answer any **three** questions from the **remaining** questions.
 3. Assume **suitable** data wherever necessary.

- Q.1 a) State the difference between evaporation cooling and refrigeration 05
 b) What are the problems associated with Flaring? Explain in brief. 05
 c) If motive pressure is 15 bar and evaporation pressure 7 mm Hg, calculate compression ratio. 05
 d) "Air is most important utility in modern chemical process plant". Explain. 05
- Q.2 a) What are the properties of an ideal refrigerant? Name the normal refrigerant used. 10
 b) What are the major vacuum machines? With the help of neat diagram explain the construction / operation of water seal vacuum pump. 10
- Q.3 a) Derive the expression for work done by a single stage Reciprocating air compressor without clearance volume for polytropic compression. 10
 b) Describe with the neat diagram, the construction and working of the Babcock and Wilcox boiler 10
- Q.4 Set up ANOVA table for the following information relating to three drug testing to judge the effectiveness in reducing blood pressure for three different groups of people. 20
 Amount of Blood Reducing in Millimeters of Mercury.

	Drug		
	x	y	Z
Group of people A	14	10	11
	15	9	11
Group of people B	12	7	10
	11	8	11
Group of people C	10	11	8
	11	11	7

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- Q.5 The storage tank system shown in following figure is used to store process feedstock. Overfilling of storage tank is a common problem in process industries. To prevent overfilling, the storage tank is equipped with a high-level alarm and a high-level shut down system. The high-level shut down system is connected to a solenoid valve that stops, the flow of input stock. 10

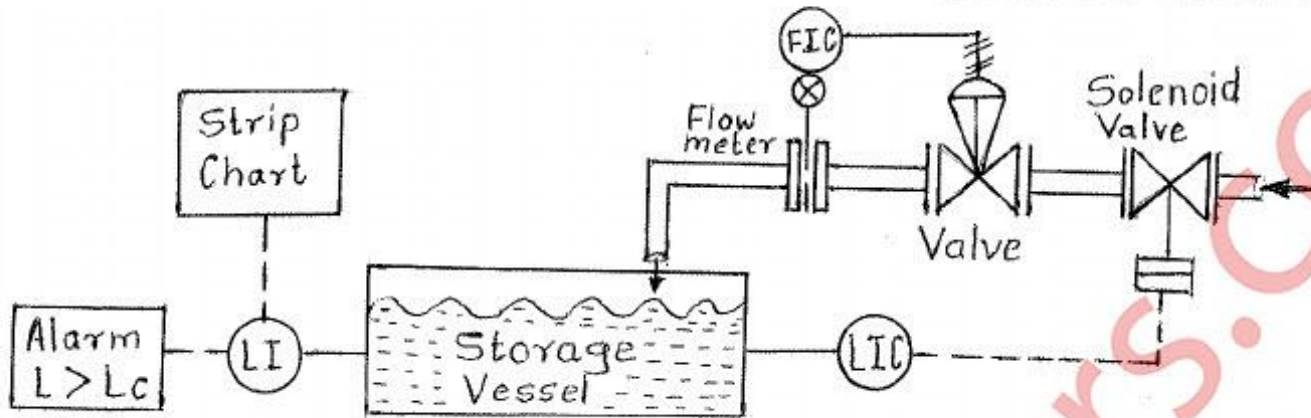


Figure Level control system with alarm.

Develop an event tree for the system using the "failure of level indicator" as the initiating event. Given that the level indicator fails 4 times/year, estimate the number of overflow expected per year. Use the following data:

System	Failures/demand
High-level alarm	0.01
Operator stops flow	0.1
High-level switch system	0.01

- b) Describe the importance of venting operation in chemical industry. 10

- Q.6 Write short notes on 20

- i. Types of Relief system
- ii. Detonation and Deflagration
- iii. BLEVE
- iv. Fire Triangle