

**B.TECH. SEM -VII (CHEMICAL 2014 COURSE (CBCS) :
SUMMER - 2018**

SUBJECT: PLANT UTILITIES AND PROCESS SAFETY

Day: **Wednesday**
Date: **23/05/2018**

S-2018-2467

Time: **02.30 PM TO 05.30 PM**
Max. Marks : **60**

N. B. :

- 1) All questions are **COMPULSORY**.
- 2) Draw neat and labeled diagram **WHEREVER** necessary.
- 3) Use of non programmable **CALCULATOR** is allowed.
- 4) Assume suitable data, if required.

Q. 1 Discuss the importance of various utilities in the operation of a typical chemical process plant. (10)

OR

Q.1 Elaborate the terms: (10)
i) Gas Flaring
ii) Pollution Abatement
iii) Water quality

Q.2 Define process steam and exhaust steam. Discuss the optimum use of process steam and exhaust steam in chemical process industries. (10)

OR

Q.2 Explain the following: (10)
i) Waste heat boilers
ii) Steam condensers

Q.3 Classify different types of vacuum pumps. Explain principle and working of oil seal vacuum pump. (10)

OR

Q.3 A single stage compressor is to compress 8×10^{-3} Kmole/s of methane gas at 27°C and 140 kPa. Calculate the power required if the mechanical efficiency is 80 % and the compression is adiabatic. For methane $\gamma = 1.31$ (10)

Q.4 Illustrate the concept of safety integrity level (SIL). Explain different methods used to achieve SIL in process industry. (10)

OR

Q.4 Discuss different methods of identification and assessment of hazards. (10)

Q.5 Explain safety aspects in the design of typical chemical process plant. (10)

OR

Q.5 Illustrate the risk and hazards for following chemicals: (10)
i) Ethylene oxide
ii) Benzene
iii) Isopropyl alcohol

Q.6 Elaborate process safety strategies adopted in chemical process industries. (10)

OR

Q.6 Recommend a safety procedure and designs for runaway reactions by using suitable example. (10)

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