

**B.Tech. SEM -VII (Chemical 2014 Course (CBCS) : SUMMER - 2019**

**SUBJECT: PLANT UTILITIES AND PROCESS SAFETY**

Day: Monday  
Date: 13/05/2019

S-2019-2787

Time: 02.30 PM TO 05.30 PM  
Max Marks. 60

**N.B. :**

- 1) All questions are **COMPURSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data, if necessary.
- 4) Use of non-programmable calculator is **ALLOWED**.
- 5) Draw neat and labeled diagram **WHEREVER** necessary.

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**Q.1** Which type of liquid phase and vapor phase heat transfer fluid systems are employed in chemical industries? Describe working of the systems. **(10)**

**OR**

**Q.1** Enlist the constituents of water that affects quality of water. Explain their effect in detail. **(10)**

**Q.2** Explain different types, selection and sizing of boilers. **(10)**

**OR**

**Q.2** Enumerate steam generation, distribution and utilization in chemical plants. **(10)**

**Q.3** Elaborated the following: **(10)**  
i) Selection of refrigerant  
ii) Material handling under vacuum

**OR**

**Q.3** State the working concept of jet ejector. How a jet ejector is selected for a particular application? **(10)**

**Q.4** Discuss HAZOP and HAZAN for identification and assessment of hazards. **(10)**

**OR**

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

**Q.5** Illustrate the risk and hazards for following chemicals: **(10)**  
i) Acetonitrile  
ii) Bromine  
iii) Ethylene oxide

**OR**

**Q.5** Elaborate the identification and assessment of safety parameters in process design. **(10)**

**Q.6** Summarize the inherently safer designs for elimination of hazards in chemical process industry. **(10)**

**OR**

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

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