B. Tech.
(SEM. VIII) EXAMINATION, 2006-07
PROCESS UTILITIES & SAFETY IN CHEMICAL PLANT

Time : 3 Hours] [Total Marks : 100

Notes : (1) Attempt all questions. Each carry equal marks.
(2) Assume the data if required.

1. Attempt any four parts in the following :
   (a) Differentiate between process utilities and process streams.
   (b) Discuss various process utilities available for cooling of the process streams and their range of application.
   (c) Discuss various sources of water availability in process industries.
   (d) How demineralised water is produced on industrial scale?
   (e) What are the various steps to be taken to obtain boiler feed water?
   (f) Discuss important processing steps to be undertaken for converting waste waters into drinking water.

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2. Attempt any four parts in the following:
   (a) Differentiate between 'saturated' and 'superheated' steam. Give applications of both.
   (b) What is a steam trap? Discuss different types of steam traps.
   (c) Discuss various equipments used for steam generation.
   (d) Discuss the operation of a reciprocating compressor.
   (e) What are the various equipments used for vacuum operations?
   (f) Name the equipment used for waste heat utilization. Discuss in detail any one.

3. Attempt any two of the following:
   (a) What is the basic mechanism of refrigeration? Discuss different refrigeration cycles used for industrial application.
   (b) Discuss operation of a desert cooler for air cooling.
   (c) Differentiate between critical and optimum insulation thickness develop a necessary expression for critical insulation of a lagged pipe.

4. Attempt any three of following:
   (a) Differentiate among Hazard, risk and safety. Give classification of Hazards.
   (b) Explain bath tube curve phenomenon. Give its application in process plants.
   (c) Explain in detail the functioning of a $CO_2$ fire extinguisher.
5. Attempt any three of the following:

(a) Discuss various legislations on safety control presently applicable in process chemical plants.

(b) Discuss in detail 'Bhopal Gas Tragedy' what were the shortcomings.

(c) Explain the following:
   (i) Reaction Hazard Index
   (ii) Fire and explosion hazard index
   (iii) Disaster Management.