

B. CHEMICAL ENGG. FINAL EXAMINATION, 2006

(2nd Semester)

SAFETY IN PROCESS INDUSTRIES

(ELECTIVE III)

Time : Three hours

Full Marks : 100

Answer any *five* questions

1. a) What are the different ignition source of plant fire. 4
b) Write different causes of plant fire. 6
c) Discuss about the fire protection and prevention methods used in industry. 10
2. Discuss about the various types of potential hazard and its remedial measures in case of Reactors and Heat Exchangers. 10+10
3. With the help of examples, state the possibilities of accidents that may be caused by human error from the following cases.
a) Wrong valve closed
b) Wrong valve opened
c) Abnormal reading unnoticed on panel instrument. 20
4. What are the different types of plant explosions that are often encountered in industry. Mention the causes, results and damage potentials of those types of explosions. 20

[Turn over

[2]

5. Prepare a flow sheet for the continuous process for the production of diammonium phosphate (DAP). In this process the phosphoric acid and ammonia are mixed and non-hazardous DAP results if the reaction of ammonia is complete. Do the HAZOP study which will identify the hazards and operability problems for the above process. Also suggest the remedial measures for the identified problems. 20
6. Discuss about the typical pipe and valve failures and give also the reasons for their occurrence for the following cases
 - a) Dead end formation at a steam connection
 - b) Corrosion resulted from collected water
 - c) Water collected in a dead end. 20
7. Write notes on (any *four*) 4×5
 - a) Guide words for HAZOP study
 - b) Interlock and trip systems for an exothermic reactor
 - c) Classification of label for dangerous goods
 - d) LD₅₀ and LC₅₀
 - e) Blast waves
 - f) Material safety Data Sheet
 - g) Failure mode for a phase separation vessel.