

**BACHELOR OF ENGINEERING IN CHEMICAL ENGINEERING EXAMINATION, 2019**

(4th Year, 2nd Semester)

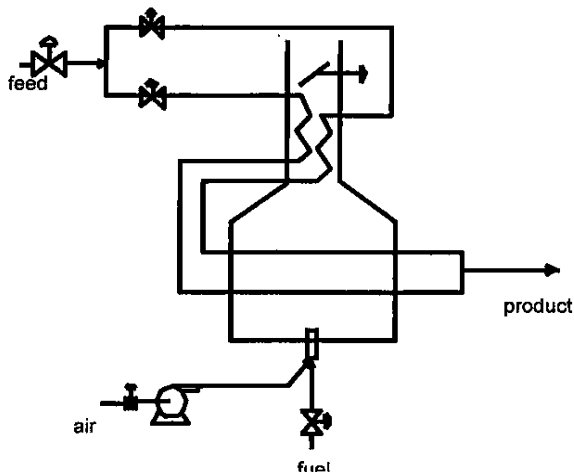
**CHEMICAL PROCESS SAFETY & RISK MANAGEMENT**

Time : Three hours

Full Marks : 100

Answer any **Five** questions

1. (a) What are the different ignition sources of plant fire? (4)  
 (b) Write different causes of plant fire? (6)  
 (c) Write about the different classification of fire? What are the various fire extinguishing system used for different classes of fire? (10)
2. (a) What do you mean by operational deviations? (2)  
 (b) Write the causes of possible deviations of the following operating parameters in case of chemical process plant (18)  
 (i) pressure deviation (ii) Temperature deviations (iii) Flow deviations (iv) Level deviations
3. (a) What are the different causes of accident in chemical process plant? (4)  
 (b) Discuss about the various types of potential hazard and its remedial measures in case of Reactors and heat exchangers (8 + 8)
4. (a) What is a fireball? How do you calculate the duration and power of a fireball? Discuss about the radiative flux and surface temperature of a fireball? (10)  
 © What are the different types of plant explosions that are encountered in industry. Mention the causes, results and damage potentials of these type of explosions? (10)
5. Write notes on (any four) (4x5)  
 (a) Pool fire  
 (b) LD<sub>50</sub> and LC<sub>50</sub>?  
 (c) Dust explosions  
 (d) Runaway reaction  
 (e) Pipe and valve failures
6. (a) Identify the type of process that should be considered for Hazop? (7)  
 (b) Define the following study notes, intension, causes, consequences and guide words (8)  
 © How are deviations manifested in a process (5)



7. (a) Draw Hazop method flow diagram. (4)  
 (b) Fired heaters are often used in process plants to heat gas or liquid to a desired temperature. It and have many potential hazards. Perform a HAZOP study. (16)  
 Node: Feed pipe after valve and before split; Process parameter: FLOW