University of Petroleum & Energy Studies
College of Management & Economics Studies, Dehradun
END SEM EXAM-APRIL 2017
MBA POWER MANAGEMENT/INFRASTRUCTURE MGT.
HSE FOR POWER SECTOR/ HSE FOR INFRASTRUCTURE INDUSTRY - MBPG 932/MBII932

TIME: 3 HRS **MAX MARKS; 100**

SECTION-A **(2x10=20 Marks)**

Q.1 Briefly write:

I. PHA ---
II. OCT is --
III. ISO is --
IV. BOD is ---
V. HAZOP is ---
VI. ALARP is --
VII. QRA is--
VIII. P&IDs ---
IX. UCVE is ---
X. CPCB is--

SECTION–B, ATTEMPT ALL QUESTIONS **(4x5= 20 Marks)**

Q.2. Write Short Notes on:

- Pool Fires
- BLEVE

Q.3 What do you mean by HSE performance indicators & Management information system (MIS)?

Q.4 EMS is on top priority for all type of industries. What is Environmental Management Systems-ISO 14001? Highlight the benefits & Key principles of EMS.

Q.5 Confined space entry is complicated study and require to follow set of procedure. Discuss in brief about confined space safe entry.

Q.6 Effluent treatment/ sewage treatment is a big problem for industries. What are the methods for treatment of waste water or sewage?

SECTION –C, ATTEMPT ANY TWO QUESTIONS (15x2= 30 Marks)

Q.7 Generation of solid waste depends upon life style of that particular region. What do you mean by solid waste? What are different techniques available to manage solid waste?

Q.8 Risk assessment at various stages of plant life can help in reduction of major accidents. Discuss objectives of risk and components of risk assessment.

Q.9 Air pollution impacts depend on concentration and duration of exposure. Discuss in detail about air pollution & what are different options available to control different air pollutants?

SECTION D – CASE STUDY (1x30= 30Marks)

Q.9a. Find out major causes of the disaster in current case study.

Q.9.b What is your learning from the given case study?

BP Texas Refinery case study

On March 23, 2005, a BP Texas City Refinery distillation tower experienced an overpressure event that caused a geyser-like release of highly flammable liquids and gases from a blow down vent stack. An explosion occurred when heavier than air hydrocarbon vapors combusted after coming into contact with an ignition source, probably a running vehicle engine. Vapour clouds ignited, killing 15 workers and injuring 170 others. The accident also resulted in significant economic losses and was one of the most serious workplace disasters in the past two decades. The total cost of deaths and injuries, damage to refinery equipment, and lost production was estimated to be over $2 billion.

Oil refineries vaporize crude oil in a furnace and then separate its various components in a distillation tower (sometimes called a raffinate splitter tower or a fractionating column) based on the different condensation points of the constituent gases. As the hot vapour rises in the tower, horizontal trays set at progressively lower temperatures collect the different components as they condense into liquids, which are then continuously drawn off into separate containers. A distillation tower can process (or separate) thousands of barrels per day of highly flammable crude oil into its constituent hydrocarbons for commercial consumption. When the tower is operating normally, overflow pipes drain the condensed liquids from each tray to the tray be- low, where the higher temperature causes re-evaporation. Uncondensed fixed gases at the top and heavy fuel oils at the bottom are also continuously drawn off and recycled through the tower.

In addition, normal operations would typically include a high and low level liquid detector in the distillation tower to indicate abnormal process conditions, activate alarms, and initiate programmed release of gas/fluid to the blow- down drum, which is usually equipped with a flare system to burn the vapours in a controlled setting.

Management decisions to continue operating with an atmospherically vented blow down stack in lieu of the widely available, and inherently safer, flare tower was an important factor. The distillation tower liquid level detection system was not designed to measure levels above a maximum height of ten feet, providing no insight into off nominal operational scenarios. The tower liquid level reached an estimated height of 138 feet immediately prior to the over- pressure event.

Subsequent investigative reports pointed to a strong cost- cutting focus by BP senior management that resulted in a lack of adequate training and supervision of filling and operating the distillation tower. Fundamental procedural errors led to overfilling the distillation tower, overheating, liquid release, and the subsequent explosion. Unit super- visors were absent during critical parts of the startup, and unit operators failed to take effective action to control deviation from the process or to sound evacuation alarms after the pressure relief valves opened.

The BP safety and quality assurance inspection and monitoring processes were absent and/or ineffective as a barrier to this failure chain. In addition, there was inadequate local, State, and Federal government safety over- sight.

The majority of 17 startups of the distillation tower from April 2000 to March 2005 had exhibited abnormally high internal pressures and liquid levels, including several occasions where pressure relief valves likely opened. However, the abnormal startups were not investigated as "near-misses," and the adequacy of the tower's design, instrumentation, and process controls were not reevaluated.

The startup of the distillation tower on March 23 was authorized despite reported problems with the tower level detector/transmitter, the high-level alarms on the tower, and the blow down drum. For example, a work order dated on March 10 acknowledged with management approval that a level detector/transmitter needed repairs but indicated that these repairs would be deferred until after startup. A control valve associated with pressure relief was also reported to have malfunctions prior to the accident. These pre-existing conditions were confirmed by the U.S. Chemical Safety Board (CSB). This release valve mal-functioned and contributed to the accident by not relieving the overpressure in a controlled manner.

Additionally, a key alarm failed to operate properly and to warn operators of unsafe conditions within the tower and the blow down drum.