

**UNIVERSITY OF PETROLEUM & ENERGY STUDIES  
DEHRADUN**



**End Semester Examination – April 2017**

**Program/course: B.Tech/ FSE**

**Subject: Advanced Safety Engineering**

**Code :FSEG 431**

**No. of page/s:2**

**Semester – 8**

**Max. Marks : 100**

**Duration : 3 Hrs**

**Section A - Define the following Questions**

**(4\*5 marks = 20 marks)**

1. Explain the maximum quantity of explosives that can be transported other than fireworks.
2. Differentiate flammable, very highly flammable, highly flammable and extremely flammable liquids?
3. Explain presence sensing, Pullback device and restraint device in guarding.
4. Give 4 examples for the following
  - a) Partial Permanent Disablement
  - b) Partial Temporary disablement
  - c) Total Permanent Disablement
  - d) Total Temporary Disablement

**Section B- Answer all Questions**

**(4\*10 marks= 40 marks)**

5. Explain the category of explosives according to the risk involved. Assuming that a 1000 kg of explosives are stored in warehouse. What are the necessary action to be taken to avoid accident due to lightning and thunderstorm. (6+4 marks)
6. A) Below here is the list of employees working in Sun Industries for the year 2015. Number of working days per year are 200. Average working hours for any employee are 8 hours .

| Time period- 2015     | Morning Shift | Night Shift | No of days |
|-----------------------|---------------|-------------|------------|
| January to August     | 1000          | 1000        | 150        |
| September to December | 1000          | 2000        | 50         |

The following are the injury statistics of the company of year 2015,

- a) Total number of accidents happened in the year 2015 - 12 Reportable Accidents
- b) Number of fatalities - 3
- c) One lost both of the his hand permanently
- d) Two lost index finger only
- e) One got facial disfigurement
- f) Three fractured their leg on 30<sup>th</sup> November 2015 and returned to work on 15 December 2015

Calculate the Accident rate, lost time Injury Frequency rate, Severity rate and Incidence rate.

Calculate only for reportable accident.

7. Define Stratification and roll over. What are the causes of stratification. What are the effects of rollover. What measures are taken to prevent rollover.
8. A) Draw a table showing compensation that has to be given for all disablement and injury.
  - b) Ram Singh is working in a Textile Industry. His age is 50. As a result of an Accident, his both legs got fractured. He legs became well after 24 months. What will be the amount of

Compensation given to him per month? His monthly Salary is 15000

c) Ill-fated Ravi aged 25 met an accident and passed away. His monthly Salary is 15000.

What will be the amount of Compensation given to his dependent? The relevant factor for his age is 200.

d) Mention four situation where employer are not liable to pay compensation (4+2+2+2)

**Section C- Answer the following questions**

**(2\*20 marks= 40 marks)**

9. You are asked to design foundation for a pressure vessel storage. Mention the material that can be used , various loading considered, Minimum fittings required for the pressure vessel. Explain the minimum requirement of fencing and pressure relief value. Mention the minimum safety distance that has to be maintained between pressure vessels and building for a toxic and non toxic gas.

10. A) Write short notes on Safety Sampling, Safety tour, Safety Inspection and Safety Survey. Define Active and Reactive monitoring. Mention various lagging and leading indicators to measure the safety performance of a company (10 Marks)

B) Explain the orders related to registration and renewal of licence of boilers according to Boilers act. (10 marks)

**OR**

A) Mention the maximum quantity in Kilogram /Number of cylinder that can be possessed without obtaining license from statutory authorities as per Gas cylinder rules for various type gases.

b) 50 Gas cylinders was designed, approved and manufactured for filling with LPG. Due to the customer request, instead of filling the empty cylinder with LPG, the company has to fill with another flammable gas. Can the conversion of Gas cylinder is possible? If yes from whom Approval is needed. For what gases you don't need approval

c) What are the various impurities removed or kept low while storing Methane gas in cylinders. What is the maximum moisture content allowed as per Gas cylinder rules.

d) Rico Pharmaceutical Company limited invented the following four new Chemicals. Those chemicals are going to be stored in a cylinder. As a safety officer of the company, what will be the color you suggest for cylinder and neck band.

| Chemical name | Toxicity | Flammability |
|---------------|----------|--------------|
| W             | Yes      | No           |
| X             | Yes      | Yes          |
| Y             | No       | No           |
| Z             | No       | Yes          |

Apart from this Acetylene, Hydrogen , chlorine, Oxygen, Carbon Monoxide, Carbon dioxide are also stored. Mention the colour for storing those cylinders? (3+1+1+5 marks)

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**Section A - Define the following Questions**

**(2\*10 marks = 20 marks)**

1. Interlock guard
2. Pinch point
3. Pull back device
4. Dissolved Acetylene cylinder
5. Boiler
6. Gas cylinder
7. Well head tank
8. Twohand control in guarding
9. Gun powder
10. Explosive limit and man limit

**Section B- Answer all Questions**

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3. Define Stratification and roll over. What are the causes of stratification. What are the effects of rollover. What measures are taken to prevent rollover.
  4. A) Draw a table showing compensation that has to be given for all types of disablement and injury.
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