

**National Exams December 2009**  
**98-Ind-B10 - Industrial Safety and Health**  
**3 hours duration**

**Notes:**

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a Closed Book exam. No calculators are allowed for this exam.
3. Any five questions constitute a complete paper. Only the first five questions as they appear in your answer book will be marked.
4. All questions are of equal value.
5. Write your answers in point-form whenever possible, but fully.

Front Page

**Marking Scheme (marks)**

- |    |        |         |         |
|----|--------|---------|---------|
| 1. | (i) 7, | (ii) 7, | (iii) 6 |
| 2. | (i) 6, | (ii) 7, | (iii) 7 |
| 3. | (i) 7, | (ii) 7, | (iii) 6 |
| 4. | (i) 7, | (ii) 7, | (iii) 6 |
| 5. | (i) 7, | (ii) 7, | (iii) 6 |
| 6. | (i) 7, | (ii) 7, | (iii) 6 |
| 7. | (i) 6, | (ii) 6  | (iii) 8 |

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1.
  - (i) State the costs associated with Occupational Health and Safety Act (OHSA) and OHSA Standards that companies, especially the smaller ones, generally object to because they feel that such costs for improvement are not economically justifiable.
  - (ii) What is your understanding of the concept of “system safety”, while dealing with accident causation or avoidance?
  - (iii) State the new hazards in non-traditional sectors in industry that are emphasized by the OHSA Act.
  
2.
  - (i) State the manner by which fault-free analysis can be used in accident investigation. What are the limitations of the fault-free analysis?
  - (ii) What is the purpose of job safety analysis (JSA)? State the steps followed in conducting a job safety analysis.
  - (iii) Explain the concept of failure modes and effects analysis (FMEA) in the context of reliability engineering.
  
3.
  - (i) Certain chemical agents are especially harmful to specific organs. Name the specific organs that are affected by such agents.
  - (ii) Explain the various types of damage caused by chemical agents to skin.
  - (iii) State the possible effects of toxic material on the operator.
  
4.
  - (i) What are the responsibilities of facilities and equipment designers in providing safety measures for toxic materials?
  - (ii) How are the toxic agents detected? What are the typical industrial operations that require the use of respiratory protective equipment and protective clothing?
  - (iii) State the major types of respiratory protection equipment including their characteristics.
  
5.
  - (i) What are the features of an effective machine guard or safety device?
  - (ii) State the precautionary measures that are common to operation of all mechanical equipment.
  - (iii) Injuries in industrial plants are due to mechanical causes arising from certain machines. State the typical machines and the types of mechanical injuries.
  
6.
  - (i) Define physical hazards and name some of the physical hazards.
  - (ii) What is a confined space? Give some examples of confined spaces.
  - (iii) What is your understanding of the criterion for permit-required confined space?
  
7. A shipping department packager in a small manufacturing plant placed a gear on a layout table and sprayed it with a rust preventative before packing it for shipment. After the employee had sprayed several gears, the spray gun became clogged and failed to operate. The employee tried to clean the clogged spray gun tip. At that instant, the gun discharged, and the employee’s left thumb was severely lacerated and subsequently had to be amputated.
  - (a) Determine the cause of the accident.
  - (b) State the corrective actions required.
  - (c) Suggest the follow-up action required.