

**National Exams May 2015**  
**11-CS-2-Engineering in Society – Health and Safety**  
**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. Candidates may use one of two calculators, the Casio or Sharp approved models.
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. Show all calculations.

**Marking Scheme (marks)**

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

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1.
  - (i) State your understanding of the terms, safety engineering and safety practice.
  - (ii) Show by means of a diagram your understanding of multiple factor theory in the context of incident and accident theories.
  - (iii) Explain the concepts of (a) reactive approach for deriving preventive actions from accident and (b) proactive approach for developing preventive actions before accidents occur. Use diagrams to explain.
  
2.
  - (i) State the various sources of hazards in industry.
  - (ii) State the priorities in order of importance for selecting controls for hazards.
  - (iii) State the steps that should be followed for the effective use of warning devices.
  
3.
  - (i) State the types of airborne contaminants.
  - (ii) What are the health effects of chemicals?
  - (iii) What are the main routes of entry for hazardous substances into the body? Explain.
  
4.
  - (i) What are the agents and sources of biological hazards?
  - (ii) Give some broad examples of biohazards.
  - (iii) State the classification of biohazards.
  
5.
  - (i) What are the components of risk management process?
  - (ii) State the steps followed in chemical risk assessment?
  - (iii) Explain the procedures followed in risk reduction in chemical processing plants?
  
6.
  - (i) Explain the types of hearing loss?
  - (ii) State the engineering controls used for noise and vibration?
  - (iii) State the characteristics and purpose of: (a) sound level meter, (b) impulse meter, (c) frequency analyzer, and (d) dosimeter.
  
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.
  - (i) Determine the cause of the accident.
  - (ii) State the corrective actions required.
  - (iii) Suggest the follow-up action required.