

**National Exams May 2014**  
**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) 7, (ii) 7, (iii) 6
2. (i) 7, (ii) 6, (iii) 7
3. (i) 8, (ii) 6, (iii) 6
4. (i) 7, (ii) 7, (iii) 6
5. (i) 7, (ii) 6, (iii) 7
6. (i) 6, (ii) 7, (iii) 7
7. (i) 7, (ii) 7, (iii) 6

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1.
  - (i) State the engineering activities in general, where the engineers should be able to recognize safety and health hazards and implement controls for them.
  - (ii) What are the design engineering activities in particular, where the engineers can eliminate, reduce or control safety and health risks?
  - (iii) What is your understanding of the three Es of safety: engineering, education and enforcement?
  
2.
  - (i) State the principles and priorities of hazard control that are helpful for selecting controls for hazards.
  - (ii) What is the purpose of safety devices? Give examples of safety devices.
  - (iii) Explain the steps followed in accident investigation. What are the investigation tools/equipment used in accident investigation?
  
3.
  - (i) Briefly explain the types of safeguards used in machines.
  - (ii) State the purpose of point-of-operation devices used in a machine. Give examples.
  - (iii) Explain the importance of handle design of hand tools from an ergonomics viewpoint.
  
4.
  - (i) Explain the controls used for protecting people from exposure to hazardous materials in the workspace.
  - (ii) State the characteristics of confined spaces. Name the confined spaces in industry.
  - (iii) What are the main hazards of confined spaces? Explain.
  
5.
  - (i) State the characteristics of the following motivational concepts proposed by: (a) Maslow, (b) Herzberg and (c) Vroom.
  - (ii) What is the purpose of job safety analysis (JSA)? State the aspects of jobs analyzed by JSA?
  - (iii) State the causes of job stress and the means to reduce and manage stress.
  
6.
  - (i) State the elements of an occupational safety program.
  - (ii) State the major elements of an ergonomics program that can be installed in a company to deal with occupational safety and health problems.
  - (iii) What are the steps followed in implementing an emergency safety plan.
  
7. A die setter and a co-worker had each rigged a chain around one end of a 5-ton die to move it by crane to a press line. The die setter did not double-check his rigging. As he turned to walk away, his co-worker signaled the crane operator to take up the slack in the chain. The chain which the die setter had rigged was against the keeper pin instead of the die notch. The sudden pressure from the chain caused the keeper pin to shear off; it struck the die setter across the back of the head causing a fracture of his skull and knocking him unconscious.
  - (i) Determine the cause of the accident.
  - (ii) State the corrective actions required.
  - (iii) Suggest the follow-up actions required.