

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

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1.
  - (i) What are the typical environmental hazard? Explain your understanding of environmental hazards.
  - (ii) What are the effects of environmental hazards?
  - (iii) Explain the sources of environmental hazards?
  
2.
  - (i) What is your understanding of cumulative trauma or repeated motion injuries resulting from repeated motion or use of tools and equipment.
  - (ii) Explain the typical cumulative trauma injuries or disorders, such as (a) trigger finger, (b) carpal tunnel syndrome and (c) tenosynovitis.
  - (iii) State the basic principles of machine guarding.
  
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 steps followed in the conduct of a safety audit process.
  - (ii) What is the purpose of accident investigation? State the criteria used to decide which accidents to investigate.
  - (iii) State the classic steps followed in accident investigation.
  
6.
  - (i) State the detrimental effects (other than hearing loss) from noise.
  - (ii) What is your understanding of audiology and audiogram?
  - (iii) An industrial worker is exposed to the following noise levels during an 8-hour work shift: 80 dBA for 4 hrs, 85 dBA for 2hrs, 90 dBA for 1 hr and 95 dBA for 1 hr. Calculate the combined effect or the daily noise dose, (OSHA permissible exposure levels for duration/day are: 80 dBA-16 hrs, 85 dBA-8 hrs, 90 dBA -4 hrs and 95 dBA – 2 hrs.). Is the daily noise acceptable? If this is not, then what should be done?
  
7. An employee in a foundry was using an over-head wall mounted electrically controlled crane to move a heavy casting from one position to another at his workstation. The casting weighted approximately 3,000 pounds. While he was moving the casting, it fell, causing the hoist cables to snap and strike the employee a glancing blow at his head. Fortunately, he was wearing a protective head gear, or the blow could have been fatal when the hoist eyebolt assembly failed.
  - (i) Determine the cause of the accident.
  - (ii) State the corrective actions required.
  - (iii) Suggest the follow-up action required.