

National Exams May 2018
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) 7, (ii) 7, (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) 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) 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) 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. 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.