

National Exams December 2010
98-CS-2-Engineering in Society - Health, Safety and the Environment
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.

Marking Scheme (marks)

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

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1.
 - (i) Since the implementation of the OSHA Act, with particular reference to the systems approach and ergonomics, state the positive developments that have taken place recently.
 - (ii) What is your understanding of the concept of “system safety”, in the context of accident causation or avoidance?
 - (iii) State the priorities that are generally followed in making safety inspections in industrial plants.

2.
 - (i) Explain the manner by which engineering design deficiencies can contribute to other causes of accidents.
 - (ii) State the order of preference that should be followed as general principles for eliminating and controlling hazards in industry.
 - (iii) What are the various safety features that can be installed in hand drills to prevent accidents?

3.
 - (i) What are the protective means of minimizing and containing effects of accidents?
 - (ii) What is the purpose of warning means and devices? State the various human senses used as warning devices.
 - (iii) State the different types of fail-safe designs. Give examples of fail-safe devices.

4.
 - (i) What are the basic objectives of fire protection, prevention and control?
 - (ii) Explain the means by which the spread of fire can be prevented once fire is discovered.
 - (iii) What are the possible effects of fire hazards?

5.
 - (i) What are toxic substances and their effects on the human body?
 - (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 specific organs of the body that are especially harmed by certain chemical agents.

6.
 - (i) What are the adverse effects of vibration and noise?
 - (ii) Explain the use of good engineering measures that are used to reduce noise levels in industry.
 - (iii) What are the effects of vibration and noise on personnel, equipment and operation?

7. A millwright was reaching out to make an adjustment on a flywheel chain on a press while standing on a 20-foot ladder. In doing so, he lost his balance and fell onto the shaft and then struck a conveyor and fell to the floor, approximately 15 feet below. This caused a compound fracture of his right leg and property damage of \$5,000 for a broken shaft and belts on a large press and broken guard on the conveyor belt.
 - (i) Determine the cause of the accident.
 - (ii) State the corrective actions required.
 - (iii) Suggest the follow-up actions required