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

1. (i) Since the implementation of the OHSA 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.