

National Exams December 2009
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.

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1.
 - (i) State the positive developments that have taken place since the implementation of the OHSA (Occupational Health and Safety Act) Act with particular reference to systems approach and ergonomics..
 - (ii) State the responsibilities of the employers and employees under the OHSA Act.
 - (iii) Explain the emphasis placed by OHSA Act to deal with the new hazards in non-traditional sectors of industry including service industries.

2.
 - (i) What are the limitations of quantitative (based on statistics) inspections of plant safety? State the reasons for the preference of qualitative plant safety inspections.
 - (ii) State the order of preference that should be followed as general principles for eliminating and controlling hazards.
 - (iii) What are the various safety features that can be installed in hand drills to prevent accidents?

3.
 - (i) State briefly your understanding of the following safety measures: isolation, lockouts, lockins and interlocks.
 - (ii) State briefly the methods used to reduce failure rates.
 - (iii) What is a “weak link” used to minimize and control serious failure or accident? Give some examples.

4.
 - (i) What are the most dangerous industries from a fire hazard standpoint? State the best way to deal with fires.
 - (ii) Explain the manner by which emergency evacuation of personnel is provided, once a fire is discovered.
 - (iii) State the four classes of fires and appropriate extinguishing media for each classification of fires.

5.
 - (i) What are toxic substances and their effects on human body?
 - (ii) What are the possible effects of toxic material?
 - (iii) State the responsibilities of the facilities and equipment designers in providing safety measures for toxic hazards.

6.
 - (i) What are the adverse effects of vibration and noise?
 - (ii) What are effects of vibration and noise on personnel, equipment and operation?
 - (iii) Explain the means by which noise can be reduced in industry.

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.