

National Exams December 2011
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) 6, (ii) 6, (iii) 8
3. (i) 6, (ii) 7, (iii) 7
4. (i) 7, (ii) 6, (iii) 7
5. (i) 7, (ii) 7, (iii) 6
6. (i) 7, (ii) 7, (iii) 6
7. (i) 7, (ii) 7, (iii) 6

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1. (i) State the concept of “system safety” in the context of accident causation or avoidance.
(ii) Explain the manner by which workplace health and safety can be improved for all workers through information technology or electronic access to regulatory information and services.
(iii) Explain the cooperative agreements the companies may establish with OSHA for maintaining safe and healthful employment to obtain exemption from certain formal inspections.
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) Give examples of methods by which hazard levels may be limited in industry.
(iii) Explain your understanding of initiating and contributing hazards resulting in injury and damage of a pressurized steel tank.
3. (i) Give some common examples of isolation to prevent injury or damage.
(ii) State the purpose of warning means and devices. What are the various human senses used as warning devices?
(iii) State the procedure that should be followed for emergency actions in an industrial plant.
4. (i) What are the most dangerous industries from a fire hazard standpoint? State the best way to deal with fires.
(ii) Explain the characteristics of fire extinguishing systems.
(iii) What are the possible effects of fire hazards on personnel, materials and resources and environment?
5. (i) Certain chemical agents are especially harmful to specific organs. Name the specific organs that are affected by such chemical agents.
(ii) State the various types of air contaminants. What are the basic approaches to measuring air contaminant exposures?
(iii) Explain the various damages by chemical agents to skin.
6. (i) State the characteristics and purpose of: (a) an audiometric test program, (b) a sound-level meter, and (c) an octave-band analyzer.
(ii) What are the sources of vibrations and noise in equipment?
(iii) What are the various types of hearing protection devices?
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.