

National Exams May 2012
98-Ind-B6 - Workplace Design
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 the calculations.

Marking Scheme (marks)

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|----|--------|---------|---------|
| 1. | (i) 6, | (ii) 7, | (iii) 7 |
| 2. | (i) 7, | (ii) 8, | (iii) 5 |
| 3. | (i) 7, | (ii) 7, | (iii) 6 |
| 4. | (i) 6, | (ii) 8, | (iii) 6 |
| 5. | (i) 7, | (ii) 6, | (iii) 7 |
| 6. | (i) 7, | (ii) 7 | (iii) 6 |
| 7. | (i) 7, | (ii) 6 | (iii) 7 |

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1.
 - (i) Explain the types of compatibility in the context of human information processing.
 - (ii) Explain when to use auditory or visual display form of presentation of information or message.
 - (iii) Explain the concept of signal detection theory (SDT) by means of a diagram.

2.
 - (i) State the “task characteristics” that should be considered in designing manual materials handling job or task to minimize industrial hazard.
 - (ii) State the guidelines that should be followed to reduce the risk of performing manual materials handling job or task.
 - (iii) What are the most promising engineering solutions to minimize industrial hazards arising from performing manual materials handling job or task?

3.
 - (i) What are the various coding systems used in control design?
 - (ii) State the guidelines for the location of displays and controls with particular reference to:
(a) visual displays, (b) hand controls, and (c) controls that require force.
 - (iii) State the characteristics of the special control devices from an ergonomics viewpoint:
(a) teleoperators, (b) speech-activated control and (c) eye-activated control.

4.
 - (i) What are the three distinct approaches to assessing manual materials handling or MMH capabilities? Explain.
 - (ii) State the factors responsible for back injuries in lifting tasks.
 - (iii) Explain the means by which the risk of MMH can be reduced.

5.
 - (i) State the factors affecting the level of energy consumption on a particular task.
 - (ii) Explain the means by which energy expenditure can be maintained within reasonable limits for human work activities.
 - (iii) Define human strength. How are the static (isometric) and dynamic (isokinetic) strengths measured?

6.
 - (i) What are the essential factors that must be taken into consideration for industrial workplace design?
 - (ii) State the steps that should be followed systematically for determining workplace design parameters.
 - (iii) Operators in industry generally perform their work in (a) seated, (b) standing, and (c) sit-stand positions. State and explain the best and worst working positions.

7.
 - (i) State the general principles used in the application of anthropometric data.
 - (ii) Explain the concepts of: (a) horizontal work surface area, and (b) work surface height, in the context of workspace/workplace design.
 - (iii) State the general principles of seat design.