

**OLLSCOIL NA hÉIREANN, GAILLIMH
NATIONAL UNIVERSITY OF IRELAND, GALWAY**

SUMMER EXAMINATIONS 2000-2001

ERGONOMICS IE520

M.Sc OCCUPATIONAL HEALTH AND ERGONOMICS

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Time Allowed: 3 Hours

Answer Any 5 Questions

Use separate answer books for each Section

Section A. Information Systems Ergonomics

Question 1.

Marks

Write short notes on **four** of the following:

5x4

- Signal Detection Theory (SDT)
- Unit of measure of information
- Allocation of functions
- Human factors in systems development
- Discrete action classification of human error
- Qualitative visual displays

Question 2.

Marks

(a) Write short notes on **two** of the following:

4x2

- Laboratory versus field research
- Experimental research
- Evaluation research
- Human reliability

(b) List criterion measures that could be used to evaluate the usability of a computerized posture evaluation system. Explain the rationale behind the selection of the criteria using a posture assessment method with which you are familiar. **12**

Question 3.

Marks

- (a) Discuss some fundamental characteristics of systems.
- (b) How does task analysis relate to these characteristics?
- (c) Using a task analysis technique of your choice carry out a task analysis of conducting a RULA analysis.

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Question 4.

Marks

- (a) Discuss the meaning of the term accident.
- (b) Outline the factors contributing to accidents
- (c) What practices can be adopted to alter the behaviour of people in potentially hazardous situations

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SECTION B. Physical Ergonomics

Question 5.

Marks

Write short notes on **four** of the following:

5x4

- Physiological requirements of artificial lighting
- Zeitgebers
- Factors contributing to WRULDs
- Hierarchical Task Analysis (HTA)
- Gender differences in anthropometrics
- Static strength evaluation

Question 6.

Marks

- (a) Distinguish between static and dynamic strength.
- (b) Discuss the usefulness of strength testing as a tool for reducing the risk of musculoskeletal disorders in the workplace.

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12

Question 7.

Marks

“Shiftwork that includes night shifts is socially burdensome and often leads to health disorders which can rightly be classified as occupational.” (Kroemer, K.H.E. and Grandjean, E., 1997). Discuss this statement and outline guidelines for the design of shift systems.

20

Question 8.

Marks

- (a) Explain the rationale for the selection of one of the criteria for the NIOSH equation. **6**
- (b) Apply the revised NIOSH Lifting Equation to the following problem. A worker manually lifts trays of clean dishes from a conveyor at the end of a dish washing machine and loads them on a cart as shown in Figure 1. The trays are filled with assorted dishes (e.g., glasses, plates, bowls) and silverware. The job takes between 45 minutes and 1 hour to complete, and the lifting frequency rate averages 5 lifts/min. Workers usually twist to one side of their body to lift the trays and then rotate to the other side of their body to lower the trays to the cart in one smooth continuous motion. The maximum amount of asymmetric twist varies between workers and within workers; however, there is usually equal twist to either side. During the lift the worker may take a step toward the cart. The trays have well designed handhold cutouts and are made of lightweight materials. At the origin of the lift, the horizontal distance (H) is 51cm, the vertical distance (V) is 112cm, and the angle of asymmetry (A) is 30°. At the destination of the lift, H is 51cm, V is 18cm, and A is 30 degrees. The trays normally weigh between 2.3kg and 9.1kg, but for this example, assume that all of the trays weigh 9.1kg. The coupling is classified as good. Significant control is required at the destination of the lift. The FM is determined to be .80. **14**

Based on the results of your analysis above what is your assessment of the lifting task. Briefly outline some redesign suggestions.