

國立清華大學 101 學年度碩士班考試入學試題

系所班組別：工業工程與工程管理學系(丙組)

考試科目 (代碼)：人因工程(1702)

共 3 頁，第 1 頁 *請在【答案卷】作答

I. Essays (70%): Please answer each question concisely and to the point. Examples must be given if specified. Handwritten answers may be done in Chinese as well as in English.

- (10%) Discuss 1) why “Human Factor is not just applying checklists and guidelines” and 2) why “Human Factors is not just common sense”
- (10%) What are the characteristics of a good coding system? Give an example to explain each characteristic in your answer.
- (12%) The following table provides the thermal environment measurement data of a manufacturing company in a typical summer working day. Given the workers are performing heavy manual material handling tasks at the warehouse area under the working schedule of resting 10 minutes in every working hour. Please evaluate the workplace thermal environment quantitatively and comment on whether it meets the requirements of the ROC safety and health standards. If not, how to improve it?

Working hour	Wet bulb T (°C)	Dry bulb T (°C)	Globe T (°C)
8:00-10:00	27	28	30
10:00-12:00	28	30	31
13:00-15:00	29	31	33
15:00-17:00	29	30	32

每小時作息時間比例		連續作業	75%作業 25%休息	50%作業 50%休息	25%作業 75%休息
時量平均綜合溫度熱指數值°C	輕工作	30.6	31.4	32.2	33.0
	中工作	28.0	29.4	31.1	32.6
	重工作	25.9	27.9	30.0	32.1

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4. (6%) Please describe the important considerations of an ergonomic chair design.

5 (12%) Please define the following terms:

- i. noise dose
- ii. Reynaud syndrome
- iii. indirect glare
- iv. wind chill effect

6.(10%) Plan an experiment to find out the best command design(指令設計) for a speech control robotic system. Describe experimental variables and procedure.

7.(10%) Please analyze human errors in the “Organ transplantation issue(器官移植事件)” occurring last year in a famous hospital, and propose your prevention strategies.

II. Filling blanks (30%).Please write the answer for the blank in each of the following question, each question is 2 points

- (1) A single motor-nerve fiber enervates a group of muscle fibers called a _____.
- (2) The most immediate source of energy for muscle contraction is _____.
- (3) The maximum aerobic power (MAP) of a 70 kg man is about _____ Kcal per minute.
- (4) For sedentary work, the energy cost is about _____ Kcal per minute.
- (5) In NIOSH₁₉₈₁ or NIOSH₁₉₉₁ lifting guide, there are AL and MPL criteria, what is the full name of MPL: _____.
- (6) The movements that a wrist can perform are flexion/extension, ulnar deviation/radial deviation, and _____.
- (7) In the beginning of a work, the _____ is due to the fact that the supply of energy is not met the demand, this should be paid back after the cessation of work.
- (8) Closed-loop theory emphasize the role of sensory _____ and consider all behavior, fast or slow, to be controlled by comparing the effect of the action to some representation of what action should be.

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- (9) Fitts Law states that movement time is logarithmic function of distance when target size is held constant, and that movement time is also a logarithmic function of target size when distance is held constant; please write out Fitts Law formula _____ . (MT: movement time; D: distance of movement from start to target center; W: width of target; a, b, c ... constants)
- (10) A _____ is the three dimensional space within which an individual works.
- (11) In the case of rotary controls and fixed linear displays, Warrick's principle can be described as the expectation that the pointer on the display will move in the _____ direction as that side of the control which is nearest to it.
- (12) On theater stage, the lighting engineer moves the spotlight to keep it on an actor. What is the control order of system? _____.
- (13) What are the three most effective operational methods of coding controls when we design a red-yellow-green traffic light: _____ coding, shape coding, and position coding.
- (14) There are general four types of resistance can be felt as feedback of controls; there are elastic resistance, static friction, _____, and inertia.
- (15) The common numeric keyboards as illustrated below, the calculator is quite different from the telephone, is there any human factor principle govern these two designs: _____. (Yes or No)

calculator	Telephone
7 8 9	1 2 3
4 5 6	4 5 6
0	0