

國立清華大學 命題紙

九十二學年度 工業工程與工程管理學系(所) 工業工程組丙 組碩士班研究生招生考試

科目 人因工程 科號 1902 共 二 頁第 一 頁 \*請在試卷【答案卷】內作答

1. The workers in the packaging department of a plastic products manufacturing company complained about the musculoskeletal discomforts and heavy workload. Their normal tasks involve placing 24 finished products in a box. Then seal the box and place the box on a pallet. In order to solve the problem, the company randomly selected 3 people, and monitoring their heart rate responses for one week. The obtained data are presented in the following. Please analyze the data and determine whether the workload is too heavy. If so, what are the approaches to improve the job design? (15%)

|   | Age (years) | Resting pulse, bpm | Average working pulse, bpm |
|---|-------------|--------------------|----------------------------|
| A | 23          | 75                 | 108                        |
| B | 26          | 78                 | 115                        |
| C | 25          | 72                 | 113                        |

2. Describe the differences between aerobic and anaerobic metabolism. (10%)
3. Please discuss the important features for VDT (computer) workstation design. (10%)
4. Define the following terms (15%)
- action potential
  - electroencephalogram
  - static effort
  - human information processing
  - wrist ulnar deviation
5. Explain the following terms (20%)
- color rendering index
  - core temperature
  - temporary threshold shift at 2 minutes ( $TTS_2$ )
  - equivalent sound level
  - mirror image arrangement
  - position coding
  - reach envelope
  - QWERTY keyboard

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6. Answer the following question (30%)

- a. How to determine the height of a work surface for standing work of light, medium and heavy tasks? How about for the same works in sitting posture?
- b. What is ET? What is heat stress index?
- c. According to ANSI and ISO, the central frequencies of ten standardized octave bands are? Now I have listed the noise spectrum in three classrooms in the following table, tell me the total SPL in each room?

| Band   | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
|--------|----|----|----|----|----|----|----|----|----|----|
| Room 1 | 34 | 29 | 46 | 49 | 82 | 66 | 68 | 54 | 49 | 66 |
| Room2  | 18 | 23 | 34 | 82 | 79 | 79 | 55 | 54 | 61 | 56 |
| Room3  | 22 | 24 | 25 | 35 | 55 | 55 | 58 | 58 | 44 | 41 |