YILDIZ TECHNICAL UNIVERSITY
DEPARTMENT OF INDUSTRIAL ENGINEERING
ERGONOMICS – MIDTERM EXAM

28.04.2021

Number :
Name-Surname :

QUESTIONS

Question 1. Read the sentences below, carefully. If you think the sentence is True or False, then write (T) or (F) inside the paranthesis. Also, if you think that a sentence is False, then write the truth of it.

( ) There are two types of metabolism: Basal and digestive.
( ) Dosimeter is devise used to measure the oxygen consumption measurement.
( ) The definition of "design the job so that any member of the workforce can perform it" belongs to "Fitting the Person to the Job" concept.
( ) Hawthorne experiments aim to arrange workplace based on Ergonomic factors.
( ) For physically light works, we may choose the colour of green in an office.

Question 2. In a factory, it is needed to locate a pedal to the most appropriate height for 7 workers (3 male and 4 female workers) to be used while sitting. Hence, the waist heights of the male and female workers are shown in the table, below. Standard deviation is computed as 2.4 for males, 2.1 for females and 2.6 for all workers. According to these, first decide which Normal Distribution Coefficient to select, and then compute the height of the pedal for,

a) Female workers.
b) Male workers.
c) All workers, together.

Female workers waist heights (cm)	Male workers waist heights (cm)
42	52
53	51
52	59
51	-

Percentage	Normal Distribution Coefficient (NDC)
%25	0.674
%50	0
%75	0.674

For Percentage < % 50 :
Anthropometric measurement = Average value - (Std. deviation x NDC)
For Percentage > % 50 :
Anthropometric measurement = Average value + (Std. deviation x NDC)

Question 3. a) Please find daily total metabolic rate for a 57 years old woman who weighs 85 kg. (The activity metabolic rate of the woman is 2400 kcal/day).

TMR = BMR + AMR +DMR DMR = 0.1 (BMR + AMR)

b) There is a 50 years old man forester, cutting down trees in a large forest. The forester's applied holding force for the work is 50 N, and the maximum holding force is 70 N. The work is static and heavy. If the work occurs durig an half hour, find the length of the special rest given for the worker.

$$DS = 1,8(t/T)^{1,4}\left[\left(F/F_{maks}\right) - 0,15\right]^{0,5} 100 \qquad t_{maks} = -15 + \frac{21}{\left(F/F_{maks}\right)} - \frac{0,6}{\left(F/F_{maks}\right)^2} + \frac{0,1}{\left(F/F_{maks}\right)^3}$$

Question 4. There is a machine control switch aimed to be implemented on the wall, and used by three male and two female workers. The average shoulder height of three men is 105 cm. and two women is 97 cm. The switch is commanding two different machines at the same time. There is a problem of locating the switch to the most appropriate height for men and women workers. The noise levels of the machines are 130 and 138 decibels, respectively. The working environment is a wide and north-sided place. The job is a work with medium-weight and low-sensitivity. The walls are painted with two colors; white and orange, respectively, from the ceiling to the floor. General illumination level of the working environment is 1000 lux; and it is ensured by a few fluorescent lamps.

a) Please comment on what should be the height of the switch by considering your anthropometry knowledge.
b) What can you say about the noise level that the workers are exposed? What kind of solutions do you suggest to eliminate the harmful effects of noise?
c) Please evaluate the working environment by considering visual environment and lighting.
d) Please make recommendations about *Ergonomics Program* implementation in this company, based on the steps discussed in the video you watched in online classroom.

Good Luck...
Prof.Dr. Alev TAŞKIN GÜMÜŞ