The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Textile and Apparel Technology

Study Programme	: Bachelor of Technology Honours in Engineering/ Bachelor of Industrial Studies Honours
Name of the Examination	: Final Examination
Course Code and Title	**: TAX6539/TAX6556 Ergonomics**
Academic Year	: 2020/2021
Date	: 22nd January 2022
Time	: 1400-1700hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Eight (8)** questions in Four **(4)** pages.
3. Write down your Index Number in all the pages of answer scripts.
4. Answer the question one (Q1), which is compulsory and five (05) more questions from Q2 to Q8. Question one (Q1) carries 25 marks and questions two (Q2) to eight (Q8) carry fifteen (15) marks each.
5. Answers to each question should commence on a new page. If a question has many parts, all the parts should be answered in the chronological order under the same question.
6. Write down the answered question numbers in the answer book.
7. Answers should be in clear hand writing.
8. Do not use red colour pens to write the answers.

Compulsory Question

(Q1) (a) Name two (02) study areas in the discipline of social psychology in relation to ergonomics. (02 marks)

(b) State the three (03) machine components of the human -machine system. (03 marks)

(c) State three (03) functions of a skeletal system of a human being. (03 marks)

(d) Name three (03) basic components of physical fitness. (03 marks)

(e) State three (03) phases of human memory. (03 marks)

(f) What is the "Permissible exposure limit " and the "Action limit" of noise for 8 hour working period ? (02 marks)

(g) Mention the percentage of light emission in the downward direction and the upward direction of direct type luminaire. (02 marks)

(h) Mention the two (02) standard shift rotational techniques, along with the relevant elemental cycles. (04 marks)

(i) List three (03) types of anthropometric data used for designing purposes. (03 marks)

Answer any five (05) questions from the following seven (07) questions

(Q2) (a) Define the following terms in relation to Ergonomics.

i. Cumulative trauma disorders
ii. Occupational illness
iii. Occupational injury

(06 marks)

(b) Briefly discuss the ergonomic approaches introduced by the following ergonomists.

i. Frederick W. Taylor
ii. Frank and Lillian Gilbreth

(05 marks)

(c) Discuss how the knowledge of the following subjects are used in ergonomic applications.

i. Mathematics
ii. Engineering and Technology

(04 marks)

(Q3) (a) With the aid of a normal distribution curve, describe the concept of percentiles used in designing. You may select the height of the population for your description. (05 marks)

(b) Giving five (05) examples, discuss the use of percentiles and anthropometric data in designing. (10 marks)

(Q4) (a) Write a short note on the "Reconstructive memory". (05 marks)

(b) Briefly explain the seven (07) major elements of a human - machine system. (07 marks)

(c) What do you understand by the term "Human performance improvement"? (03 marks)

(Q5) Giving appropriate values, describe the below given factors, which are essential to design desirable thermal conditions at workplaces.

i. Air temperature (04 marks)
ii. Air humidity (04 marks)
iii Air movement (04 marks)
iv Radiant temperature (03 marks)

(Q6) (a) Briefly describe the importance of designing proper displays and controls in industrial machines. (03 marks)

(b) Write short notes on the following.

i. Guidelines for designing displays (06 marks)
ii. Guidelines for designing controls (06 marks)

(Q7) (a) Briefly describe the three (03) design philosophies, which can be used to design workplaces. (06 marks)

(b) Discuss the advantages of sitting work posture over the standing work posture. (06 marks)

(c) Discuss the important features of an ergonomically designed chair. (03 marks)

(Q8) (a) Three (03) types of task performances are common in manufacturing industries. Briefly explain each of them. (06 marks)

(b) Discuss why human performance technology can be considered as "systematic" and "systemic". (04 marks)

(c) Giving examples, describe the terms "whole body vibration" and "segmental vibration". (05 marks)