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

Study Programme	:	Bachelor of Science Honours in Engineering / Bachelor of Industrial Studies Honours
Name of the Examination	:	Final Examination
Course Code and Title	:	**TAX6556 Ergonomics**
Academic Year	:	2024/25
Date	:	25th January 2026
Time	:	0930-1230h
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 on all the pages of answer scripts.
4. Answer 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 chronological order under the same question.
6. Write down the answered question numbers in the answer book.
7. Answers should be in clear handwriting.
8. This is a Closed Book Test (CBT).

Compulsory Question

Question 01

a) List the basic principles of ergonomics and give examples of the data used in each principle. (04 marks)

b) State three (03) basic components of physical fitness that are important for performing industrial work efficiently. (03 marks)

c) Name three (03) study areas of human cognition relevant to workplace performance. (03 marks)

d) List four (04) factors that affect aerobic capacity . (04 marks)

e) Identify the purpose of the Job Description Index (JDI). (02 marks)

f) Describe the difference between fixed shifts and rotating shifts. (04 marks)

g) Identify two (02) common musculoskeletal problems faced by industrial workers and two (02) ergonomic practices to prevent musculoskeletal injuries. (02 marks)

h) Name the three (03) basic design philosophies used by ergonomists when applying anthropometric data in workplace design. (03 marks)

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

Question 02

a) Discuss the contributions of Bernardino Ramazzini, Frederick W. Taylor, and Frank and Lillian Gilbreth to the historical development of ergonomics. (06 marks)

b) Consider a computer-based office workstation. Explain how human, machine, and local environmental components should be designed to improve operator comfort and work efficiency. (09 marks)

Question 03

a) Explain the phases of human memory and their importance in task performance. (05 marks)

b) A manufacturing organisation has reported high error rates, low productivity, and increased worker fatigue, even though the workers are technically qualified and experienced.

i Using the concept of human performance, explain three (03) possible factors that could contribute to the observed performance problems in this organisation. (03 marks)

ii Describe how the Human Performance Technology (HPT) process can be applied to this situation to identify performance gaps and their root causes. (05 marks)

iii Suggest two (02) appropriate HPT interventions that could be implemented or measured to improve worker performance and justify your answers. (02 marks)

Question 04

a) Motivation and job satisfaction play a vital role in improving workers' performance and productivity in industrial organisations. Using relevant ergonomic concepts, discuss the importance of motivation and job satisfaction at the workplace. In your answer, you should include:

- The concept of motivation with reference to Maslow's hierarchy of needs. (05 marks)
- The concept of job satisfaction with reference to Herzberg's two-factor theory. (05 marks)
- The role of job design strategies (job rotation, job enlargement, job enrichment) in improving motivation and job satisfaction. (05 marks)

Question 05

a) A factory has received complaints from workers about heat stress, discomfort, and reduced concentration during long working hours. Using your knowledge of thermal environmental conditions, explain which factors should be considered and how each factor contributes to designing a comfortable working environment. (10 marks)

b) Workers in a manufacturing plant are required to wear uniforms for long hours, and some workers report discomfort and reduced efficiency. Define clothing comfort and explain why it is important in the design of workwear for industrial environments. (05 marks)

Question 06

a) Compare the characteristics of workers who are suitable and unsuitable for night-shift work. (06 marks)

b) A factory manager plans to change from fixed shifts to rotating shifts. Using ergonomic principles, explain one (01) advantage and one (01) disadvantage of this change for workers. (04 marks)

c) A manufacturing organisation has reported an increase in minor accidents, worker fatigue, and absenteeism in the workplace. Using safety and health principles, explain four (04) possible causes for these problems and suggest suitable preventive measures to improve workplace safety and health.

(05 marks)

Question 07

a) Define a human–machine system. (02 marks)

b) List the steps involved in the system design process of a human–machine system and describe them. (07 marks)

c) Explain how colour affects the appearance of the work environment and how it helps in communicating safety and operational information. (06 marks)

Question 08

a) Differentiate between workplace and workspace with suitable examples.

(05 marks)

b) In a factory, some workers perform tasks in seated workstations, while others work in standing workstations for long hours. Write a short note on the ergonomic considerations in designing seated workplaces and standing workstations with suitable workplace examples. (10 marks)

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