

THE OPEN UNIVERSITY OF SRI LANKA
 DEPARTMENT OF TEXTILE AND APPAREL TECHNOLOGY
 BACHELOR OF TECHNOLOGY HONOURS IN ENGINEERING/
 BACHELOR OF INDUSTRIAL STUDIES HONOURS
 TTX6239 - ERGONOMICS
 FINAL EXAMINATION - 2015/2016
 DURATION: 03 HOURS



Date: 16th November 2016

Time: 0930 -1230 hrs

Total number of questions = 08

Number of questions to be answered = 06

Answer question one (Q1), which is compulsory and five (05) other questions

Question one (Q1) carries 25 marks and questions two (Q2) to eight (Q8) carry fifteen (15) marks each.

Compulsory Question

- (Q1) (a) Give two (02) reasons for the occurrence of cumulative trauma disorders. (02 marks)
- (b) State three (03) factors, which should be considered in the discipline of biomechanics. (03 marks)
- (c) Write down two (02) major types of joint movements of a human being. (02 marks)
- (d) Write down three (03) examples, where the 5th percentile can be used for designing purposes of them. (03 marks)
- (e) Write down three (03) factors, which affect the maximal aerobic capacity of a human being. (03 marks)
- (f) List two (02) forms of memory. (02 marks)
- (g) Give two (02) phases of personnel selection. (02 marks)
- (h) List three (03) factors, which could be considered when designing displays for machines. (03 marks)
- (i) What is the measuring unit of luminous flux? (01 mark)
- (j) Write down two (02) major task requirements in relation to designing of a work space. (02 marks)
- (k) List two (02) components of physical fitness. (02 marks)

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

- (Q2) (a) Briefly explain the three (03) major components of a human –machine system. (09 marks)
- (b) The main study areas of ergonomics can be divided into six (06). Giving suitable examples, describe the each of these study areas in short. (06 marks)
- (Q3) (a) Briefly explain the important functions of the skeletal system of a human being. (05 marks)
- (b) Giving suitable examples, describe how “Anthropometry tables” can be used for designing of tools, machines and equipment. (05 marks)
- (c) Differentiate the terms “Prolong work” and “Intermittent work” and briefly explain oxygen consumption profiles for “prolong work” and “intermittent work” using suitable diagrams. (05 marks)
- (Q4) (a) Write down the three (03) phases of memory. (03 marks)
- (b) Write a short note on the “Reconstructive memory”. (04 marks)
- (c) Describe in detail, the four (04) phases of the human performance technology. You should include the important points, which must be considered in each phase. (08 marks)
- (Q5) (a) Write a short note on the desirable thermal conditions of a work place. (05 marks)
- (b) Giving necessary equations, describe a suitable method, which can be used to determine the safe noise level at work places. (04 marks)
- (c) Prepare the best plan for a worker, who has to work eight hours in five different sections of a manufacturing plant under the average noise levels of 80 dB, 95 dB, 90 dB, 100 dB and 105 dB. Assume that the worker has to work at least one hour in each section. Determine whether the worker is at a risk or not. (06 marks)

- (Q6) (a) Giving necessary equations and standards, describe a suitable method, which can be used to determine whether the vibration level at a work place is harmful to the workers or not. (06 marks)
- (b) With the aid of suitable diagrams, describe six (06) different types of luminaries, which can be used for designing lighting at work places. You should include the percentage-wise light emission in different directions in your answer. (09 marks)
- (Q7) (a) Briefly explain the concepts of “Job rotation”, “Job enlargement” and “Job enrichment” in relation to work organisation. (03 marks)
- (b) Prepare two (02) separate shift rotational schedules by using metropolitan and continental shift rotational methods for the month of January for three shifts. (08 marks)
- (c) Briefly explain how shift work affects on the circadian rhythms of shift workers. (04 marks)
- (Q8) (a) Describe three (03) basic design philosophies, which are used when applying anthropometric data for designing machines, tools and equipment. (06 marks)
- (b) Describe the nature of jobs/tasks separately, where seated work places and standing work places can be recommended. (09 marks)