THE OPEN UNIVERSITY OF SRI LANKA

BACHELOR OF INDUSTRIAL STUDIES / BACHELOR OF TECHNOLOGY

FINAL EXAMINATION - 2007/2008

TTX6233 TECHNICAL TEXTILES

DURATION - THREE HOURS

DATE: 25 April 2008 TIME: 0930 - 1230 Hours

Total Number of Questions = 09 Number of Questions to be answered = 06

Answer Question 1, which is compulsory, and additional five (05) questions.

Question 1 carries twenty-five (25) marks and Questions 2 to 9 carry fifteen (15) marks each.

01. a. Biocompatibility is one of the main factors that is taken into consideration while designing biomedical textiles. Briefly explain, with an example, what you understand by biocompatibility. (03 marks)

b. Briefly explain why it is necessary that resins used with textile reinforcements should have good adhesion properties? (02 marks)

c. Thermo-bonding is one of the methods by which laminated fabrics are produced. Briefly state the process of thermo-bonding. (02 marks)

d. State the main function of a geotextile used as a separator. (01 mark)

e. State three distinguishing features of jute that makes it an eco-friendly geotextile. (03 marks)

f. Spacer fabrics are widely used in making seat covers for vehicles. Briefly state the structural arrangement of spacer fabrics. (03 marks)

g. Modern hovercrafts are being manufactured using aramid composites in place of aluminium. State the advantages of using aramid over aluminium. (03 marks)

h. One of the tests used to characterise the flammability of heat protective fabrics is "Limiting Oxygen Index (LOI)". State what you understand by LOI and the level of LOI required for a material to burn in air. (04 marks)

i. In examining methods to impart flame resistance on fabrics, textiles are frequently classified into four groups. What are these four groups? (02 marks)

j. Name two uses of ceramic fibres as technical textiles. (02 marks)

02. a. Resin transfer moulding is a method by which long-fibre reinforcements are manufactured. With the aid of diagrams explain the resin transfer moulding technique. (08 marks)

b. State the main disadvantages of "wet lay up process" of manufacturing textile composites. (04 marks)

c. Give a few applications of fibre reinforced elastomers and state the properties which made them usable for these applications. (03 marks)

03. a. State the intrinsic characteristics of geosynthetics that have made them ideal for soil reinforcement applications. (03 marks)

b. In determining the most appropriate geotextile properties for reinforced soil applications there exists a complex interaction between many inter-related factors such as, tensile strength, extension, structure, time, temperature, environment and economics. Write an essay on how these factors contribute towards selection of a geotextile for a particular application. (12 marks)

04. a. What are the basic criteria, which are considered while selecting a filter fabric for a particular application? Discuss each of them. (06 marks)

b. State and explain the environments where a geotextile filter is required and illustrate the process of filtration in the presence of a geotextile. (06 marks)

c. Give the advantages of using geotextiles in hydraulic applications. (03 marks)

05. a. Explain the principle of functioning of cabin air filters in vehicles. How textile materials aid this function of air filtering? (06 marks)

b. Discuss the advantages and disadvantages of various types of synthetic fibre materials used in tyres. (05 marks)

c. Briefly discuss the quality tests that need to be done on tarpaulins used in heavy goods vehicles. (04 marks)

06. a. Discuss the tests that are used to evaluate the effectiveness of chemical protective clothing. (05 marks)

b. Explain how textile materials are effectively used to reduce various mechanical hazards. (05 marks)

c. In clothing design, protection and comfort go hand in hand. Explain how chemical resistance in fabrics could be built-in without sacrificing human comfort. (05 marks)

07. a. With the help of suitable diagram explain the mechanism of heat transfer from the body through the clothing system. (10 marks)

b. With the help of suitable diagram explain how "Cut Resistant Polyester" fibres are engineered to provide protection against cutting hazards. (05 marks)

08. a. Explain, with suitable diagrams, how colonisation of surfaces by micro-organisms take place. (07 marks)

b. Explain the principle behind the construction of antimicrobial fabrics. (04 marks)

c. Protective clothing used in the medical field needs to be sterilised, disinfected and decontaminated from micro-organisms. Briefly explain what you understand by sterilisation, disinfection and decontamination. (04 marks)

09. a. Explain the processes involved in the process of converting polyacrylonitrile to carbon fibres. (06 marks)

b. Explain the process of manufacturing high performance polyethylene fibres using the gel spinning process. (06 marks)

c. Glass fibres come in different grades, such as E-glass, S-glass, A-glass and C-glass. What is the difference with these different grades of glass fibres with respect to their properties? (03 marks)