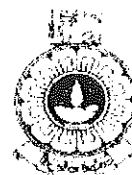


THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF ENGINEERING TECHNOLOGY
DEPARTMENT OF TEXTILE AND APPAREL
TECHNOLOGY

032



Study Programme : Bachelor of Technology Honours in Engineering
Name of the Examination : Final Examination
Course Code and Title : TAX7369
Engineering Aspects of Weaving
Academic Year : 2020/21
Date : 29th January 2022
Time : 0930 -1230hrs
Duration : **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Eight (08)** questions in **Four (04)** pages.
3. Answer question **One (01)**, which is compulsory, and **Five (05)** additional questions.
4. Total number of questions to be answered is **Six (06)**.
5. Question One (01) carries thirty (30) marks and questions Two (02) to Eight (08) carry fourteen (14) marks each.
6. Answer for each question should commence from a new page.
7. Answers should be in clear hand writing.
8. Do not use red color pens.

01. Compulsory question

- a) Calculate the values of the following parameters, if the traverse ratio of the pattern repeat is 2.5. (04 marks)
- Number of Double Traverses per Repeat
 - Number of Diamonds Lengthwise
 - Number of Diamonds in circumference
 - Number of Coils per repeat
- b) List four (04) factors to consider when locating a weaving mill. (02 marks)
- c) State four (04) factors that should be considered when calculating the Useful Time Factor (UTF) of a weaving mill. (02 marks)
- d) Distinguish between “Random winding” and “Precision winding” employed in cross winding. (04 marks)
- e) State four (04) factors affecting the warping productivity. (02 marks)
- f) List four (04) methods used to prevent patterning in random winding. (02 marks)
- g) Define the term “Liner gain” related to yarn winding. (02 marks)
- h) Define the term “Warp Stretch” related to warp sizing. (02 marks)
- i) List four (04) factors that affect the machine allocation in a weaving factory. (04 marks)
- j) State four (04) short term loom stoppages. (02 marks)
- k) An air jet loom is used to weave a fabric with 80 cm used reed width and a projectile loom is used to weave a fabric of with 90 cm used reed- width. Calculate the actual weft insertion rates of both machines if they operate at speeds 900 rpm and 450 rpm respectively. (04 marks)

-End of the compulsory question-

02.

- a) Briefly explain three (03) approaches that can be used to control different costs in a weaving mill. (06 marks)
- b) A woven fabric with the following specifications is to be produced. Determine the selling price of one meter of the fabric. Clearly mention all the steps you follow to calculate it. (08 marks)
- Total production/conversion cost of the fabric/meter = Rs.56.00
 - Annual production - 5 million

- Profit margin - 15%
- Warp consumption per 5 million – 800.000 kg
- Weft consumption per 5 million – 500.000 kg
- Selvedge yarn consumption – 100,000 kg
- Total yarn consumption – 14,000,000 kg
- Yarn price per kg – Rs.300.00

03.

A Weaver's beam with 4000 m long warp having 6000 ends of 20 tex cotton yarn is to be produced. A sectional warping machine is available for this purpose. The creel capacity of the warping machine is 600. Each creeling is sufficient for two beams and assume a waste of 3% of yarn. The warping speed of the machine is 800 m/min., while beaming speed is 80 m/min. The processes of warping and beaming have machine stop times due to several reasons:

- It takes about 0.4 minutes to creel a supply package and to tie in the end.
- It takes 3 minutes per section for leasing and moving the traverse.
- It takes in average about 1.2 min to repair a breakage and the average number of breaks during warping is about 3.5 per 1 million meters yarn.
- Time taken to prepare the warp for beaming and change of the beam is about 7 min.

Calculate the followings.

- a) The minimum weight of yarn to be available on each supply package. (04 marks)
- b) The duration of time the warping machine has to run for warping all the sections and beaming of the two weavers' beams. (04 marks)
- c) The total time taken to produce the two weavers' beams and the running efficiency of the warping machine. (06 marks)

04.

- a) A 15 tex cotton warp having 5000 ends and a length of 4500 m has been sized. The mass of the warp beam after sizing is 700 kg. The mass of the oven dry sized warp beam is 600 kg. The mass of the empty warp beam is 150 kg. The moisture regain of the cotton warp before sizing was 8%.
 - i. Determine the moisture regain of the sized warp. (04 marks)

- ii. Determine the size percentage of the sized warp. (04 marks)
- b) Discuss how size take – up is influenced by concentration, viscosity and the temperature of the size paste. (06 marks)
- 05.**
- a) Explain the influence of warp shed geometry on the process of weaving. (04 marks)
- b) Write short notes on three (03) types of warp sheds. (06 marks)
- c) Explain in brief four (04) reasons for maintaining an optimum warp tension during weaving. (04 marks)
- 06.**
- a) Briefly explain the three (03) phases in the weft insertion cycle of shuttle picking. (06 marks)
- b) The reed width of a shuttle loom is 100 cm. The distances between the two extremes of the reed and the shuttle boxes are 4 cm each. The length of the shuttle is 40 cm. Mass of the shuttle with the full pirn is 700g. Weft insertion must be completed over a crank shaft rotation of 110° . The machine has to run at 230 rpm. The distance over which the picking force is applied is 30cm. The coefficient of friction between the shuttle and the shuttle box walls is 0.5, and the force applied by the swell on the shuttle is 20N. Calculate the following. (08 marks)
- i. Average velocity of the shuttle
- ii. Force to be applied by the picker
- 07.**
- a) Distinguish between “Shuttle weaving” and “Shuttle-less weaving” with respect to their cost-effectiveness. (06 marks)
- b) Explain the influence of the characteristics of filament yarns and spun yarns on the weft insertion behavior during air-jet picking. (08 marks)
- 08.**
- a) Write short notes on any two (02) of the below topics. (14 marks)
- i. The effect of cloth fell position and beat-up force of a loom on the weft sett of the fabric
- ii. Advantages of beam or direct warping over sectional warping
- iii. Digi Cone winding

-End of the question paper-