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Daffodil International University

Department of Textile Engineering
Faculty of Engineering
Mid-term Examination, Semester: Summer-2026

Course Code: 0723-221 Course Title: Textile Physics
Level & Term: L3T1 Section: F1, F2, F3
Name & Designation of the Course Teacher: Arnob Chowdhury Mithun, Lecturer

Time: 1.5 hours. **Total Marks: 25**

Answer all the questions:

01. State the laws of friction. Briefly explain the factors that affect the frictional behavior of textile fibers. **05**

[CO-1, PO-1, C-2]

02. Define the following terms: **03**
- (a) Flexural rigidity
- (b) Bending modulus
- (c) Specific torsional rigidity

[CO-1, PO-1, C-2]

03. Draw a typical load–elongation (stress–strain) curve of a textile fibre and indicate the yield point, breaking point, and the region representing work of rupture. **03**

[CO-1, PO-1, C-2]

04. A fibre has a shape factor $\eta = 0.8$, specific modulus $E = 6$ N/tex, and density $\rho = 1.5$ g/cm³. If the linear density increases from 1.0 tex to 2.0 tex, calculate the new flexural rigidity and comment on the effect of yarn fineness on bending behaviour. **05**

[CO-2, PO-2, C-3]

05. (a) Distinguish between ~~area~~ volume swelling (S_V) and diameter swelling (S_D) and derive the relationship between them for a fibre that swells isotropically. **05+03**

(b) Based on the typical thermal-conductivity values of textile fibres, analyse and justify which fibre type (natural or synthetic) is more suitable for manufacturing winter garments. Support your answer by comparing at least two natural and two synthetic fibres.

[CO-3, PO-2, C-4]

Fibre	Thermal Conductivity ($mW \cdot m^{-1} \cdot K^{-1}$)
Cotton	71

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Wool	54
Silk	50
PVC	160
Cellulose acetate	230
Nylon	250
Polyester	140
Polyethylene	340
Polypropylene	120