Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014**

**Subject code: 1722505** **Date: 23-06-2014**

**Subject Name: Advanced Fiber Properties**

**Time: 02:30 pm - 05:00 pm** **Total Marks: 70**

**Instructions:**

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

| | | | |
|---|---|---|---|
| **Q.1** | **(a)** | What is flexural rigidity? Derive equations with reference to bending of fibres. | **07** |
| | **(b)** | ñBreaking load of the fibre depends on the rate at which the load is appliedò Explain. | **07** |
| **Q.2** | **(a)** | Derive different heat of sorption equations from the absorption isotherms based on Clausius-Clapeyron water vapour equation. | **07** |
| | **(b)** | Briefly discuss stress relaxation experiment, as carried out by Meredith, in case of viscose rayon fibres. | **07** |
| | | **OR** | |
| | **(b)** | Elaborately discuss the indirect methods to measure moisture. | **07** |
| **Q.3** | **(a)** | Elaborately discuss the transverse swelling after water absorption. | **07** |
| | **(b)** | List out and explain the parameters which influence the conditioning rate of material. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Define and describe following:<br>(i) Thermodynamic equilibrium<br>(ii) Diffusion coefficient | **06** |
| | **(b)** | Write on molecular forms and packing in wool. Also write on structural mechanics of wool fibre as given by Chapman. | **08** |
| **Q.4** | **(a)** | Schematically represent fibre structure in terms of three major variables.(As given by Hearle) | |
| | **(b)** | Describe following test procedures in short for measurement of bending of fibres:<br>(i) Use of Tensile tester for coarse fibres<br>(ii) By a loop method | **09** |
| | | **OR** | |
| **Q.4** | **(a)** | What is torsional rigidity of fibres? Derive equations with reference to torsional rigidity, shear modulus etc. for fibres. | **06** |
| | **(b)** | Describe experimental methods used by Morton for measuring torque-twist relationship in fibres. | **08** |
| **Q.5** | **(a)** | Write in detail on empirical results with reference to effect of various parameters on fibre friction. | **05** |
| | **(b)** | Write essential features of following apparatus for measurement of fibre friction.<br>(i) Bowden and Lebenôs apparatus<br>(ii) Guthrie and Oliverôs apparatus<br>(iii) Pascoe and Taborôs modifications for low loads. | **09** |
| | | **OR** | |
| **Q.5** | **(a)** | Write briefly on theory of the directional frictional effect with reference to wool fibres. | **05** |
| | **(b)** | With reference to theories of time dependence how ideal spring and dashpot in series and in parallel help to elucidate viscoelastic behaviour of fibres? Also write on Eyringôs three element model with reference to reaction-rate theory. | **09** |