

GUJARAT TECHNOLOGICAL UNIVERSITY**ME - SEMESTER-II • EXAMINATION – SUMMER • 2014****Subject Code: 1722502****Date: 03-12-2014****Subject Name: Theory of Yarn Manufacturing****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** Calculate the no. of fibres in yarn cross section from following data:- **14**
 Fibre length $\approx 27\text{mm}$
 Fibre fineness $\approx 1.3\text{dtex}$
 Yarn count $\approx 12\text{s Ne}$
 Sliver linear density $\approx 3.5\text{ktex}$
 Opening roller speed $\approx 11,500\text{ rpm}$
 Opening roller radius $\approx 1.20\text{m}$
 Rotor speed $\approx 120000\text{ rpm}$
 Rotor diameter $\approx 34\text{mm}$
 Yarn withdrawal rate $\approx 200\text{ m/min}$
 Also calculate yarn arm rotational speed, theoretical twist and nominal twist.
- Q.2** (a) Which fibres are known as floating fibres? Derive the equation of force to draft the fibres at draw frame. **07**
 (b) How the fibres acceleration behind top comb at comber affect noil, short fibre and long fibre breakages? **07**
- OR**
- (b) With an equation make understand tension in yarn at any radius at ring frame. **07**
- Q.3** (a) Derive an equation for traveler speed at ring frame. **07**
 Calculate the traveler speed at start and end of the doff from the following:
 Package diameter at start $\approx 1.5\text{cms}$
 Package diameter at start $\approx 6\text{cms}$
 Spindle speed $\approx 13000\text{ r.p.m}$
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 (b) Define: fibre extent, fibre migration, spinning co-efficient, scratch combing and obipartite structure **07**
- OR**
- Q.3** (a) Which factors affects number of turns in spinning zone? Explain it. **07**
 (b) Explain straight fibre integration in to yarn in rotor spinning. **07**
- Q.4** Compare forces involved, tenacity, hairiness, load elongation curve and structure of ring, rotor and friction spun yarn. **14**
- OR**
- Q.4** Elaborately discuss different principles involved in making fasciated yarns. Also explain working in brief of fasciated spinning process. **14**
- Q.5** (a) Discuss the influence of hook direction in sliver and roving structure on fibre orientation and quality of yarn. **07**
 (b) Which characteristics explain fibre orientation? **07**

OR

- Q.5** (a) Define drafting force and carding force in relation with fibre orientation.
 (b) How the helix angle and spinning triangle affect migration frequency and migration factor of compact and ring spun yarn. **07**

[illegible]