

Swami Ramanand Teerth Marathwada University, Nanded
PET Syllabus for Textile Technology

Syllabi for Ph.D. Entrance Test (PET)

The followings will be the syllabi for Ph.D. Entrance Test under sections B for Textile Technology.

Section B

Textile Testing

Principle and measurement of fibre length, fineness, strength, friction, moisture regain, maturity, trash content; Measurement of fibre properties by High Volume Instrument (HVI) and AFIS equipment, Yarn count, twist, crimp and hairiness, Measurement of fabric thickness, Tear strength, Bursting strength, Abrasion resistance, Fabric handle, drape and stiffness, Crease resistance and crease recovery, Air permeability, Water repellence and permeability, flammability testing, Tensile behaviour of textiles- fibre, yarn and fabric, Concepts of CRT, CRE and CRL principles, Working mechanism and details of Pendulum lever machines, Stelometer, Instron, Ballistic tester, Fundamentals of evenness testing, principle and working of capacitance based evenness tester, Index of irregularity and related calculations, Kawabata (KES) and FAST systems- various attachments and units, Principle of measurement of various parameters

Yarn and Fabric Structures

Geometry of twisted yarns, Idealized helical yarn geometry, Yarn diameter and twist, Count and twist factor, Twist contraction: Theoretical calculations and related numerical, Limits of Twist, Average fibre length in twisted yarns and derivations, Packing of fibres in yarns, Packing coefficient, Open and close packing & numerical, Migration of fibres in yarns- Ideal and real, Characterization of migration behaviour, Tracer measurements, Morton and his associates work and view on migration, Float and weave value, warp & weft crimp, density of cloth, cover factor, elements of fabric geometry, cloth setting theories, plain and matt weaves

Fundamentals of Statistics

Collection of data, Representation of data, Frequency distribution, Mean and Standard deviation, Use of standard deviation, Random variable, Normal distribution- fundamental concepts and applications, Central Limit Theorem, Sampling techniques, sample size and sampling errors, Confidence Level and confidence interval, Interval estimation, Hypothesis testing of mean(s), proportion and variances- both small and large samples, Applications in spinning and textiles, Control charts importance and applications, Correlation and regression analysis

It is considered that there is one specialization i.e. Textile Technology. So, from each of the sub-sections (1-5) of this section one question may be covered

1. Yarn Manufacture

Fibre mixing and blending, Principle of opening and cleaning, Principle of carding, Design and working of carding machine, Card clothing, Principle of roller drafting, Causes and control of irregularity of a drafted textile strand, Auto-levellers in draw frame, Lap preparation in Combing,

Working mechanism and construction of combing machine, Principle of speedframe machine, differential gearing, Cone-drums, Building mechanism, Drafting systems, Ring spinning fundamentals, Working of building mechanism, Ring and traveller, Drafting systems, Principles and mechanism of open-end, friction and air-jet spinning, Structure and properties of these yarns and comparison with ring yarns.

2. Fabric Manufacture

Principle and mechanism of shedding, picking and beating, Take-up and let-off motions, Principle of surface driven and spindle driven winder, Yarn clearers and tensioners, Different systems of yarn splicing; Warping, Sizing, Principles and working of different dobbies and jacquards, Electronic dobbies and jacquards, Principles and Working mechanism of- Rapier looms, Air-jet looms, Water-jet looms and projectile looms, Multiphase looms; Principles of weft and warp knitting; basic weft and warp knitted structures.

3. Textile Chemistry

Chemistry and technology of different desizing viz. Enzymatic, acid and oxidative, Scouring and bleaching, Mercerisation, Colour, Spectrophotometer, Theory of dyeing, Mechanisms of dissolution, absorption and fixation of different dyes viz. Direct, vat, solubilised vat, reactive, azoic, sulphur, acid and basic dyes on cellulosic and protein fibres, Principle of working of different dyeing machine like jigger, yarn dyeing machine, padding mangle, HTHP beam dyeing machine, Jet dyeing machine, Dope dyeing, dyeing of synthetics like viscose rayon, polyester, polyamide, acrylonitrile fabrics with suitable dyes, Natural dyes, Printing of cellulose with reactive and vat, Printing with disperse, acid and cationic dyes, Printing with pigments. Working of flat bed and rotary screen printing, Transfer printing, ageing and steaming in printing, Finishing of textiles, Temporary & Permanent, Heat setting and calendaring, Coating of textiles.

4. Textile Fibres

Essential and desirable properties of textile fibres, Classification of textile fibres, Cotton, Wool, Silk and Jute fibres: Morphology, Fine structure, Chemical structure, Physical & chemical properties, Molecular weights and measurements, Amorphous and crystalline phases, Glass transition, plasticization, crystallization, melting, factors affecting T_g and T_m, Melt spinning, Manufacturing method and properties of PET Nylon 6, Nylon 66, Wet and dry spinning of polyacrylonitrile and viscose fibres and properties, High performance fibres viz. Carbon, Glass and Kevlar, their properties and applications, Methods of investigating fibre structure: Density, X-ray diffraction, birefringence, optical and electron microscopy, I.R. absorption, thermal methods (DSC, DMA/TMA, TGA)

5. Technical textiles and Non-woven

High-performance and high- functional fibres and textiles, Filter fabrics: Mechanics of filtration, Different filtration processes and textiles, Thermal, chemical clothing, and mechanical protective clothing, Automotive Textiles: Major fibres, fabric types, formation and properties, building of seat, seat belt, carpet, air-bags etc., Tyre cord, Coated fabrics: introduction, different coating materials, different coating methods, U-V Cured coating, Geotextiles: Functions, raw material, application of geotextiles for drainage, stabilization, filtration, erosion control and reinforcement, Medical textiles and sports textiles, Classification of non-wovens, Nonwoven web preparation by carding and aerodynamic method, Needle-punching process, Various bonding techniques of nonwoven webs. Spun bonded nonwoven manufacturing.