

Department of Textile Technology

Technical Assistant

Stage-I (Screening Test)

Stage-I (Screening Test): A screening test shall be conducted in the first phase in form of multiple choice written test. Written test shall be of **90 minutes'** duration comprising of **75 questions**. Each **correct answer will be awarded One [1] mark** and for each **wrong answer One-fourth [1/4] mark shall be deducted**. Screening test shall consist of questions on **General English**(Tenses, Active and Passive, Direct and Indirect speech, Punctuation, Correction of sentences, One word substitutes, Modals, Articles, Clauses, Synonyms, Antonyms, Idioms and Phrases); **Numerical Aptitude Arithmetic**(Simplification of Fractions, Simple and Compound Interest, Profit and Loss, Percentage, Averages, Number System, Time and Work, Problems on Trains, Calendar, Area, Problems on Numbers, Square root, Cube root, Time and Distance and Other basic Arithmetic related matters);**Reasoning and Data Interpretation** (Number Series Compilation, Missing Number finding, Pattern series, Direction Sense Test, Series Compilations, Classification, Missing Character finding, odd man out, Blood relations, Analogy, Coding and Decoding, Letter and Symbol Series, Verbal reasoning, Statement and Conclusions, Letter and Symbol Series, Logical Problems, Arithmetic reasoning, Logical Sequence of words, Pie Chart and Bar Chart).

Eligible candidates **Ten Times** of the positions in each category will be screened for the Stage-II subject to the fulfillment of all educational qualification etc. as per the Recruitment Rules-2019.

Stage-II (Skill test)

Stage-II (Skill Test): The skill test will be of qualifying nature.

Laboratory Experiments etc. as per nature of the post shall be conducted in the respective laboratories/field. Minimum qualifying marks in the skill test will be [UR:30%; EWS:27%; OBC:27%; SC;20%; ST:20%; PwD:15%].

The candidates, who will qualify the skill test, will be called for the final written test. The Candidates appearing in the written test must ensure their eligibility for the particular category of post. The documents in support of their eligibility shall be verified before the Final test. If any candidate will not have requisite qualification etc. as per the post for which he is appearing will not be allowed to sit in the final test (Stage-III).

Stage-III (Final test)

Stage-III (Final Test): Final written test shall be of 2 hours duration comprising of 100 multiple choice questions.

Each **correct answer will be awarded One [1] mark** and for each **wrong answer One-fourth [1/4] mark shall be deducted**. Only those who are screened in after the Screening test [Stage –I] and qualify the Skill Test [Stage-II] will be allowed to appear in the Final Test [Stage III]. The minimum passing marks in Final test will be [UR:30%; EWS:27%; OBC:27%; SC;20%; ST:20%; PwD:15%].

The final merit list shall be drawn on the basis of the stage-III written test.

SYLLABUS FOR SKILL TEST AND FINAL WRITTEN TEST IS AS PER ANNEXURE-IV.

Department of Textile Technology

Syllabus for Skill Test (Technical Assistant)

Post- Technical Assistant

Textile Fiber

1. Identification of cotton
2. Identification of wool
3. Identification of silk
4. Identification of Bast fibres
5. Identification of polyester
6. Estimation of fiber/filament fineness using projection microscope.

Yarn Formation

1. Study of general outline of opener and clearer machine employed in B/R line process.
2. Study of gearing mechanism, calculation of the speed of different organs of carding machine.
3. Calculation of draft between different zones of carding machine and its production.
4. Calculation of the total draft and its distribution in draw frame machine.
5. Effects of break draft and roller settings on sliver uniformity.
6. Measurement of nip-load pressure, roller eccentricity and shore hardness of top roller drafting rollers.

Fabric Formation

1. Study of the motion transmission system in winding machine.
2. Study of Package stop motion in cone winding machine.
3. Calculation of winding speed on grooved drum winding system and study of anti-patterning system incorporated to it.
4. Study of the motion transmission system in Pirn winding machine.
5. Calculation of winding speed and traversing speed of Pirn winding machine.
6. Study of the sectional warping machine and planning the width of a section according to pattern of the given striped fabric.
7. Study of shedding mechanism of shuttle loom and cam positioning with respect to loom cycle.
8. Study of picking mechanism, Picker movement in relation with crank shaft rotation and calculation of average velocity of shuttle.
9. Study of sley movement, construction and calculation of sley eccentricity.

Fabric structure and design analysis

To analyze the yarn and fabric particulars of the different weave structures along with their graphical presentation and weaving plans.

- a. Plain weave
- b. Twill weave
- c. Satin/sateen weave
- d. Diamond weave
- e. Honeycomb weaves
- f. Bedford cord weaves
- g. Stripe and check weaves
- h. Huck a back weaves
- i. Double fabrics
- j. Backed fabrics

Textile Testing

1. To prepare and analyze Baer Sorter diagram and determine the following:
2. Determine the micronaire value of a given cotton sample by Air-Flow method. Convert the result into SI units and give a suitable rating to the fibre sample.
3. Determine Pressley Index of a cotton sample by Pressley Tester at zero and 3mm gauge
4. Determine crimp (crimp %) of a given manmade fibre sample.
5. Determine fibre fineness of a manmade fibres/filaments by:
6. Prepare yarns Appearance Boards and compare with ASTM standards.
7. Determine bending rigidity by (HEART) loop method.
8. Determine the Lea C.S.P by Lea CSP Tester and Autosorter and compare the results of various yarn.
9. Determine the tensile properties of yarn by single thread strength tester.
10. Determine twist of yarn using different principle of measurement.
11. Characterize a woven fabric with respect to its dimensional properties.
12. Determine the tensile strength and elongation of a woven fabric and compare the Load-elongation curve with non-woven and knitted fabric.
13. Determine the abrasion resistance and pilling resistance of a fabric.
14. Determine the crease recovery of fabric and observe effect of loading time and recovery time on crease recovery.
15. Determine the Drape coefficient of a fabric sample.
16. Determine the compression property of a fabric (thickness).
17. Determine the Air permeability, water permeability and water repellency of a fabric.
18. Determine the thermal resistance of a fabric.
19. Evaluation of tensile and compressional characteristics of different woven and nonwoven fabric.
20. Assessment of yarn diameter, fabric pore size using image analysis method.
21. Evaluation and analysis of bending behaviour of woven fabric using Shirley stiffness tester and through bending length measurement.
22. Evaluation and analysis of tearing strength of fabric using universal tester and Elmendorf tear tester.

Department of Textile Technology

Syllabus for Final written test (Technical Assistant)

Computer awareness:

Basic knowledge of Computer Applications, viz. MS Word, MS Excel, Power Point etc. Internet, MS-DOS, Computer Generation & Development, Windows, Data Entry, Softwares knowledge, Networking Platforms, applications of computers in textile technology and instrumentation

Section 1: Textile fibres

Classification of textile fibres, essential requirements of fibre forming polymers, gross and fine structure of natural fibres like cotton, wool, silk, introduction to important bast fibres, properties and uses of natural and man-made fibres including carbon, aramid and ultra-high molecular weight polyethylene fibres, physical and chemical methods of fibre and blend identification and blend analysis. Molecular architecture, amorphous and crystalline phases, glass transition, plasticization, crystallization, melting, factors affecting T_g and T_m, production process of viscose and other regenerated cellulosic fibres. Polymerization of nylon-6, nylon-66, poly (ethylene terephthalate), polyacrylonitrile and polypropylene, melt spinning processes for pet, polyamide and polypropylene, wet and dry spinning processes for viscose and acrylic fibres, post spinning operations such as drawing, heat setting, tow to top conversion and different texturing methods. Methods of investigating fibre structure and morphology, mechanical properties of fibres, moisture sorption in fibres, fibre structure and property correlation.

Section 2: Yarn manufacturing

Principles of opening, cleaning and mixing/blending of fibrous materials, working principle of modern opening and cleaning equipment, the technology of carding, carding of cotton and synthetic fibres, drafting operation, roller and apron drafting principle, causes of mass irregularity introduced by drafting, roller arrangements in drafting systems, principles of cotton combing, combing cycle, mechanism and function, combing efficiency, lap preparation, recent developments in comber, roving production, mechanism of bobbin building, roving twist, principle of ring spinning, forces acting on yarn and traveller, ring & traveller designs, mechanism of cop formation, causes of end breakages, working principle of ring doubler and two for one twister, single and folded yarn twist, properties of double yarns, production of core spun yarn, principles of compact, rotor, air jet, air vortex, core, wrap, twist less and friction spinning. Yarn contraction, yarn diameter, specific volume & packing coefficient, twist factor, twist strength relationship in spun yarns, fibre configuration and orientation in yarn, cause of fibre migration and its estimation, irregularity index, structure property relationship of compact ring, rotor, air-jet and friction spun yarns. Calculations.

Section 3: Fabric manufacturing

Principles of winding processes and machines, random, precision and step precision winding, package faults and their remedies, yarn clearers and tensioners, different systems of yarn splicing, features of modern cone winding machines, different types of warping creels, features of modern beam and sectional warping machines, different

sizing systems, sizing of spun and filament yarns, sizing machines, principles of pirn winding processes and machines.

Motions of loom, cam design & kinematics of sley, effect of their settings and timings on fabric formation, fabric appearance and weaving performance, dobby and jacquard shedding, mechanics of weft insertion with shuttle, warp and weft stop motions, warp protection, weft replenishment, principles of weft insertion systems of shuttle-less weaving machines, principles of multiphase and circular looms. Basic woven fabric constructions and their derivatives, crepe, cord, terry, gauze, leno and double cloth constructions. Peirce's equations for fabric geometry, elastic model of plain woven fabrics, thickness, cover and maximum set of woven fabrics. **Knitting**- principles of weft and warp knitting, basic weft and warp knitted structures. **Nonwoven**-classification, production, properties and application of nonwoven fabrics, principle of web formation & bonding. Calculations. **Garments** - pattern making, spreading, marking, bundling, cutting, cutting tools and sewing machinery, trims and accessories, Quality control in garment production.

Section 4: Textile testing

Sampling techniques, sample size and sampling errors, measurement of fibre length, fineness, crimp, measurement of cotton fibre maturity and trash content, high volume fibre testing and AFIS, testing of wool and man-made staple fibres, measurement of fibre friction and crimp, measurement of yarn count, twist and hairiness, tensile testing of fibres, yarns and fabrics, evenness testing of slivers, rovings and yarns, evaluations and interpretation of evenness results, classimat fault analysis, testing equipment for measurement of fabric properties like thickness, compressibility, air permeability, wetting & wicking, drape, crease recovery, tear strength, bursting strength and abrasion resistance, instruments and systems for objective evaluation of fabric hand. Statistical analysis of experimental results, frequency distributions, correlation, significance tests, analysis of variance and control charts. Calculations.

Section 5: Chemical processing

Basic knowledge of analytical and organic chemistry. Impurities in natural fibre, chemistry and practice of preparatory processes for cotton, wool and silk, mercerization of cotton, preparatory processes for manmade fibres and their blends. Classification of dyes, dyeing of cotton, wool, silk, polyester, nylon and acrylic with appropriate dye classes, dyeing of blends, dyeing machines, dyeing of cotton knitted fabrics and machines used, dye fibre interaction, introduction to thermodynamics and kinetics of dyeing, methods for determination of wash, light and rubbing fastness. Styles of printing, printing thickeners, printing auxiliaries, printing of cotton with reactive dyes, wool, silk, nylon with acid and metal complex dyes, printing of polyester with disperse dyes, pigment printing, resist and discharge printing of cotton, silk and polyester, transfer printing of polyester, inkjet printing. Mechanical finishing of cotton. Stiff, soft, wrinkle resistant, water repellent, flame retardant and enzyme (bio-polishing) finishing of cotton, milling, decatizing and shrink resistant finishing of wool, antistatic and soil release finishing, heat setting of synthetic fabrics, minimum application techniques. Quality control parameters of water, various auxiliaries, dyeing, printing & finishing operations. Exposure of analytical and textile wet processing instruments. Sustainability aspects in textile wet processing, pollution control and effluent treatment. Various advancements in textile wet processing.