

6.1 TEXTILE TESTING AND QUALITY CONTROL – II

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RATIONALE

The diploma holders in textile technology have to ensure quality at all levels. The skills in testing of materials and textiles of various stages of production and finishing are essential to be developed in the students. To train the students in assessment of performance characteristics of various textile materials i.e. fibre, yarns and fabrics the subject of Textile Testing and Quality Control has been included in the curriculum.

DETAILED CONTENTS

Sr. No.	Theory	Practical
1.	Tensile Testing of Textiles (18 hrs)	
1.1	Fabric strength testing by Tensile Strength Tester (06 hrs)	Tensile Strength Testing of Fabrics
1.2	Tearing Strength Tester for Umbrella and Parachute failure (06 hrs)	
1.3	Bursting strength testing of fabric by Hydraulic Bursting Strength Tester (06 hrs)	Find out bursting strength of fabric by Hydraulic Strength Tester
2.	Fabric Dimension (36 hrs)	
2.1	Fabric thickness testing by thickness tester (02 hrs)	Find out fabric thickness by thickness tester.
2.2	Definition of air permeability, air resistance. Porosity Measurement of permeability by Shirley Air Permeability Tester (03 hrs)	Find out air permeability of fabric by Air Permeability Tester
2.3	Crease recovery of fabric. Measurement of crease recovery by Shirley Crease Recovery Tester (02 hrs)	Find out Crease Recovery of fabric by Crease Recovery Tester
2.4	Abrasion resistance and serviceability, wear and abrasion test on fabrics. Measurement of serviceability by Abrasion Tester Stiffness, Handle & drape of fabric (04 hrs)	<ul style="list-style-type: none"> - Find out serviceability of fabric by abrasion tester - Use of Drapemeter - Stiffness Tester - Drapemeter
2.5	Definition of crimp, measurement of warp and weft crimp in fabric by crimpmeter (02 hrs)	Find out crimp in warp and weft of fabric

2.6	Fabric shrinkage relaxation and felting. Measurement of fabric shrinkage (02 hrs)	Shrinkage test by Launderometer and Template
2.7	Flammability test for fabrics (02 hrs)	Flammability test by Flammability Testers.
2.8	Fabric cover and its relation with fabric properties (02 hrs)	
2.9	Methods of determination of colour fastness to Washing, perspiration (acidic and alkaline), rubbing (dry and wet), light and sublimation (10hrs)	Colour fastness of fabric: Washing- Launderometer Perspiration – by Persperometer Rubbing (dry & wet) – Crock meter Light – Light fastness tester Sublimation – Sublimation Tester
2.10	Blend tests by solubility methods (02 hrs)	Blend testing by chemical (Solubility) methods
2.11	Wettability test for fabric water proofing and shower proofing. Drop penetration test. Spray test (03 hrs)	
2.12	Test for Pilling of Fabric by using Pilling Tester (02 hrs)	Findout pilling by ICI pill box (Pilling Tester)
3.	Evenness Testing (10 hrs)	
3.1	Importance of evenness in yarn. Short term, medium term and long term variations in yarns). Periodic and non-periodic irregularities. Causes and remedies for yarn uneven-ness (10 hrs)	Uster classmate testing

INSTRUCTIONAL STRATEGY

The teacher should lay emphasis on understanding of basic concepts and various terms used in the subject. Practical exercises will reinforce various concepts. Industrial exposure must be given by organizing visits.

RECOMMENDED BOOKS

1. Principles of Textile Testing by JE Booth
2. Textile Testing by P Angappan, R Gopalakrishnan
3. Handbook of Textile Testing and Quality Control by Grover and Hamby
4. Stains Remover from Textiles and Garments by S.S. Satsangi, Usha Publications, Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	18	30
2	36	55
3	10	15
Total	64	100

6.2 GARMENT MANUFACTURING TECHNOLOGY

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RATIONALE

Some of the diploma holders in Textile Technology may also find placement in the Garment House. The basic concepts of Garment Manufacturing are included in this subject.

DETAILED CONTENTS

Sr. No.	Theory	Practical
1.	Cutting: Planning, Drawing, Drafting and Pattern Making and reproduction of the marker, spreading of the fabric to form a lay, cutting of the fabric (10 hrs)	To study tools and equipments used in clothing/garment constructions.
2.	Sewing Properties of Seams, Darts seam types, sewing machine needle types, sewing needles, sewing problems, basic sewing machine (10 hrs)	To study machines parts of sewing machine, threading & working defects remedies and oiling. Type of stitches.
3.	Use of components and trimmings: Labels and motifs, linings, interlinking, waddings (10 hrs)	Practice of making of different types of openings, button holes fasteners, taking & hemming, Types of pleating, Types of Collars, neck-lines, stitching of different cloths
4.	Pressing: The principle of pressing, pressing equipment and methods (10 hrs)	Demonstration of Appliances required for pressing, finishing and pressing of textiles and finishes (through mill visits only)
5.	Quality control: Principles of quality control, Total Quality control, just in time. Inspection systems and care labeling of apparel and textiles. Eco labels, American Care Labeling (CLS), International care labeling system, British care labeling systems, Japanese care labeling system (08 hrs)	

INSTRUCTIONAL STRATEGY

The teacher should lay emphasis on understanding of basic concepts and various terms used in the subject. Practical exercises will reinforce various concepts. Industrial exposure must be given by organizing visits.

RECOMMENDED BOOKS

1. Garment Finishing and Care Labeling by S.S. Satsangi M/s Usha Publishers Delhi
2. Textile Fibres and Fabrics by Bernard P Corbman-M/s Mc Graw-Hill, International Edition
3. Garment Designs-by Amstrong

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	10	21
2	10	21
3	10	21
4	10	21
5	08	16
Total	48	100

6.3 ADVANCED YARN MANUFACTURING

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RATIONALE

A student of diploma in textile technology must be familiar with the new systems of yarn manufacturing coming in modern industry. Hence the subject has been included in the curriculum.

DETAILED CONTENTS

1. Fibre properties, requirements for different spinning processes (04 hrs)
2. Limitations of ring spinning (03 hrs)
3. Basic elements and principles of Rotor Spinning Machine. Passage through the Rotor Spinning Frame (07 hrs)
4. Range of speed for opening roller and rotor (03 hrs)
5. Functions of transport channel (03 hrs)
6. Introduction to Air-jet spinning. Principle of yarn formation (06 hrs)
7. Introduction to Friction Spinning. Principle of yarn formation (06 hrs)
8. Comparison of Ring, Rotor yarn, Air-jet yarn, Friction yarn (03 hrs)
9. Introduction to texturing process. Different texturing processes, their overview. Application and advantages of Textured Yarn (10 hrs)
10. Fibre characteristics required for blending (04 hrs)
11. Recommended settings/modification of machinery in man-made fiber and blends (08 hrs)
12. Information and objective of post spinning operation in man-made fiber production. Introduction to drawing filament. Introduction and concept of heat setting. Object of heat setting (07 hrs)

RECOMMENDED BOOKS

1. Manual of Textile Technology (Vol.5) by W Klein
2. Manual of Textile Technology (Vol.6) by W Klein
3. Spinning of man-made Fibres and their Blends in Cotton Spinning by KR Salhotra
4. Open End Spinning by V.Rohlena
5. Spun Yarn Technology by Venktasubramanian
6. Production of synthetic fibers by A.A Vaidya

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	04	06
2	03	04
3	07	12
4	03	04
5	03	04
6	06	10
7	06	10
8	03	04
9	10	16
10	04	06
11	08	12
12	07	12
Total	64	100

6.4 COMPUTER APPLICATIONS IN TEXTILE TECHNOLOGY

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RATIONALE

Students should be capable to run and implement various application softwares used in the designing and operating textile machines. Since some highly priced machines cannot be purchased, students should be taken to mills where these machines are working e.g. CAM etc.

DETAILED CONTENTS

1. Practice on any textile based software such as Textronics, Wonder Weave, Scot Weave, Ned Graphics etc.
2. Demonstration of various design software and various computer-aided- manufacturing processes
 - Operating CAD-Computer Aided Design in preparing CARDS
 - Practical application of computer networks
 - Introduction to Corel Draw/Photoshop (latest)
3. Demonstration of computer networking, its uses and applications in Textile Technology machines
4. Demonstration of CAM-Computer Aided Manufacturing through visit to mills where such machines are in use

NOTE:

1. Time should be devoted according to depth of the individual software
2. Students should be taken to those mills where such machines are operative and they should be shown the working of these machines (Automated Machines in Mills).

6.5 BASICS OF MANAGEMENT

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RATIONALE

The diploma holders are generally expected to take up middle level managerial positions, their exposure to basic management principles is very essential. Topics like Structure of Organization, Leadership, Motivation, Ethics and Values, Customer Relationship Management (CRM), Legal Aspects of Business, Total Quality Management (TQM), Intellectual Property Rights (IPR) etc. have been included in the subject to provide elementary knowledge about these management areas.

DETAILED CONTENTS

1. Principles of Management (06 hrs)
 - 1.1 Introduction, definition and importance of management
 - 1.2 Functions of Management
Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling
 - 1.3 Concept and Structure of an organization

Types of industrial organization
 - a) Line organization
 - b) Functional organization
 - c) Line and Functional organization
 - 1.4 Hierarchical Management Structure
Top, middle and lower level management
 - 1.5 Departmentalization
Introduction and its advantages
2. Work Culture (06 hrs)
 - 2.1 Introduction and importance of Healthy Work Culture in organization
 - 2.2 Components of Culture
 - 2.3 Importance of attitude, values and behaviour
Behavioural Science – Individual and group behaviour
 - 2.4 Professional ethics – Concept and need of Professional Ethics

- 3. Leadership and Motivation (06 hrs)
 - 3.1 Leadership
 - 3.1.1. Definition and Need of Leadership
 - 3.1.2. Qualities of a good leader
 - 3.1.3. Manager vs. leader
 - 3.2 Motivation
 - 3.2.1 Definition and characteristics of motivation
 - 3.2.2 Factors affecting motivation
 - 3.2.3 Maslow's Need Hierarchy Theory of Motivation
 - 3.3 Job Satisfaction
- 4. Legal Aspects of Business: Introduction and need (06 hrs)
 - 4.1 Labour Welfare Schemes
 - 4.1.1 Wage payment - Definition and types
 - 4.1.2 Incentives - Definition, need and types
 - 4.2 Factory Act 1948
 - 4.3 Minimum Wages Act 1948
- 5. Management Scope in different Areas (12 hrs)
 - 5.1 Human Resource Development
 - 5.1.1 Introduction and objective
 - 5.1.2 Manpower Planning, recruitment and selection
 - 5.1.3 Performance appraisal methods
 - 5.2 Material and Store Management
 - a) Introduction, functions and objectives of material management
 - b) Purchasing: definition and procedure
 - c) Just in time (JIT)
 - 5.3 Marketing and Sales
 - a) Introduction, importance and its functions
 - b) Difference between marketing and selling
 - c) Advertisement- print media and electronic media
 - d) Market-Survey and Sales promotion.

- 5.4 Financial Management – Introduction
 - a) Concept of NPV, IRR, Cost-benefit analysis
 - b) Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty, Provident Fund
- 5.5 Maintenance Management
 - a) Concept
 - b) Preventive Maintenance
- 6. Miscellaneous topics (12 hrs)
 - 6.1 Customer Relationship Management (CRM)
 - a) Definition and Need
 - b) Types of CRM
 - c) Customer satisfaction
 - 6.2 Total Quality Management (TQM)
 - a) Inspection and Quality Control
 - b) Concept of Quality Assurance
 - c) TQM
 - 6.3 Intellectual Property Rights (IPR)
 - a) Introduction, definition and its importance
 - b) Infringements related to patents, copyright, trade mark

INSTRUCTIONAL STRATEGY

It is observed that the diploma holders generally take up middle level managerial positions, therefore, their exposure to basic management principles is very essential. Accordingly students may be given conceptual understanding of different functions related to management. Some of the topics may be taught using question answer, assignment or seminar method. The teacher will discuss success stories and case studies with students, which in turn, will develop appropriate managerial qualities in the students. In addition, expert lectures may also be arranged from within the institutions or from management organizations. Appropriate extracted reading material and handouts may be provided.

RECOMMENDED BOOKS

1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi.
3. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co., 7, West Patel Nagar , New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited , Rajouri Garden, New Delhi.
5. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.
6. Essentials of Management by H Koontz, C O' Daniel , McGraw Hill Book Company, New Delhi.
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Total Quality Management by DD Sharma, Sultan Chand and Sons, New Delhi.
9. Intellectual Property Rights and the Law by Dr. GB Reddy.
10. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.
11. Customer Relationship Management: A step-by-step approach, Mohamed & Sagadevan Oscar Publication, Delhi
12. Customer Relation Management, Sugandhi RK, Oscar Publication, Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	06	15
2	06	10
3	06	15
4	06	10
5	12	25
6	12	25
Total	48	100

6.6 EMPLOYABILITY SKILLS – II

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RATIONALE

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. Our diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject to prepare students for employability in job market and survive in cut throat competition among professionals.

DETAILED CONTENTS

1. Oral Practice
 - i) Mock interview (05 hrs)
 - ii) Preparing for meeting (05 hrs)
 - iii) Group discussion (05 hrs)
 - iv) Seminar presentation (05 hrs)
 - v) Making a presentation (12 hrs)
 - a) Elements of good presentation
 - b) Structure and tools of presentation
 - c) Paper reading
 - d) Power point presentation

6.7 MAJOR PROJECT WORK

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Project work aims at developing skills in the students whereby they apply the totality of knowledge and skills gained through the course in the solution of particular problem or undertaking a project. The students have various aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given for a group. The students should identify or given project assignment at least two to three months in advance. The project work identified in collaboration with industry may be preferred. The Industrial/practice based major project is intended to place students for project oriented practical training in actual work situations for the stipulated period with a view to:

- i) Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study.
- ii) Develop understanding of subject based knowledge given in the class room in the context of its applications at work places
- iii) Develop first hand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems in the world of work.
- iv) Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values

The major project should not be considered as merely conventional Industrial training in which students are sent at work places with minimal supervision. This experience is required to be planned and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organisations for providing such and experience. It is necessary that each organisation is visited well in advance and activities to be performed by the students are well defined. The chosen activities should be such which are of curricular interest to students and of professional value to Industrial/field organisations. Each teacher is expected to supervise and guide 5-6 students.

Efforts should be made to identify actual field problems in the textile industries to be given as project work to the students. Project selected should not be too complex which is beyond the level of the students. The placement of the students for such a practical cum project work should match with the competency profile of students and the project work assigned to them. Students may be assessed both by industry and polytechnic faculty.

Some of the suggested project activities are given below:

For Spinning group

1. Assessment of yarn realization, expected waste percentage at different stages from a specific trash percentage raw material
2. To prepare a spin plan for a particular count balancing the machines, material and labour
3. Modifications/changes required in the various machines for processing of stapled man made fibres on cotton spinning system
4. Comparison of semi high production and high production card silver on yarn quality and economics of the both
5. Effect of draft distribution and total draft and change in twist on ring spun yarn with respect to productivity and quality
6. Reasons of end breakages, their remedies and analysis in a ring frame machine
7. Effect of odd no of doubling and even no. of doubling on draw frame seiver.

For Weaving Group

1. Graph to fabric (may be in the mill or institute)
2. Mill plan (for certain number of looms)
3. Sample testing
4. Loom efficiency
5. Project fire fighting
6. Reproduction from fabric samples
7. Fabric faults and remedial steps
8. Study of any latest technology/machine related to weaving

For Knitting and Garmenting

1. Study of variation of knitted structures
2. Comparison of different garment manufacturing systems
3. Knitting faults and remedial steps
4. Garment faults and remedial steps
5. Garment Testing
6. Line setting in garment house

A suggestive criteria for assessing student performance by the external (personnel from industry) and internal (teacher) examiner is given in table below:

Sr. No.	Performance criteria	Max.** marks	Rating Scale				
			Excellent	Very good	Good	Fair	Poor
1.	Selection of project assignment	10	10	8	6	4	2
2.	Planning and execution of considerations	10	10	8	6	4	2
3.	Quality of performance	20	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20	20	16	12	8	4
5.	Sense of responsibility	10	10	8	6	4	2
6.	Self expression/ communication skills	5	5	4	3	2	1
7.	Interpersonal skills/human relations	5	5	4	3	2	1
8.	Report writing skills	10	10	8	6	4	2
9.	Viva voce	10	10	8	6	4	2
Total marks		100	100	80	60	40	20

The overall grading of the practical training shall be made as per following table

	Range of maximum marks	Overall grade
i)	More than 80	Excellent
ii)	79 <> 65	Very good
iii)	64 <> 50	Good
iv)	49 <> 40	Fair
v)	Less than 40	Poor

In order to qualify for the diploma, students must get “Overall Good grade” failing which the students may be given one more chance of undergoing 8 -10 weeks of project oriented professional training in the same industry and re-evaluated before being disqualified and declared “not eligible to receive diploma”. It is also important to note that the students must get more than six “goods” or above “good” grade in different performance criteria items in order to get “Overall Good” grade.

Important Notes

1. This criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.
2. The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.
3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.

4. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

The teachers are free to evolve another criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations in such an exhibition. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.