

**Dr. A.P.J. ABDUL KALAM TECHNICAL  
UNIVERSITY, LUCKNOW**



**EVALUATION SCHEME & SYLLABUS**

**FOR**

**B. TECH. FOURTH YEAR**

***Carpet & Textile Technology***

**AS PER**

**AICTE MODEL CURRICULUM & NEP2020**

**[Effective from the Session: 2025-26]**

| Sl. No. | Subject Codes                | Subject Name                                                                         | Learning Mode     | LTP      |          |           | Evaluation Scheme |    |       |     |    |    | Total      | Credit    |
|---------|------------------------------|--------------------------------------------------------------------------------------|-------------------|----------|----------|-----------|-------------------|----|-------|-----|----|----|------------|-----------|
|         |                              |                                                                                      |                   | L        | T        | P         | CT                | TA | Total | PS  | TE | PE |            |           |
| 1       | BCT701                       | Technical Textiles                                                                   | Offline           | 3        | -        | -         | 20                | 10 | 30    | -   | 70 | -  | 100        | 3         |
| 2       | BCT070/<br>BCT071/<br>BCT072 | Quality Control in Home Textiles/ Design Management/Engineering of Textile Structure | Offline           | 3        | -        | -         | 20                | 10 | 30    | -   | 70 | -  | 100        | 3         |
| 3       |                              | Open Elective-II                                                                     | Offline/<br>MOOCs | 3        | 0        | 0         | 20                | 10 | 30    | -   | 70 |    | 100        | 3         |
| 4       | BCT751                       | Technical Textiles Lab                                                               | Offline           | 0        | 0        | 2         | -                 | -  | -     | 50  | -  | 50 | 100        | 1         |
| 5       | BCT752                       | Mini Project or Internship Assessment*                                               |                   | 0        | 0        | 4         | -                 | -  | -     | 100 | -  | -  | 100        | 2         |
| 6       | BCT752                       | Project - I                                                                          |                   | 0        | 0        | 10        | -                 | -  | -     | 150 | -  | -  | 150        | 5         |
|         |                              | Startup and Entrepreneurial Activity Assessment <sup>#</sup>                         |                   | 0        | 0        | 4         | -                 | -  | -     | 100 | -  | -  | 100        | 2         |
|         |                              | <b>Total</b>                                                                         |                   | <b>9</b> | <b>0</b> | <b>20</b> |                   |    |       |     |    |    | <b>750</b> | <b>19</b> |

\* The Mini Project or internship (5-6 weeks) conducted during summer break after VI semester and will be assessed during VII semester.  
<sup>#</sup> The Startup and Entrepreneurial Activity Assessment will be done in 7<sup>th</sup> semester under which a student will have to undergo a startup/entrepreneurship activity of at least 60 hours till 6<sup>th</sup> semester.

**B.Tech. Fourth Year, Semester- VIII**  
**(Carpet & Textile Technology)**

|         |               | Semester- VIII    |               |         |   |    |                   |    |       |     |    |     |       |        |
|---------|---------------|-------------------|---------------|---------|---|----|-------------------|----|-------|-----|----|-----|-------|--------|
| Sl. No. | Subject Codes | Subject Name      | Learning Mode | Periods |   |    | Evaluation Scheme |    |       |     |    |     | Total | Credit |
|         |               |                   |               | L       | T | P  | CT                | TA | Total | PS  | TE | PE  |       |        |
| 1       |               | Open Elective-III | MOOCs         | 3       | 0 | 0  | 20                | 10 | 30    |     | 70 |     | 100   | 3      |
| 2       |               | Open Elective-IV  | MOOCs         | 3       | 0 | 0  | 20                | 10 | 30    |     | 70 |     | 100   | 3      |
| 3       | BCT851        | Project - II      |               | 0       | 0 | 18 |                   |    |       | 100 |    | 350 | 450   | 10     |
|         |               | Total             |               | 6       | 0 | 18 |                   |    |       |     |    |     | 650   | 16     |

## SYLLABUS

### BCT701 TECHNICAL TEXTILES

#### Course Objectives:

1. To understand scope of usage of technical textiles in various sectors of technical textiles.
2. To know basic concepts of Mobiltech and Protech.
3. To comprehend the use of textile materials in filters, geotextiles, smart textiles, FRC.
4. To understand the applications of technical textiles in heat, flame protection and Medical Textiles.
5. To learn about broadloom, tufted and woven carpets.
6. To get idea of other machine made carpets manufacturing and finishing techniques.

| Unit | Topic                                                                                                                                                                                                                                                                                                                                      | Lecture required |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1    | Introduction – Definition, classification and scope of technical textiles, present and future market trends in technical textiles<br>Mobiltech – Introduction, textiles in automobiles, aircrafts application.<br>Protech- Introduction, ballistic protection, biological and chemical warfare protection                                  | 8                |
| 2    | Filter - Introduction of different types of filters, principle and application-.<br>Nonwoven material-production and application<br>Geotextiles – scope, definition, product specification, application<br>Smart textiles-definition-types-principles- manufacturing method<br>Fibre Reinforced Composites (FRC), Diversified applications | 8                |
| 3    | Heat and flame protection-fibres (PBI, PBO, PEEK, glass, carbon etc.) and application , flame retardant carpet.<br>Medical Textiles (Meditech) – Introduction – classification and application of textiles                                                                                                                                 | 8                |
| 4    | Introduction to machine made carpets- raw material, classification, advantages and limitations.<br>Table tufting, robotic tufting, Kibby and M-tuft sample making machines,<br>Manufacturing, lamination and coating of Broad loom tufted carpets-principles, production.                                                                  | 8                |
| 5    | Machine Woven carpet – Gripper loom, Wired loom weaving and face to face weaving,<br>Knitted carpet<br>Needle punch and spun bonded carpets.                                                                                                                                                                                               | 8                |

#### References:

1. A.R. Horrocks and S. C. Anand (2016) Handbook of Technical Textiles by Woodhead Publishing.
2. Subhash Anand (2001) Medical Textiles, Woodhead Publishing.
3. NPTEL, <https://nptel.ac.in> 6 Automotive Textiles by Warner Fung
4. Technical Textiles Industry in India OPPORTUNITIES AND CHALLENGES Baseline Study 2020  
([https://texmin.nic.in/sites/default/files/Baseline\\_Survey\\_Technical\\_Textiles\\_Sector\\_20042022.pdf](https://texmin.nic.in/sites/default/files/Baseline_Survey_Technical_Textiles_Sector_20042022.pdf))
5. G Crawshaw (2002), Carpet Manufacture, Wool Research Organisation of New Zealand.

#### Course outcome

At the end of the course students will be able to:

1. Recall the knowledge in Mobiltech, Protech, Filter, Geotech, Flame Retardant Fabric. Medtech, Smart Textiles, Composites and advanced carpet manufacturing and finishing techniques.
2. Classify and identify Mobiltech, Protech, Filter, Geotech, Flame Retardant Fabric. Medtech, Smart Textiles and Composites and advanced carpet manufacturing and finishing techniques.
3. Illustrate and show Mobiltech, Protech, Filter, Geotech, Flame Retardant Fabric. Medtech, Smart Textiles and Composites and advanced carpet manufacturing and finishing techniques.
4. Manage and investigate Mobiltech, Protech, Filter, Geotech, Flame Retardant Fabric, Medtech, Smart Textiles and Composites and advanced carpet manufacturing and finishing techniques.
5. Determine and evaluate Mobiltech, Protech, Filter, Geotech, Flame Retardant Fabric. Medtech, Smart Textiles and Composites and advanced carpet manufacturing and finishing techniques.
6. Create and develop Mobiltech, Protech, Filter, Geotech, Flame Retardant Fabric. Medtech, Smart Textiles and Composites and advanced carpet manufacturing and finishing techniques.

## BCT070 QUALITY CONTROL IN HOME TEXTILES

### Course Objectives:

Objective of this course is to understand quality and quality control through inspection as well as testing techniques in home textiles industry.

| Unit | Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Lecture required |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1    | <b>Introduction to Quality</b> .Importance of quality, managing quality through inspection, managing quality through testing. seven tools of quality control.<br><b>Inspections Techniques: - Raw Material Inspection:</b> Fabric inspection, 4-point system, fabric defects, sewing threads, zippers                                                                                                                                                                                         | 8                |
| 2    | <b>Inspections Techniques: - In process Inspection:</b> Introduction, spreading, cutting, sewing, pressing/finishing, fusing, welding technique, moulding technique, screen printing, embroidery.<br><b>Final Inspection</b> , How much to inspect, Selection of Inspectors.                                                                                                                                                                                                                  | 8                |
| 3    | <b>Textile Testing &amp; Product Evaluation: -</b><br>Precision & Accuracy of Test methods, atmospheric conditions for testing, strength properties of apparel, fabric stretch properties , dimensional changes in soft furnishing due to laundering, dry cleaning, steaming and pressing , durable press evaluation of fabrics & soft furnishings. needle cutting & yarn severance, sew ability of fabrics, bow & skew ness, fabric distortion, fabric streak, soil / stain releasing tests. | 8                |
| 4    | <b>Textile Testing &amp; Product Evaluation: -</b><br>Bonded & laminated furnishing Fabric, testing of fusible interlining. testing of zippers, elastics waist band testing yarn strength & elongation, sewing threads, buttons & snap fastness & wear testing, flammability of clothing, flammability testing methods, factors affecting fabric flammability.                                                                                                                                | 8                |
| 5    | <b>Introduction to shade Sorting.</b> Instrumental shade sorting.<br><b>International care labeling System.</b><br><b>Introduction to laboratory accreditation:-</b> About NABL, meaning of accreditation, accreditation v/s certification, benefits of accreditation etc.                                                                                                                                                                                                                    | 8                |

### References

1. Managing quality control in apparel industry by P.V.Mehta & S.K.Bharadwaj, ASQC Quality Press, New york, 1998.
2. An Introduction to quality control for the apparel industry by P.V.Mehta, ASQC Quality Press, New York.
3. Principles of textile testing by J.E. Booth, C.B.S., publishers and distributors, New Delhi,1996
4. Process control in home textile manufacturing by K Kgoswami, Abhishek Publisher Chandigarh, India.(In press)

**Course Outcome:** At the end of the course, students will be able to:

1. Explain quality and seven tools of quality control i.e. cause and effect diagram, check sheet, control chart, flow chart, histogram, pareto chart and scatter diagram as well as Describe raw material inspection techniques of quality control i.e fabrics, sewing threads and zippers.

2. Describe in process inspection techniques of quality control i.e. spreading, cutting, sewing, pressing etc. and final home textiles inspection.
3. Explain various testing methods for evaluation of home textiles as mentioned in Unit 3.
4. Explain various testing methods for evaluation of home textiles as mentioned in Unit 4.
5. Describe shade sorting of fabrics and care labeling of home textile products.

## BC071 Design Management

### Course Objectives:

1. To differentiate design sources of nature, industry, various phases of product life cycle.
2. To discuss stage design process, raw material, importance of CAD, buyer involve as per market trend.
3. To describe different methods of design for manufacturing (DFM), analysis, quality function & development as per ISO and colour forecast as per market trends.
4. To elaborate about design management, manufacturing costing and creation of design future
5. To explain different methods of producing samples and recording of design catalogue through website and their presentation.
6. To evaluate design, different element and their aesthetic value as per market prospect.

| Unit | Topic                                                                                                                                                                                                                                        | Lecture required |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1    | Difference between design and development, aspects of home textiles design, sources of design ideas / inputs, design requirements pertaining to different countries, characteristics of industry during various phases of product life cycle | 8                |
| 2    | Stages in Design process, planning with Design output, Design inputs, selection of raw material and accessories, customer involvement in design process, innovation in the design process, importance of CAD Tools in Design Management      | 8                |
| 3    | Design for manufacturing (DFM), quality function deployment (QFD), and design and development system requirements as per ISO, designing for future, colour forecast market trends management                                                 | 8                |
| 4    | Validation and verification of designs, time management in designing, basics of network analysis (PERT & CPM), standard costing methods professional practices of designing                                                                  | 8                |
| 5    | Presentation of designs need and maintenance, design related records and their maintenance, design catalogue – preparation, evaluation of performance of designs; define elements and their aesthetic value and marketing prospect.          | 8                |

### References

1. Design Management by Brigitte de Mozota
2. Design Project Management by Griff Boyle
3. Principles and Practice of Management by Prasad, L M.
4. Principle of Management by Tripathi & Reddy, P.N.
5. Production Operation Management by Heizer, Joy.
6. Export, Import Procedure & Documentation by Jain, Archarya.
7. Textile Designing: Theory & Concept by Jain, Tanya
8. Watson's Textile Design and Colour by Grosicki, Z. J.
9. Hand book of textile design, Jacquie Wilson, wood head, publishing UK

**Course Outcome:** At the end of the course, students will be able to:

1. Difference between design home sources of nature, industry, various phases of PLC.
2. Get knowledge on stage design process, raw material, CAD tools, buyer involved on different market test.

3. Understand different method of DFM, Analysis, and Quality function & development system requirements as per ISO.
4. Get Knowledge managing in design, manufacturing costing, verification, costing of methods & Build-up the creation of design future.
5. Different methods of producing samples presentation & records design catalogue through website & online presentation.
6. Knowledge evaluation of designs, different elements & their Aesthetic value & marketing

## BCT072 ENGINEERING OF TEXTILE STRUCTURE

### Course Objective:

Objective of the course is to identify yarn and fabric parameters and understand structure of woven fabric structure for evaluation, design and product development.

| Unit | Topic                                                                                                                                                                                                     | Lecture required |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1    | Packing of fiber in yarn and Packing factor. Measurement of Yarn diameter.<br>Cloth setting theories and fabric tightness. Cloth cover and porosity.<br>Relationship of fabric density and fabric weight. | 8                |
| 2    | Fiber migration- mechanism of migration, Measurement of migration and factor affecting frequency of migration.<br>Mechanics of staple fibre yarns and limit of twist. Hamburger model.                    | 8                |
| 3    | Idealized yarn geometry. Twist factor. Twist contraction. Effect of twist on Yarn tenacity.<br>Extension of continuous filament yarn and prediction of break.                                             | 8                |
| 4    | Pierce concept of fabric geometry for plain weave.<br>Functional relationship for crimp amplitude, Fabric thickness.<br>Special cases of fabric geometry and jam structures.                              | 8                |
| 5    | Flexible and elastic threads model, Crimp interchange & Crimp balance in woven fabric.<br>Uniaxial and biaxial tensile behavior of cloth.                                                                 | 8                |

### Reference

1. Textile yarns. Technology, structure and applications. by Goswami, Martindale, Scardino. Wiley Publication.
2. Textile Mathematics by J.E. Booth
3. Pierce papers in Journal of textile institute 1930, 1937
4. Watson's Advanced Textile Design. Compound woven structures, Woodhead Publishing Ltd.
5. Woven Textile Structure: Theory & Applications. B K Behera & P K hari. Woodhead publishing Ltd.

### Course Outcomes:

At the end of the course students will be able to:

1. Recall the Knowledge of parameters of yarn and woven fabric structure by listing, defining and memorizing.
2. Describe yarn and fabric parameters.
3. Execute knowledge of yarn and fabric parameters for translation into properties.
4. Analyze test results of yarn fabric properties in terms of structural parameters.
5. Synthesis the parameters for design and development of product.
6. Evaluate yarn and fabric properties with reasoning.

## BCT-751 TECHNICAL TEXTILES LAB

### Course Objectives:

1. To know the process sequence and production technique of Kibby machine.
2. To know the process sequence and production technique of M-tuft machine.
3. To know the process sequence and production technique of Table tuft carpet sampling machine.
4. To know the process sequence and production technique of needle punch nonwoven machine.
5. To know the process sequence and production technique of spunbond nonwoven machine.
6. To know the process sequence and production technique of friction spinning machine.

| Unit | Topic                                                                 | Lecture required<br>(hrs) |
|------|-----------------------------------------------------------------------|---------------------------|
| 1    | Preparation of sample on Kibby carpet sampling machine                | 4                         |
| 2    | Preparation of sample on M-tuft carpet sampling machine               | 4                         |
| 3    | Preparation of sample on Table tuft carpet sampling machine           | 4                         |
| 4    | Study the sequence of machines in needle punch nonwoven line          | 6                         |
| 5    | Study the sequence of machines in spunbond nonwoven line              | 6                         |
| 6    | Preparation of sample of technical yarn in friction spinning machine. | 4                         |

### Course outcome

At the end of the course students will be able to:

1. Recall the knowledge in machine parameters of kibby , M-tuft, table tuft, needle punched and spunbond nonwoven and friction spinning machine.
2. Classify and identify process sequence of Kibby, M-tuft, table tuft, needle punched and spunbond nonwoven and friction spinning machine.
3. Illustrate and show machine parameters and process sequence of Kibby , M-tuft, table tuft, needle punched and spunbond nonwoven and friction spinning machine.
4. Manage and investigate any malfunction of kibby, M-tuft, table tuft, needle punched and spunbond nonwoven and friction spinning machine.
5. Determine and evaluate production process in kibby, M-tuft, table tuft, needle punched and spunbond nonwoven and friction spinning machine.
6. Create and develop required samples in Kibby , M-tuft, table tuft, needle punched and spunbond nonwoven and friction spinning machine.