

# **SYLLABUS**

**Uttar Pradesh Textile Technology Institute, Kanpur**

*Affiliated to*

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



**STUDY & EVALUATION SCHEME  
FOR  
FINAL YEAR B. TECH. TEXTILE ENGINEERING  
On  
AICTE B.Tech Model Curriculum Structure (MCS)  
(Effective from the Session: 2021-22)**

# Uttar Pradesh Textile Technology Institute, Kanpur

*Affiliated to*

Dr. APJ Abdul Kalam Technical University, Lucknow

## STUDY AND EVALUATION SCHEME

### B. Tech. Textile Engineering

4<sup>th</sup> Year VII-SEMESTER

Effective from SESSION-2021-22

S. No.	Subject Code	Subject Name	Periods			Evaluation Scheme				End Semester		Total	Credit	
			L	T	P	CT	TA	Total	PS	TE	PE			
1	KHU701/ KHU801/ KHU702/ KHU802	<b>HSMC 1</b> : Rural Development Administration and Planning / Project Management & Entrepreneurship	3	0	0	30	20	50		100		150	3	
2	KTT071 / KTT072	<b>Dept. Elective-IV:</b> Garment Technology / Knitting Technology	3	0	0	30	20	50		100		150	3	
3	KTT075 / KTT076 / KTT077	<b>Dept. Elective V:</b> Technical Textiles/High Performance Fibre/Mill Planning & organization	3	0	0	30	20	50		100		150	3	
4		Open Elective-II:	3	0	0	30	20	50		100		150	3	
5	KTT0751 / KTT752	Lab-I: Garment Technology /Knitting Technology	0	0	2	20	10		25		25	50	1	
6	KTT755	Internship	0	0	2				50			50	1	
7	KTT756	Mini Project	0	0	8				150			150	4	
8		MOOCs (Essential for Hons. Degree)												
<b>TOTAL</b>			12	0	12							<b>850</b>	<b>18</b>	

**HSMC -1: Humanities & Social Science including Management Courses; As per AKTU Lucknow**

**Open Elective-II: As per AKTU Lucknow**

KOE071	Filter design
KOE072	Bioeconomics
KOE073	Machine learning
KOE074	Renewable energy resources
KOE075	Operations research
KOE076	Value relationship & ethical human conduct- for a happy & harmonious society
KOE077	Design thinking
KOE078	Soil and water conservation engineering
KOE078	Introduction to women's and gender studies

**4<sup>th</sup> Year VIII-SEMESTER**

**Effective from SESSION-2021-22**

S. No.	Subject Code	Subject Name	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KHU701/ KHU801/ KHU702/ KHU802	<b>HSMC 2</b> : Rural Development Administration and Planning / Project Management & Entrepreneurship	3	0	0	30	20	50		100		150	3
2		Open Elective-III	3	0	0	30	20	50		100		150	3
3		Open Elective IV:	3	0	0	30	20	50		100		150	3
4	KTT851	Project	0	0	18				100		300	400	9
5		MOOCs (Essential for Hons. Degree)											
<b>TOTAL</b>			12	0	18							<b>850</b>	<b>18</b>

HSMC -2: As per AKTU, Lucknow

Open Elective-III & IV: As per AKTU Lucknow

## 7<sup>th</sup> Semester B. Tech. Textile Engineering (Effective from 2021-22)

### 1. HSMC-I : (L T P 3 0 0) As per AKTU Lucknow

#### 1.1 KHU701/801 – Rural Development: Administration and Planning (3-0-0)

Credit = 3

**Course outcome:** After completion of the course, student will be able to:

CO1	Understand the definitions, concepts and components of Rural Development
CO2	Know the importance, structure, significance, resources of Indian rural economy.
CO3	Have a clear idea about the area development programmes and its impact
CO4	Acquire knowledge about rural entrepreneurship
CO5	Understand about the using of different methods for human resource planning

Unit	Topics	Lectures
I	<b>Rural Planning &amp; Development:</b> Concepts of Rural Development, Basic elements of rural Development, and Importance of Rural Development for creation of Sustainable Livelihoods, An overview of Policies and Programmes for Rural Development- Programmes in the agricultural sector, Programmes in the Social Security, Programmes in area of Social Sector.	8
II	<b>Rural Development Programmes:</b> Sriniketan experiment, Gurgaon experiment, marthandam experiment, Baroda experiment, Firkha development scheme, Etawa pilot project, Nilokheri experiment, approaches to rural community development: Tagore, Gandhi etc	8
III	<b>Panchayati Raj &amp; Rural Administration:</b> Administrative Structure: bureaucracy, structure of administration; Panchayati Raj Institutions Emergence and Growth of Panchayati Raj Institutions in India; People and Panchayati Raj; Financial Organizations in Panchayati Raj Institutions, Structure of rural finance, Government & Non-Government Organizations / Community Based Organizations, Concept of Self help group.	8
IV	<b>Human Resource Development in Rural Sector:</b> Need for Human Resource Development, Elements of Human Resource Development in Rural Sector Dimensions of HRD for rural development-Health, Education, Energy, Skill Development, Training, Nutritional Status access to basic amenities - Population composition.	8
V	<b>Rural Industrialization and Entrepreneurship:</b> Concept of Rural Industrialization, Gandhian approach to Rural Industrialization, Appropriate Technology for Rural Industries, Entrepreneurship and Rural Industrialization-Problems and diagnosis of Rural Entrepreneurship in India, with special reference to Women Entrepreneurship; Development of Small Entrepreneurs in India, need for and scope of entrepreneurship in Rural area.	8

#### Text Books:

1. Corporate Social Responsibility: An Ethical Approach - Mark S. Schwartz
2. Katar Singh: Rural Development in India – Theory History and Policy
3. Todaro M.P. Economic Development in III World war

4. Arora R.C – Integrated Rural Development in India
5. Dhandekar V.M and Rath N, Poverty in India
6. A.N.Agarwal and KundanaLal: Rural Economy of India
7. B.K.Prasad: Rural Development-Sarup& Son's Publications.

**1.2 KHU702/802 – PROJECT MANAGEMENT & ENTREPRENEURSHIP (3-0-0) Credit = 3**

Unit	Topics	Lectures
I	<b>Entrepreneurship:</b> Entrepreneurship: need, scope , Entrepreneurial competencies & traits, Factors affecting entrepreneurial development, Entrepreneurial motivation (Mc Clelland's Achievement motivation theory), conceptual model of entrepreneurship , entrepreneur vs. intrapreneur; Classification of entrepreneurs; Entrepreneurial Development Programmes	8
II	<b>Entrepreneurial Idea and Innovation:</b> Introduction to Innovation, Entrepreneurial Idea Generation and Identifying Business Opportunities, Management skills for Entrepreneurs and managing for Value Creation, Creating and Sustaining Enterprising Model & Organizational Effectiveness	8
III	<b>Project Management:</b> Project management: meaning, scope & importance, role of project manager; project life-cycle Project appraisal: Preparation of a real time project feasibility report containing Technical appraisal,; Environmental appraisal, Market appraisal (including market survey for forecasting future demand and sales) and Managerial appraisal.	8
IV	<b>Project Financing:</b> Project cost estimation & working capital requirements, sources of funds, capital budgeting, Risk & uncertainty in project evaluation , preparation of projected financial statements viz. Projected balance sheet, projected income statement, projected funds & cash flow statements, Preparation of detailed project report, Project finance.	8
V	<b>Social Entrepreneurship:</b> Social Sector Perspectives and Social Entrepreneurship, Social Entrepreneurship Opportunities and Successful Models, Social Innovations and Sustainability, Marketing Management for Social Ventures, Risk Management in Social Enterprises, Legal Framework for Social Ventures.	8

**Text Books:**

1. Innovation and Entrepreneurship by Drucker, P.F.; Harper and Row
2. Business, Entrepreneurship and Management: Rao, V.S.P. ;Vikas
3. Entrepreneurship: Roy Rajeev; OUP.
4. Text Book of Project Management: Gopalkrishnan, P. and Ramamoorthy, V.E.;McMillan
5. Project Management for Engineering, Business and Technology: Nicholas, J.M., and Steyn, H.; PHI
6. Project Management: The Managerial Process: Gray, C.F., Larson, E.W. and Desai,G.V.; MGH

## 2.0 Department Elective IV:

### 2.1 Knitting Technology [KTT072]: (3-0-0)

Credit = 3

**Course Outcome:** After completing the course student is able to:

CO1	Understand basic concept of knitting, classification of knitting
CO2	Understand basic difference between different knitting system,
CO3	Understand mechanism of weft & warp knitting machines & principles behind warp & weft knitting
CO4	Understand the different types of structures made on different types of knitting machines
CO5	Compare important properties of fabric made of it. Be able to calculate & estimate stitch density, cover & gsm of knitted fabric

**Unit 1:** Difference between knits and woven, knitting terms and definitions (Course,, wale, stitch density) different type of knitting needles: bearded needle, latch needle, sinker, jack, cam arrangement, overlap, under lap, closed lap, open lap.

**Total Lectures required =8**

**Unit 2:** Comparison of warp and weft knitting, Classification of weft knitting machine, elements of knitting machine, all type of needles, sinkers, positive feeder etc Needle numbering system, technology of loop formation, geometry of loop structure, Elements of loop structure: needle loop, sinker loop, relation between yarn count, machine gauge and stitch density.

**Total Lectures required =9**

**Unit 3:** Classification of knit-structures, loop formation on: single jersey, Rib machines and interlock machines, socks knitting technology, sliver knitting machine, Loop formation on flat bed machine, 3-D knitting, Knitting for active wear,

**Total Lectures required =9**

**Unit 4:** Four primary base knitting structures: Plain knitted fabric, Rib fabric, Interlock and Purl fabric, Special knitting machines: Fabric machine, garment length machine, flat machine, circular machine fabrics and Spacer fabrics.

**Total Lectures required =7**

**Unit 5:** Basic warp knitting machines, classification of warp knitting, Modern developments in warp knitting technique, calculations regarding production, gsm, stitch density, tightness factor etc, Causes and remedies of faults of knitted fabrics.

**Total Lectures required =9**

**Grand total of lectures required = 42**

#### Text Books and References-

1. David J Spencer, Knitting Technology, A comprehensive handbook and practical guide, Third edition, Woodhead Publishing Limited, Cambridge, 2001
2. Samuel Raz., Flat Knitting: The new generation, Meisenbach GmbH, Bamberg, 1997.
3. Samuel Raz., Warp Knitting production, Melliand Textilberichte, GmbH, Rohrbacher, 1987.
4. Sadhan C Ray, Fundamentals and Advances in Knitting Technology, Woodhead Publishing India Pvt. Ltd., New Delhi, 2012.

5. Prof Ajgaonkar D B, Knitting technology, Universal Publishing Corp., Bombay, India 1998.
6. Iyer, Mammel and Schach, Circular knitting, Technology Process Structures Yarns Quality, Meisenbach GmbH in Bamberg, Third Edition, 2004.
7. K P Weber; Karl Mayer, Introduction to Warp knitting, Textilmaschinenfabri, Obertshausen, 2001.
8. Subhankar Maity Sohel Rana Pintu Pandit Kunal Singha, Advanced Knitting Technology, Woodhead Publishing, Elsevir, 2021.

## 2.2 Garment Technology [KTT071] : (3-0-0)

Credit = 3

**Course Outcome:** After completing the course student is able to:

CO1	Understand concept of garment making, cutting, fusing sewing, pressing, etc
CO2	Understand the important properties required for garment making, apply the importance of low stress properties, thermal properties, to garment making
CO3	Understand the garment cutting, marker planning, methods of spreading etc in garment making
CO4	Understand the importance of seam, stich classification, seam formation etc.
CO5	Get the knowledge about different sewing machines, classification of sewing machines, their application etc

**Unit 1:** Introduction to garment manufacturing technology, Sample cutting, Fusing, Sewing, Pressing, Finishing and inspection, Concept of Line balancing.

**Total Lectures required =8**

**Unit 2:** Introduction to measurement of fabric dimensional properties, fabric comfort, thermal comfort, objective evaluation of fabric, low stress fabric properties, Kawabata system, fabric assurance by sample testing, fabric defects, Fabric inspection and feedback to previous process.

**Total Lectures required =8**

**Unit 3:** Introduction to garment cutting, Marker planning, Efficiency of Marker planning, software for marker planning, methods of marker planning and marker use, spreading of the fabric, to form a lay, spreading requirements, methods of spreading, fabric packages, objective of cuttings, methods of cuttings,

**Total Lectures required =9**

**Unit 4:** Introduction to seam, stitch, stitch classification, stitch structure, seam formation, joining material, surface characteristics, seam appearance, damages (thermal and mechanical), seam performance, seam degradation, seam failure, seam puckering and seam testing. Sewing needle and sewing thread, thread consumption,

**Total Lectures required = 9**

**Unit 5:** Introduction of spreading machines and cutting machines- types and functions, History of sewing machines. Sewing machinery- classification according to bed types, stitch types (hook or looper) material wise (extra light to heavy weight). Major parts of sewing machinery and functions. Parts, functions and adjustments of Over Lock: Collar turning machines, folding machinery fusing and pressing machinery, Computer controlled cutting, sewing, folding machinery. Automatic piece handling system (ETONE system), SAM (standard average minute) value.

**Total Lectures Required = 8**

**Grand total of lectures required = 42**

**Text Books and References:**

1. Rajkishore Nayak and Rajiv Padhye, Garment Manufacturing Technology, Woodhead Publishing and The Textile Institute, Elsevier Ltd, 2015.
2. Mary Methews, Practical Clothing Construction Part I & II, Cosmic Press, Chennai, 1986.
3. Carr H and Lantham B, The Technology of Clothing Manufacture, Blackwell Science, U.K.,1994.
4. Mehta P V and Bhardwaj S K, Managing Quality in apparel industry, New Age International (P) Ltd., Delhi, 2002
5. Aldrich W, Metric Pattern Cutting for men's wear (2011) and Metric Pattern Cutting for women's wear, Wiley, 2015.
6. Cooklin Gerry, Garment Technology for Fashion Designers, Om Book Service, New Delhi, 1997.
7. Eveleyn M and Ucas, "Clothing Construction", 2<sup>nd</sup> Edition Hughton Mifflin Co, Boston 1974.

**3.0 Department Elective V: (L T P 3 0 0)**

**3.1 Technical Textiles [KTT075] : (3-0-0)**

**Credit = 3**

**Course Outcome:** After completing the course student is able to:

CO1	Understand the application of different fibres in technical application, different types of technical textiles.
CO2	Get the important parameters required for different types of protective textiles, the properties required for different types of technical textiles
CO3	Apply the knowledge in manufacture of protective textiles, waterproof textiles, antimicrobial textiles, NBC textiles product manufacturing
CO4	Get the knowledge about requirement of different types of medical textiles, their manufacturing process, different types of fibres & their properties required for medical textiles
CO5	Get the idea about smart textiles. About the application of different fibres in geo-textiles and their manufacturing

**Unit 1:** Introduction to technical textile, types of technical textiles, textiles used in industry such as filtration, filter fabric construction- woven, needle felt & knitted filter fabric, finishing treatment of filter fabric, thermal and chemical properties of filter fabric, essential requirements of good filter fabric. Application of nano technology and nano materials for the improved filtration.

**Total Lectures required =8**

**Unit 2:** Manufacture and properties of protective textiles- water proof/coated and water repellent, antimicrobial, flame retardant, chemical resistance, Nuclear and biological resistance, mechanical resistance such as bullet proof, cut proof, stab proof.

**Total Lectures required =9**

**Unit 3:** Medical textiles, fibres used, classification of medical textiles- non-implantable material wound dressings, bandages, plasters, etc, Extra-corporal devices – Artificial kidney, liver lung, implantable material- suture, soft tissue implant, Orthopaedic implants, Cardiovascular implants, Healthcare/ hygiene products, medical cost, surgical gown, face mast etc.

**Total Lectures required =8**

**Unit 4:** Smart textiles, brief introduction of smart textiles, classification of smart textiles, passive smart textiles, active smart textiles, brief discussion of smart shirt, smart suit, musical jacket, space suit etc. automotive textiles: type cord, seat belt, air bag, seat upholstery, carpets, headliners, helmets etc, Agro textile: Shade net, green house film, Mulch net, crop cover, anti hail and bird protection net, finishing net etc.

**Total Lectures required =9**

**Unit 5:** Introduction of geo textile, classification of geo textiles, functions of geo textile-soil reinforcement, drainage (fluid transmission), filtration, separation, erosion control/ absorption, objective of geo textiles, manufacturing of geo textile, essential properties of geo textiles-Mechanical determinants, Hydraulic determinants, durability determinants.

**Total Lectures required =8**

**Grand total of lectures required = 42**

**Text Books and References:**

1. A R Horrocks and S C Anand, Handbook of Technical Textiles, Woodhead Publishing Ltd., Cambridge, 2000.
2. Sabit Adanaur, Wellington Sears Handbook of Industrial Textiles, Technimic Publishing Company, Pennsylvania, USA, 1995. CRC Press, 1995.
3. R W Sarsby, Geosynthetics in civil engineering, Woodhead Publishing, 2007.
4. M Raheel, Marcel Dekker, Modern Textile Characterization Methods, Marcel Dekke Inc., 1996.
5. Mukhopadhyay S K and Partridge J F, Automotive Textiles, Textile Progress, Vol. 29, No. 1 / 2, 1999, Textile Institute, Manchester, UK.
6. Ukponmwan J. O, Mukhopadhyay A. and Chatterjee K. N., Sewing Threads, Textile Progress, Vol. 30, No. 3/4, 2000, Textile Institute, Manchester, UK.
7. Tao X, Smart fibre, fabrics and clothing, Woodhead Publishing, 2001.

**3.2 High Performance Fibre [KTT076] : (3-0-0)**

**Credit = 3**

**Course Outcome:** After completing the course student is able to:

CO1	Appreciate different types of high performance fibres and their applications
CO2	Understand the manufacturing process of high performance fibres
CO3	Appreciate manufacturing, application & uses of glass fibres, ceramic fibres, etc
CO4	Understand manufacturing, application & properties of gel spun fibres, thermally resistant fibres, chemically resistance fibres,
CO5	Understand the development of biodegradable fibres, absorbent fibres, bi-component fibres & other high performance speciality fibres

**Unit 1: Introduction of High performance fibres:** Classification of High performance fibres, Comparison between apparel and high performance fibres. Outline of characterisation of high performance fibres. **Total Lectures required =8**

**Unit 2: Glass Fibres:** Types and Composition, Manufactures Processes, Fibre structures, Properties and Applications. **Poly Ethylene Fibres: Types-** HDPE, UHMWPE, Manufacturing process, properties and applications **Ceramic Fibres:** Classification and fibre formation, composition, structure, properties and application. Basalt fibres. **Total Lectures required =8**

**Unit 3: Polyurethane Elastomeric Fibres:** Manufacturing Processes, Fibre Properties, Application and future trends **Metallic Compound Fibres:** Aluminium Oxide fibres and lead oxide fibres – Preparation and processes, Fibre structure, properties and Application. **Total Lectures required =8**

**Unit 4: Chemically resistant fibres:** PEEK (Polyether ether ketone fibre), PVDF and PTFE fibres, various physical and chemical fibre properties, heat and chemical resistance. **Aramids & Co Polyesters:** Fibres formation – Fibre& structure properties, performance and Application. **Total Lectures required =9**

**Unit 5: Electro spun and Speciality Fibres:** Basic concepts of Electrospinning, fibres characteristics and various end Applications. Photovoltaic fibres for energy harvesting, piezo electric fibres, photochromic fibres, hollow and noncircular cross section fibres. **Total Lectures required =9**

**Grand total of lectures required = 42**

#### **Text Books and References:**

1. T. Hongu, P. Tatasuya, Glyn O, New fibres, (Ellis Horwood Series in Polymer Science and Technology), Ellis Horwood, New York, 1990.
2. M. Lewin. EM.Pearce, J. Preston, Hand book of fibre science and technology Vol.4, Marcel Dekkar, New York 1989.
3. Donnet J. B. Bansol R .C Carbon fibres, Marcel Dekkar, New York 1990.
4. Hearle J.W.S., High Performance Fibres, Textile Institute, Woodhead Publishing, 2001.
5. Mukhopadyay. S. K, High Performance Fibres, Textile progress Vol. 25, Textile Institute Manchester, 1993.
6. Characterization of Polymers and Fibres, 1<sup>st</sup> Edition, Authors: Mukesh Kumar Singh, Annika Singh, Woodhead Publishing, 2021.
7. Fibre Science and Technology, Akira Nakamura, Science Publishers, U.S, 2000.

### 3.3 Mill Planning & Organization [KTT077] : (3-0-0)

Credit = 3

**Course Outcome:** After completing the course student is able to:

CO1	Understand the concept of site selection, building, plant & machinery selection
CO2	Summarize various hazards, and discuss the way to ensure safety measures in mill, understand different safety rules & their implementation mechanism
CO3	Understand, Implement, and calculate the machine balancing for optimum utilization & profitability.
CO4	Realise and carry out product costing, selection of product mix for optimum profitability
CO5	Discuss critically management related to apply staffing, recruiting, MIS systems in textile industry

**Unit 1: Preparation of project—Spinning/Weaving/Processing/Composite** Selection of product, Site Selection (site, location, land and cost), Building, single, double and multiple, Rain water harvesting system, Legal & statutory compliances. Plant and Machinery.

**Total lectures required=9**

**Unit 2:** Industrial hazards: i. Fire hazards, ii. Mechanical hazards, iii. Electrical etc. Safety rules for prevention of accidents, Humidification of textile mill- humidifier and humidification, Ventilation, floor cleaning in textile mills, lightning arrester, Air conditioning and Refrigeration system.

**Total lectures required =8**

**Unit 3:** Balancing of machine (plant layout for machines-- balancing of machines, layout of different machines, calculation for balancing of machines for different processes—spinning, weaving).

**Total lectures required =7**

**Unit 4:** Production Costing—various terms used in costing cost volume, profit analysis, depreciation, cost allocation on waste, effect on cost direct, indirect, Various elements of costing-concept of estimation for costing, break-even analysis, different economic ratios.

**Total lectures required =10**

**Unit 5:** Economic Viability, organizational structure in textile mills – daily wages, various systems, piece wages system, Recruitment, allocation and skill development, Management and information system MIS.

**Total lectures required =8**

**Grand total of lectures required = 42**

#### **Text Books & References:**

1. Tara Chand, Industrial Engineering, Organization & management, Nem Chand; 5th Edition,1982.
2. S. K Sharma, Industrial Economics & Principle of Management, Generic Publishers, 2007.
3. Dudeja V D, Management of Textile Industry, Textile Trade Press, Ahmadabad, 1981.
4. Ormerod A, Textile Project Management, The Textile Institute, Manchester, UK, 1992.
5. Talukdar M K, Sriramulu P K and Ajgaokar D B, Weaving – Machine, Mechanism and Management, Mahajan Publisher Private Ltd., Ahmadabad, India, 1998.
6. Garde A R and Subramanian T A, Process Control in Spinning, ATIRA Ahmadabad, 3<sup>rd</sup> edition, 1987.
7. Higgins, Handbook of Maintenance Management, Prentice Hall New York, 1999.

**4.0 Open Elective II: (L T P 3 0 0) As per AKTU Syllabus** **Credit = 3**

**5.0 Lab-I**

**5.1 Knitting Technology Lab [KTT752] : (0-0-2)** **Credit = 1**

To study the path of yarn through circular and flat knitting machine, different knitting elements including the cam system, driving mechanism of plain knitting machine, cloth take-up mechanism of plain knitting m/c, rib knitting m/c including arrangement of dial and cylinder needles, cam, system and driving mechanism, Interlock knitting m/c including arrangement of dial and cylinder needle, cam system and driving mechanism, Warp knitting machine constructional details and mechanism of operation.

**5.2 Garment Technology Lab [KTT751] : (0-0-2)** **Credit = 1**

As per syllabus of Garment Technology

**6.0 Internship [KTT755] : (0-0-2)** **Credit = 1**

**7.0 Mini Project [KTT756] : (L T P 0 0 8)** **Credit = 4**

Students will carry out minor project during seventh semester as a part of curriculum as per AKTU guidelines

**8.0 MOOCs (Essential for Hons Degree) As per AKTU List**

**TOTAL CREDITS (7<sup>TH</sup> SEMESTER) = 18**