

SYLLABUS

Uttar Pradesh Textile Technology Institute, Kanpur

Affiliated to

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



**PROPOSED STUDY & EVALUATION SCHEME
FOR
FINAL YEAR B. TECH. (TEXTILE CHEMISTRY)**

**Based 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 Chemistry

4th 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	KHU 701/ KHU 702	HSMC 1 : Rural Development Administration and Planning / Project management & Entrepreneurship	3	0	0	30	20	50		100		150	3	
2	KTT 073/ KTT 074	Dept Elective-IV: Textile Chemicals and Quality Testing / Coating of Textiles	3	0	0	30	20	50		100		150	3	
3	KTT 078/ KTT 079	Dept Elective V: Advances in Chemical Processing / Waste Management & Pollution Control	3	0	0	30	20	50		100		150	3	
4	KOE 071 to 078	Open Elective-II:	3	0	0	30	20	50		100		150	3	
5	KTT7 53/KT T754	Lab-I: Textile Chemicals and Quality Testing Lab / Coating Lab	0	0	2	20	10		25		25	50	1	
6	KTT 755	Mini Project or Internship	0	0	2				50			50	1	
7	KTT 756	Project	0	0	8				150			150	4	
8		MOOCs (Essential for Hons. Degree)												
TOTAL			12	0	12							850	18	

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

4th 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		HSMC -2	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	KTT 851	Project	0	0	18				100		300	400	9	
5		MOOCs (Essential for Hons. Degree)												
TOTAL			12	0	18							850	18	

HSMC -2: As per AKTU Lucknow

Open Elective-III & IV: As per AKTU Lucknow

7th Semester B. Tech. Textile Chemistry (Effective from 2021-22)

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

KHU701 /KHU801 Rural Development: Administration and Planning (3 0 0) 3 Credits

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	Rural Planning & Development: 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	Rural Development Programmes: 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	Panchayati Raj & Rural Administration: 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	Human Resource Development in Rural Sector: 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	Rural Industrialization and Entrepreneurship: 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.

KHU702 /KHU802 PROJECT MANAGEMENT & ENTREPRENEURSHIP (3 0 0) 3 Credits

Unit	Topics	Lectures
I	Entrepreneurship: 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	Entrepreneurial Idea and Innovation: 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	Project Management: 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	Project Financing: 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	Social Entrepreneurship: 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
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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 Textile Chemicals and Quality Testing (L T P 3-0-0=3)

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

CO1	Understand the various qualitative and quantitative testings of chemicals used in textile processing.
CO2	Explain the various fastness testings and international standards for them
CO3	Analyse the various methods of Estimation of mechanical and chemical degradation of fibres
CO4	Understand the various methods of Evaluation of auxiliaries and effluents
CO5	Explain the various process and quality control parameters

Unit 1: Introduction to textile chemical testing – aim and scope, Quantitative chemical analysis of textile fibres and their blends, Quantitative estimation of bleaching agents and dyes.

Total lecture required -8

Unit 2: Colour fastness of dyes on textiles (wash, light, rubbing, hot press, perspiration) using National and International standards (BIS, AATCC, ISO). Evaluation of Wet treatments

Total lecture required -7

Unit 3: Estimation of mechanical and chemical degradation of cotton, wool, silk and polyester (aldehyde and carboxyl group estimation in celluloses, amino group estimation of protein fibres, fluidity/viscosity measurement, critical dissolution time, etc).

Total lecture required -9

Unit 4: Evaluation of various chemicals, auxiliaries used in wet processing plants, Analysis of fresh water and effluent, Measurement of viscosity of chemical ingredients, printing paste, instruments used in chemical analysis.

Total lecture required -8

Unit 5: Process and quality control in wet processing, Industrial practices for their maintenance, Check points of all wet pretreatments, dyeing, printing and finishing. Concept of Restricted substances – RSL and MRSL.

Total lecture required -10

Grand total of lectures required: 42

Text Books and References-

1. JW Weaver, Analytical Methods for a Textile laboratory, American Association of Textile Chemists and Colorists, 3rd Edition, 1984.
2. Qinguo Fan, Chemical testing of textiles, Woodhead Publishing Ltd, 2005.
3. AATCC Technical Manual, Vol.85, American Association Of Textile Chemists And Colorists, 2010.
4. Christopher Earland, David J. Raven, Experiments in Textile and Fibre Chemistry, Butterworths, London, 1971.
5. Karl Mahall, Quality Assessment of Textiles - Damage Detection, Second Edition, Springer, 2003.
6. S R Karmakar, Chemical Technology in the Pre-treatment Processes of Textiles, Elsevier, 1999.

2.2 Coating of Textiles (L T P 3-0-0)

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

CO1	Understand the various Polymeric materials for coating of textiles.
CO2	Explain the various coating methods.
CO3	Understand the Rheology of coating pastes & Physical properties of coated fabric
CO4	Analyse the various effects produced in coated textiles.
CO5	Understand the various testing carried out for coated textiles.

Unit-1: Polymeric materials for coating- (Rubbers: natural and synthetic, Polyvinyl chloride, Polyurethane, Acrylic polymers and its dough preparation for coating, Adhesive treatment .

Total lecture required=7

Unit-2: Coating Methods: Knife coating, Roller coating transfer coating , Rotary screen printing and coating, calendaring, lamination, melt coating.

Total lecture required=7

Unit-3: Physical properties of coated fabric, Rheology of coating pastes, Rheological Behaviors of fluids and pastes, hydrodynamic analysis of coating, factors effecting degradation of coated fabric.

Total lecture required=8

Unit-4: Coating for foul weather protection, Impermeable cloth, breathable cloth, Non Apparel cloth, Coating for Chemical protection, Thermo chromic coating, Temperature Adaptable coating, Camouflage nets. Metal and conducting polymer-coated fabrics, Radiation cured coating.

Total lecture required=8

Unit-5: Test methods for coated fabrics, Coating per unit area wt/area, Degree of fusion/curing of coating- blocking, Abrasion resistance. Test for colour- Fastness to dry and wet rubbing, Resistance to water penetration, Air permeability, water vapour permeability, low temperature bend test, low temperature impact test. Adhesion test

Total lecture required=10

Grand Total lecture required=40

Text books and References:

1. Water Fung, Coating & Laminated Textiles, Woodhead Publishing Ltd, 2002.
2. Ashish Kumar Sen , Coated Textile: Principles and Applications, CRC Press, 2008
3. Coated Fabric technology Vol 1-3 Technomic publication, Westport, Connecticut. 1979
4. Coated & laminated Fabric, AATCC symposium, 1998
5. Jinlian Hu, Active Coatings for Smart Textiles, Woodhead Publishing, 2016.
6. Güneri Akovali, Advances in Polymer Coated Textiles, Smithers Rapra Technology Ltd, 2012.
7. Andreas Giessmann, Coating Substrates and Textiles, Springer, 2012.

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

3.1 Advances in Chemical Processing (L T P 3-0-0)

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

CO1	Understand the various advancements in pretreatment of textiles.
CO2	Analyse the various developments in dyes and dyeing methods.
CO3	Explain the latest methods of printing textiles.
CO4	Understand the concept and practice of eco-friendly methods of finishing.
CO5	Understand the plasma technology applications and eco-standards & certifications.

Unit 1- Developments in pretreatment: Quick response pretreatment, continuous open width processing, use of environment friendly chemicals, application of enzymes. Other pretreatment options like solvent scouring, combined preparatory processes.

Total Lectures required =9

Unit 2- Developments in dyeing and dyes: New forms of dyes, i.e. encapsulated, polymeric, pearl and granular forms. New direct, reactive and disperse dyes. Dyeing of microfibre fabrics. Continuous dyeing, right-first-time approach, solvent dyeing, Super critical CO₂ dyeing.

Total Lectures required =10

Unit 3- Developments in printing: Automated colour kitchens, Kerosene substitutes, Novel printing techniques like Ink Jet printing, Xerox printing. Ink, machinery and process for Digital printing. Concept of 3D printing.

Total Lectures required =7

Unit 4- Developments in finishing: Zero formaldehyde easy-care finishes and use of Polycarboxylic acids, polysiloxanes based softeners, restriction on use of some Fire retardants . Breathable water-proof fabrics. Finishing of microfibre fabrics.

Total Lectures required =8

Unit 5- Plasma technology; Effect and application on textiles, E-Control processing; Eco-friendly processing of textiles. Eco conformance certifications – OekoTex (Confidence in Textiles), GOTS, REACH, etc.

Total Lectures required =8

Grand total of lectures required: 42

Text Books and References:

1. R Shishoo, Plasma technologies for textiles, Woodhead Publishing Ltd, 2007
2. S. K. Nema, P. B. Jhala, Plasma technologies for textile and apparel, Woodhead Publishing Ltd, 2015.

3. Pretreatment of textile materials for dyeing and printing - Prof. (Dr.) M.S. Parmar, Published by NITRA
4. Textile Ink jet Printing – Edited by T L Dawson & B Glover (SDC Technical Monograph, UK)
5. R. M. Christie, Environmental aspects of textile dyeing, Woodhead Publishing Limited, 2007
6. M. Miraftab, A. R. Horrocks, Ecotextiles The way forward for sustainable development in textiles, Woodhead Publishing Limited, 2007.
7. H. Ujiie, Digital printing of textiles, Woodhead Publishing Limited, 2006
8. Christina Cie, Ink Jet Textile Printing, Woodhead Publishing Limited, 2015.
9. Subramanian Senthilkannan Muthu, Sustainable Innovations in Textile Chemical Processes, Springer, 2018.

3.2 Waste Management & Pollution Control (L T P 3-0-0)

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

CO1	Explain the various analytical methods for evaluating pollutants
CO2	Understand about the Environmental impact assessment.
CO3	Explain the various methods treating effluents, characterization, disposals of wastes.
CO4	Understand the various physical, biological, chemical standards for quality of treated water.
CO5	Know the air & noise pollution and the related legislation for textile industry.

Unit 1: Toxicity of intermediates, dyes, processing aids- bleaching, dyeing, printing and finishing auxiliaries etc, Analytical methods for various pollutants, Formaldehydes, Pentachlorophenol, Biological Oxygen Demand (BOD), Chemical Oxygen demand (COD)

Total number of lectures required = 8

Unit 2: Environmental impact assessment, Definition & need, Introduction to environmental impact assessment methodology, Unit process, waste minimization and recycling

Total number of lectures required = 8

Unit 3: Textile effluent and their characterization, Methods of effluent treatment, Disposal of effluents, reuse of water in a process house.

Total number of lectures required = 8

Unit 4: Source of water: factors contributing water pollution and their effect, water pollution parameters, physical, biological, chemical standards for quality of treated water. Effluent

treatment methods and control, basic principles, Unit Operations (Sedimentation, precipitation, filtration and incineration), specific pollutants.

Total number of lectures required = 8

Unit 5: Pollution of air, causes, effect, monitoring and control, Source of noise pollution, its effect and control, Legislation- salient provisions of water act, Air act, Environment pollution act.

Total number of lectures required = 8

Grand total of lectures required = 40

Text books and References:

1. A. Deswal, S. Deswal, Basic course in environmental studies, Dhanpat Rai & Co, 2013.
2. Carter L.W , Environment Impact Assessment by.Mc Graw Hill Publications, 1977
3. De A K, “Environmental Chemistry”, New Age International P Ltd, New Delhi, 2006
4. Peter J. Hauser , Advances in Treating Textile Effluent, InTech, 2011.
5. N.Manivasakam , Treatment of Textile processing Effluents, Chemical Publishing Company, U.S.A, 2013
6. Mohd Yusuf, Handbook of Textile Effluent Remediation, Pan Stanford Publishing Pte. Ltd., 2018.
7. Keith Slater, Environmental impact of textiles, Woodhead Publishing Ltd, 2003.
8. S. C. Bhatia, Pollution Control in Textile Industry, Woodhead Publishing India Pvt. Ltd., 2017.

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

5.0 Lab syllabus

5.1 Textile Chemicals and Quality Testing Lab

Quantitative analysis of textile fibres and their blends. Strength analysis of hydrogen peroxide, Strength analysis of sodium carbonate and sodium hydroxide, Identification of dyes, Colourfastness tests- Wash, light (Weatherometer test), perspiration, sublimation and crocking etc.

5.2 Coating Lab

As per syllabus of Coating of Textiles

6.0 Internship Assessment (0 0 2):

Students shall carryout industrial training as a part of their curriculum after the completion of their 3rd year for one month. After this, their performance shall be evaluated during 7th semester on the basis of Report submitted by the students

followed by viva/ presentation of each student.

7.0 Project (L T P 0 0 2): 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

8th Semester B. Tech. Textile Chemistry (Effective From 2021-22)

1. HSMC-2 As per AKTU Lucknow:

- 1.1 Engineering Economics
- 1.2 Indian Economics & taxation system
- 1.3 Fundamentals of Linguistics
- 1.4 Ethics & Holistic Life

2. Open Elective-III (3 0 0): As per AKTU Lucknow

- 2.1 Internet of Things (IOT)
- 2.2 Smart material & Intellectual Systems Design
- 2.3 Energy management
- 2.4 Product Design and Innovation
- 2.5 Machine Learning
- 2.6 Waste Water Treatment & Management

3. Open Elective-IV: (3 0 0) As per AKTU Lucknow

- 3.1 Blockchain Architecture & Use Cases
- 3.2 Research methodology
- 3.3 Green technology
- 3.4 Intellectual Property Right
- 3.5 Big data Analysis
- 3.6 Technology Management

4. Project (0 0 18): Students will carry out major project during 8th semester as a part of curriculum as per university guidelines

5. MOOCs (Essential for Hons Degree)