

Syllabus of  
UNDERGRADUATE DEGREE COURSE

# Textile Chemistry



Rajasthan Technical University, Kota  
Effective from session: 2021 – 2022



# RAJASTHAN TECHNICAL UNIVERSITY, KOTA

## SYLLABUS

2<sup>nd</sup> Year - III Semester: B.Tech. (Textile Chemistry)

[Common with 3TT2-01, 3TE2-01]

### 3TC2-01: ADVANCED ENGINEERING MATHEMATICS- I

Credit: 3

Max. Marks: 100 (IA:30, ETE:70)

3L+0T+0P

End Term Exam: 3 Hours

SN	Contents	Hours
1	<b>Laplace Transform:</b> Laplace transform, Inverse transform, properties, Transforms of derivatives and integrals, Unit step function, Dirac's delta function, Differentiation and integration of transforms.	5
2	<b>Applications of Laplace transform:</b> Applications of Laplace Transform to the solution of ordinary and partial differential equations having constant coefficients with special reference to the wave and diffusion equations.	6
3	<b>Numerical Analysis –I:</b> Finite differences, Difference operators: forward, Backward, central and average operators. Newton's forward and backward interpolation formula, Stirling's central difference formula Lagrange's interpolation formula for unequal interval	5
4	<b>Numerical Analysis –II:</b> Numerical differentiation, Numerical integration trapezoidal rule, Simpson's one third and three eight rule. Numerical solution of ordinary differential equation of first order: Picard's method, Euler's, and modified Euler's, method, Milne's methods and Runge-Kutta fourth order method	8
5	<b>Statistics &amp; Probability:</b> Measures of central tendency, measure of dispersion, Basic Concepts of probability, Conditional Probability, Bayes' Theorem.	7
6	<b>Random Variable and distributions:</b> Discrete and continuous random variable, Moments, Expectation, Moment generating function, Binomial, Poisson and Normal distribution. <b>Hypothesis Testing:</b> t-Test, Z-test, F-test, Chi-square test.	9
<b>Total</b>		<b>40</b>

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Rajasthan Technical University, Kota



# RAJASTHAN TECHNICAL UNIVERSITY, KOTA

## SYLLABUS

2<sup>nd</sup> Year - III Semester: B.Tech. (Textile Chemistry)

[Common with 3TT1-02, 3TE1-02]

### 3TC1-02: TECHNICAL COMMUNICATION

Credit: 2

Max. Marks: 100 (IA:30, ETE:70)

2L+0T+0P

End Term Exam: 2 Hours

SN	Contents	Hours
1	<b>Introduction to Technical Communication-</b> Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication, technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication.	4
2	<b>Comprehension of Technical Materials/Texts and Information Design &amp; development-</b> Reading of technical texts, Reading and comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note-making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media.	6
3	<b>Technical Writing, Grammar and Editing-</b> Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking, Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, Minutes of Meetings.	8
4	<b>Advanced Technical Writing-</b> Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals, Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles.	8
<b>Total</b>		<b>26</b>

Office of Dean Academic Affairs  
Rajasthan Technical University, Kota



# RAJASTHAN TECHNICAL UNIVERSITY, KOTA

## SYLLABUS

2<sup>nd</sup> Year - III Semester: B.Tech. (Textile Chemistry)

[Common with 3TT1-03, 3TE1-03]

### 3TC1-03: MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTING

Credit: 2  
2L+0T+0P

Max. Marks: 100 (IA:30, ETE:70)  
End Term Exam: 2 Hours

SN	Contents	Hours
1	<b>Basic economic concepts-</b> Meaning, nature and scope of economics, deductive vs inductive methods, static and dynamics, Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement.	4
2	<b>Demand and Supply analysis-</b> Demand-types of demand, determinants of demand, demand function, elasticity of demand, demand forecasting –purpose, determinants and methods, Supply-determinants of supply, supply function, elasticity of supply.	5
3	<b>Production and Cost analysis-</b> Theory of production- production function, law of variable proportions, laws of returns to scale, production optimization, least cost combination of inputs, isoquants. Cost concepts-explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation.	5
4	<b>Market structure and pricing theory-</b> Perfect competition, Monopoly, Monopolistic competition, Oligopoly.	4
5	<b>Financial statement analysis-</b> Balance sheet and related concepts, profit and loss statement and related concepts, financial ratio analysis, cash-flow analysis, funds-flow analysis, comparative financial statement, analysis and interpretation of financial statements, capital budgeting techniques.	8
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Office of Dean Academic Affairs  
Rajasthan Technical University, Kota



# RAJASTHAN TECHNICAL UNIVERSITY, KOTA

## SYLLABUS

2<sup>nd</sup> Year - III Semester: B.Tech. (Textile Chemistry)

[Common with 3TT3-04, 3TE3-04]

### 3TC3-04: OBJECT ORIENTED PROGRAMMING

**Credit: 2**  
**2L+0T+0P**

**Max. Marks: 100 (IA:30, ETE:70)**  
**End Term Exam: 2 Hours**

SN	Contents	Hours
1	Introduction: Review of structures in C, accessing members of structures using structure variables, pointer to structures, passing structures to functions, structures as user defined data types.	5
2	Introduction to programming paradigms- Concept of object, class, objects as variables of class data type, difference in structures and class in terms of access to members, private and public Basics of C++: Structure of C++ programs, introduction to defining member functions within and outside a class, keyword using, declaring class, creating objects, constructors & destructor functions, Initializing member values with and without use of constructors, simple programs to access & manipulate data members, cin and cout functions. Dangers of returning reference to a private data member, constant objects and members function, composition of classes, friend functions and classes, members of a class, data & function members. Characteristics of OOP- Data hiding, Encapsulation, data security.	10
3	Operator overloading: Fundamentals, Restrictions, operator functions as class members v/s as friend functions. Overloading stream function, binary operators and unary operators. Converting between types.	5
4	Inheritance: Base classes and derived classes, protected members, relationship between base class and derived classes, constructors and destructors in derived classes, public, private and protected inheritance, relationship among objects in an inheritance hierarchy, abstract classes, virtual functions and dynamic binding.	5
5	Multiple inheritance, virtual base classes, and class members, multiple class members. Templates, exception handling.	6
<b>Total</b>		<b>31</b>

Office of Dean Academic Affairs  
Rajasthan Technical University, Kota



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## SYLLABUS

2<sup>nd</sup> Year - III Semester: B.Tech. (Textile Chemistry)

### 3TC4-05: TEXTILE FIBERS

**Credit: 2**

**Max. Marks: 100 (IA:30, ETE:70)**

**2L+0T+0P**

**End Term Exam: 2 Hours**

SN	Contents	Hours
1	General definitions and important terminologies related to textiles; Classification of textile fibres; Essential and desirable properties of textile fibres and their role in final products; Advantages and disadvantages of natural and manmade fibres. Polymerization, degree of polymerization, inter polymer forces of attraction, requirements of fibre forming polymers and general considerations with regard to fibre properties.	8
2	Cotton: Geographical distribution, cultivation practices, morphological structure, physical and chemical properties; Different varieties of cotton and their uses. Bast and leaf fibres such as jute, linen, hemp, ramie, sisal etc: extraction techniques and processes, structure and chemical composition, properties and their uses.	7
3	Classification and varieties of wool and other animal hair fibres, sorting and grading of wool, fibre extraction, chemical composition, morphological structure, chemical and physical properties of wool, applications.	5
4	Varieties of natural silk, rearing of silk worm, chemical compositions, morphological structure, properties and uses of various types of silk; silk reeling, throwing and weighting, varieties of silk yarns and fabrics.	5
5	Introduction to the manufacturing processes of important man-made fibres, viz. viscose rayon and acetate rayon, polyester, N <sub>6</sub> and N <sub>66</sub> , acrylic, polypropylene, their important physical and chemical properties and applications.	5
<b>Total</b>		<b>30</b>

Office of Dean Academic Affairs  
Rajasthan Technical University, Kota



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## SYLLABUS

2<sup>nd</sup> Year - III Semester: B.Tech. (Textile Chemistry)

### 3TC4-06: PRINCIPLES OF TEXTILE MANUFACTURING – I

**Credit: 3**

**Max. Marks: 100 (IA:30, ETE:70)**

**3L+0T+0P**

**End Term Exam: 3 Hours**

SN	Contents	Hours
1	System of expressing yarn linear density. Introduction to Cotton, Woolen and Worsted systems of yarn production	6
2	Basic principle of opening, cleaning, Blow-room, Carding. Combing, drawing and roving	12
3	Ring spinning Doubling. Twist and twist multiplier	8
4	Introduction to non-conventional spinning systems viz. air jet, open end, friction- spinning. Calculations pertaining to draft and production of the machines dealt with course	7
5	Properties and end uses of ring spun, rotor spun and air jet spun yarns Brief description of fancy yarns, ply cable yarn, core spun yarn	7
<b>Total</b>		<b>40</b>

Office of Dean Academic Affairs  
Rajasthan Technical University, Kota



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## SYLLABUS

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### 3TC4-07: FABRIC PREPARATION

Credit: 3

Max. Marks: 100 (IA:30, ETE:70)

3L+0T+0P

End Term Exam: 3 Hours

SN	Contents	Hours
1	Impurities in raw cotton and Grey cloth and chemical principle involved in their removal Object of shearing, principles of working of shearing machines Object of singeing, different types of singeing machines and their working Different methods of desizing.	8
2	Scouring of cotton in Kiers, J-boxes, continuous methods, solvent scouring etc, different types of washing machines. Mechanism of bleaching using various bleaching agents viz. bleaching powder, sodium hypo-chlorite, hydrogen peroxide. Effect of pH in bleaching, semi continuous and continuous methods, faults and remedies.	8
3	Scouring and bleaching of jute, Linen, wool and silk Optical brighteners	8
4	Short sequences, combined preparatory processes, low temperature preparatory processes Rapid bleaching, bleaching machines viz. kiers, J-boxes, bleaching cisterns, Chlorine free bleaching	8
5	Methods and equipments for yarn and fabric mercerization, Factors affecting efficiency of mercerization, Physical and chemical changes in cotton Mercerization of cotton and PC blends, Causticization. Hot mercerization, Liquid ammonia treatment of cotton.	8
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### 3TC4-08: ADVANCE ORGANIC CHEMISTRY

Credit: 2

Max. Marks: 100 (IA:30, ETE:70)

2L+0T+0P

End Term Exam: 2 Hours

SN	Contents	Hours
1	<b>Origin of organic products and their chemistry</b> Destructive distillation of coal and its products Isolation of products for manufacturing of dye intermediates Chemistry of benzene and naphthalene with their orientation rules	8
2	<b>Nitration</b> General methods of nitration Nitration of toluene, phenol, anilene, naphthalene series	4
3	<b>Sulphopnation</b> General methods of sulphonation Dye sulphonation Sulphonation of benzene, anilene, naphthalene series, naphthols sulphothols, sulphonic acids.	6
4	<b>Amination</b> General methods of amination Amination of nitro compounds	6
5	Preparation of diazo salts Amination of naphthalene series	6
<b>Total</b>		<b>30</b>

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### PRACTICALS

#### 3TC4-21: TEXTILE FIBER IDENTIFICATION & ANALYSIS PRACTICAL

**Credit: 2**

**Max. Marks: 100 (IA:60, ETE:40)**

**OL+0T+4P**

Principle of microscopy, microscopic identification of fibers, preparation and mounting of specimen for longitudinal view. Cross-section cutting –microtomy cork method, metal plate method, Hardy's microtone, mountants and reagents for fiber microscopy.

Standard scheme of analysis of homogeneous fiber and blends by physical and chemical methods. Qualitative and quantitative determination of components.



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### 3TC4-22: PRINCIPLE OF TEXTILE MANUFACTURING PRACTICAL – I

**Credit: 2**

**Max. Marks: 100 (IA:60, ETE:40)**

**OL+OT+4P**

Demonstration and working principle of various spinning machines used for yarn manufacturing such as Blow room, Carding, Drawing, Lap former, Combing, Simplex, Ring spinning etc.

Introduction to open end spinning, air jet spinning, dref, friction spinning.



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### 3TC4-23: FABRIC PREPARATION LAB

**Credit: 2**

**Max. Marks: 100 (IA:60, ETE:40)**

**OL+OT+4P**

Desizing of cotton by rot steeping, acid and enzymatic method.

Scouring of cotton and estimation of weight loss in scouring.

Bleaching of cotton yarns and fabrics with Sodium hypochlorite, Hydrogen Peroxide, Optical bleaching Mercerization of cotton yarns and fabrics. Scouring of wool by Solvent and Emulsion method. Carbonization of wool, bleaching of wool etc. Degumming of silk.

Bleaching of synthetic fibers with peroxide and sodium chlorite.



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### 3TC7-30: INDUSTRIAL TRAINING

**Credit: 1**  
**OL+OT+1P**

**Max. Marks: 100 (IA:60, ETE:40)**

Each student, individual or in association with some other students at the end of the First B.TECH. course will observe and collect the general and technical information pertaining to machinery, raw materials used, yarns and fabrics produced by the textile mills, in which he/she/they are undertaking 2 weeks' in-house training with the approval of the **Principal, M.L.V.T.E.C.** Each student will have to submit a written/typed report duly approved and signed by the guide to the Head of the department.

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