

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



**Study & Evaluation Scheme with Syllabus
for
B.Tech. Second Year
Textile Chemistry
On
Choice Based Credit System
(Effective from the Session: 2017-18)**

2nd Year III-SEMESTER

S. No.	Subject Code	Subject Name	L-T-P	ESE Marks	Sessional		Total	Credit
					CT	TA		
1.	ROE030 to 039/ RAS301	Science Based Open Elective/ Mathematics-III	3-1-0	70	20	10	100	4
2.	RVE301/ RAS302	Universal Human Values & Professional Ethics/ Environment & Ecology	3-0-0	70	20	10	100	3
3.	RCS305	Data Structures	3-0-0	70	20	10	100	3
4.	RTT305	Textile Fibre-I	3-0-0	70	20	10	100	3
5.	RTC301	Principles of Yarn Manufacture	3-1-0	70	20	10	100	4
6.	RTC302	Preparatory to Processing of Textiles	3-0-0	70	20	10	100	3
7.	RCS355	Data Structures Using C/ Java Lab	0-0-2	50	30	20	100	1
8.	RTT353	Textile Fibre-I Lab	0-0-2	50	30	20	100	1
9.	RTC351	Principles of Yarn Manufacture Lab	0-0-2	50	30	20	100	1
10.	RTC352	Preparatory to Processing of Textiles Lab	0-0-2	50	30	20	100	1
11.	RME101*	Elements of Mechanical Engineering*	3-1-0	70	20	10	100*	--
12.	RCE151*	Computer Aided Engineering Graphics*	0-0-3	50	30	20	100*	--
Total							1000	24

CT: Class Test

TA: Teacher Assessment

L/T/P: Lecture/ Tutorial/ Practical

***B.Tech. IInd year lateral entry students belonging to B.Sc. Stream, shall clear the subjects RCE151/RCE251 and RME101/201 of the first year Engineering Programme along with the second year subjects.**

Science Based Open Electives:

- a. ROE030/ROE040 Manufacturing Process
- b. ROE031/ROE041 Introduction to soft computing
- c. ROE032/ROE042 Nano Science
- d. ROE033/ROE043 Laser System and Application
- e. ROE034/ROE044 Space Science
- f. ROE035/ROE045 Polymer Science & Technology
- g. ROE036/ROE046 Nuclear Science
- h. ROE037/ROE047 Material Science
- i. ROE038/ROE048 Discrete Mathematics
- j. ROE039/ROE049 Applied Linear Algebra

2nd Year IV-SEMESTER

S. No.	Subject Code	Subject Name	L-T-P	ESE Marks	Sessional		Total	Credit
					CT	TA		
1.	RAS401/ ROE040 to 049	Mathematics-III/ Science Based Open Elective	3-1-0	70	20	10	100	4
2.	RAS402/ RVE401	Environment & Ecology/ Universal Human Values & Professional Ethics	3-0-0	70	20	10	100	3
3.	RTT403	Textile Fibre-II	3-1-0	70	20	10	100	4
4.	RTC401	Principles of Fabric Manufacture	3-0-0	70	20	10	100	3
5.	RTC402	Technology of Dyeing-I	3-0-0	70	20	10	100	3
6.	RTC403	Textile Auxiliaries	3-0-0	70	20	10	100	3
7.	RTT453	Textile Fibre-II Lab	0-0-2	50	30	20	100	1
8.	RTC451	Principles of Fabric Manufacture Lab	0-0-2	50	30	20	100	1
9.	RTC452	Technology of Dyeing-I Lab	0-0-2	50	30	20	100	1
10.	RTC453	Textile Auxiliaries Lab	0-0-2	50	30	20	100	1
11.	RME201*	Elements of Mechanical Engineering*	3-1-0	70	20	10	100*	--
12.	RCE251*	Computer Aided Engineering Graphics*	0-0-3	50	30	20	100*	--
Total							1000	24

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TA: Teacher Assessment

L/T/P: Lecture/ Tutorial/ Practical

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Science Based Open Electives:

- a. ROE030/ROE040 Manufacturing Process
- b. ROE031/ROE041 Introduction to soft computing
- c. ROE032/ROE042 Nano Science
- d. ROE033/ROE043 Laser System and Application
- e. ROE034/ROE044 Space Science
- f. ROE035/ROE045 Polymer Science & Technology
- g. ROE036/ROE046 Nuclear Science
- h. ROE037/ROE047 Material Science
- i. ROE038/ROE048 Discrete Mathematics
- j. ROE039/ROE049 Applied Linear Algebra

RTC301: PRINCIPLES OF YARN MANUFACTURE

UNIT I

Cotton ginning, Name of ginning machines, different types of mixing. Different machines of blow room department with the basic idea of each machines along with their opening and cleaning principle. Lap formation and chute feed system.

UNIT II

Objectives of carding process. Description of carding machine parts with passage of materials, Carding and doffing actions. Flexible and metallic Card clothing. Carding, striping and grinding actions. Different carding engine setting and speed of different parts. Drafts (actual & mechanical) and draft constant, Quality of web and neps etc.

UNIT III

Objectives of Draw frame. Different types of drafting systems. Stop motion and their importance, weighting system used in draw frame, passage of material on modern draw frame machine, Concept of draft.

UNIT IV

Objectives of Comber, Passage of material of modern comber along with functions of various parts of comber machine, Fibre presentation and its effects on combing. Preparatory machines for comber and its working.

UNIT V

Objectives of speed frame, drafting, twisting & winding mechanism of speed frame. Package building on speed frame, ring frame, drafting twisting and winding on ring frame, double apron drafting system on ring frame.

References:

1. Essential elements of practical cotton spinning by TK Pattabhiram
2. Cotton blow room, carding, ring frame by Gilbert R. Merrill
3. Cotton spinning by W. Taggart
4. Spun yarn technology by Eric Oxtoby

RTC302: PREPARATORY TO PROCESSING OF TEXTILES

UNIT I

Natural and added impurities in grey fabric, Singeing-its object and various types of singeing. Introduction to various preparatory processes for cotton, wool, silk, nylon polyester, acrylic and their blends. Preparatory Process for wool: scouring, decatizing.

UNIT II

Desizing- its objects, various desizing methods with its advantages, disadvantages and comparative study (hydrolytic, oxidative methods), Scouring of cotton and fabric: conventional and bio-scouring, Kiers –various types of kiers and their working.

UNIT III

Objectives of Bleaching, various types of bleaching agent such as NaOCl, CaOCl₂ and H₂O₂, NaClO₂. Bleaching chemistry and mechanism of above mentioned bleaching agents, batch wise, semi continuous and continuous bleaching processes: J-box, Continuous bleaching range (CBR).

UNIT IV

Methods used for determination of degradation of cotton during scouring and bleaching such as copper no., methylene blue absorption method, cuprammonium fluidity etc. optical whitening agent and their applications.

UNIT V

Objectives of mercerization, physical and chemical changes in cotton due to mercerization. Methods and equipment for yarn and fabric mercerization . various methods of determination of efficiency of mercerization.

References:

1. Technology of bleaching Vol. 3 by VA Shenai
2. Textile Scouring & Bleaching by ER Trotman
3. Bleaching & mercerization by JT Marsh
4. Bleaching & mercerization by BTRA

RTC351: PRINCIPLE OF YARN MANUFACTURE LAB

Practice in handling and operation of blow room, study of constructional details of machinery in blow room, card, draw frame, speed frame & ring frame, calculating speed of different machine parts, Study of constructional details of card, change places and speed calculation of a carding machine, finding out individual draft and total draft in carding machine, draf frame, rinf frame and roving frame.

RTC352: PREPARATORY TO PROCESSING OF TEXTILE LAB

Bleaching and mercerization of cotton fabric and to evaluate the effectiveness of each process using various test such as Tewega test, drop absorption test, whiteness index, barium activity number test, measure wax content, ash content and scouring loss of cotton fabric.

RTC401: PRINCIPLES OF FABRIC MANUFACTURE

UNIT I

Objects of winding process, working principles of automatic cone and cheese winders. Precision and drum winding machine, pirn winding, winding faults and remedies.

UNIT II

Objectives warping process, working principles of Beam warping m/c. Sectional warping m/c, beaming, warper beam defects: cause and remedies.

UNIT III

Objectives sizing process, Slasher Sizing machine, Brief description of modern sizing machine with proper function of each essential part, multicylinderdrying, hot air drying and unconventional drying of sized yarns, . Sizing ingredients used for cotton and synthetic yarns.

UNIT IV

Drawing-in process, Passage of material on handloom and power loom, Study and working principles of Handloom, Powerloom and Automatic Loom Primary, secondary and auxiliary motions of a power loom.

UNIT V

Comparison between shuttle and shuttleless looms, Basic concepts of shuttleless looms, Brief description of various shuttleless weft insertion principles, Fabric faults and remedies.

References:

1. Tablets (ATIRA) a. Winding b. Warping c. Sizing
2. Process control in warping, winding and sizing (ATIRA,BTRA)
3. Yarn preparation Vol. I & II R. Sengupta
4. Warp sizing by Rame Bottom
5. Yarn calculation by R. Sengupta

RTC402: TECHNOLOGY OF DYEING-I

UNIT I

Classification of dyes according to the methods of application, general theory of dyeing, various method of dyeing- Batch, Semi continuous, Continuous dyeing. Dyeing of cellulosic fibres with direct dyes Reactive Dyes.

UNIT II

Dyeing of cellulosic fibres with Vat dyes-vatting, dyeing, oxidation, Solublised vat dyes. Sulphur dye dissolution ,application ,faults and remedies .Azoic-diazotization, naphtholation, coupling, Oxidation colour-aniline black, mineral colours-mineral khaki.

UNIT III

Dyeing of protein fibres – silk and wool with different types of acid dyes –its advantages and limitations, Metal Complex dyes- 1:1, 1:2, metal complex, Chrome dyes-pre, post & simultaneous mordanting, Basic Dyes.

UNIT IV

Dyeing of synthetic fibres: polyester-carrier ,HTHP& thermosol method, Acrylic dyeing with basic dye, dyeing of Nylon and their blends .Problems associated with dyeing, Common fault and their remedies.

UNIT V

Mechanism of dyeing, role of fibre structure in dyeing .dyeing equilibria, adsorption isotherms, chemical potential – activity of dyes in solution and fibre, heat of dyeing, entropy of dyeing. Kinetics of dyeing –diffusion coefficient, diffusion in steady state and non steady state, rate of dyeing.

References:

1. Chemical processing of cotton and p/c blends – ATIRA
2. A glimpse on the chemical technology and textile fibres by RR Chackrawartty
3. Technology of Dyeing by VA Shenai
4. Chemical technology of fibrous material by F. Shadov
5. Physical chemistry of dyeing –Vickerstaff

RTC403: TEXTILE AUXILIARIES

UNIT I

General Consideration and classification of textile auxiliaries, Essential requirement of surfactants, Mechanism of surface activity, Surface active agents Physical principles involved in detergency conditions for efficient detergency, Preparation of detergents.

UNIT II

Scouring auxiliaries, mercerizing auxiliaries, Various bleaching agents, Dyeing auxiliaries-wetting agents, dispersing, leveling, carriers, sequestering, stripping agents, dye fixing agents, wetting and detergency. carriers, swelling agents and dispersing agents.

UNIT III

Printing auxiliaries- thickeners, classification of thickeners, thickeners for reactive dyes, emulsion thickeners, wetting agents, hygroscopic agents, antifoaming agent, pigment binders, fixers, and reducing agents, oxidizing agents, miscellaneous auxiliaries.

UNIT IV

Finishing agents-Cross linking agents, urea formaldehyde derivatives, melamine formaldehyde, triazones, epoxides, Synthetic resin emulsion use in textile industry, PV alcohol, PVC acrylic polymer, silicon emulsion, urea formaldehyde resin etc.

UNIT V

Determination of strength of hypochlorite, hydrogen peroxide, hydrosulphite, Estimation of strength of NaOH containing sodium carbonate volumetrically and by Tw meter . Performance evaluation of textile auxiliaries- Testing of wetting agents, detergents, foaming characteristics, soil release agents, leveling agents, flame retarding agents, water repellants. Softeners –different types of softeners. reactive softeners.

References:

1. Textile auxiliaries-VA Shanai
2. Textile auxiliaries finishing chemicals-AA Vaidaya Trivedi
3. Textile Scouring and bleaching-VA Shanai
4. Hand book of chemical specialties by- John E. Nettles
5. Chemistry of organic textile chemicals by VA Shenai

RTC451: PRINCIPLES OF FABRIC MANUFACTURE LAB

Study of cone winding, cheese winding, pirn winding and auto coner, constructional details of machine, types of packages produced by them and package faults, Calculations pertaining to cone winding, cheese winding, pirn winding

Study of beam warping & sectional warping machine, stop motion and tensioners in warping, Calculations pertaining to warping machines.

Study of different types of looms, their constructional details, working of dobby & jacquards.

RTC452: TECHNOLOGY OF DYEING-I LAB

Dye cotton with direct, reactive, vat and sulphur dye, dyeing polyester, wool, silk, acrylic and nylon using, appropriate disperse, acid and basic dyes, Print cotton fabric using various styles of printing, namely, direct, resist and discharge, Evaluate colour fastness to washing, light, perspiration and rubbing properties

RTC453: TEXTILE AUXILIARIES LAB

Determination of strength of hypochlorite, hydrogen peroxide, hydrosulphite, Estimation of strength of NaOH containing sodium carbonate volumetrically and by Twiddle meter etc.