

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

**LUCKNOW**



**Study & Evaluation Scheme with Syllabus**

**for**

**B.Tech. Second Year**

**Carpet And Textile Technology**

**On**

**Choice Based Credit System**

**(Effective from the Session: 2017-18)**

**2<sup>nd</sup> 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.	RCT301	Yarn Technology-I	3-0-0	70	20	10	100	3
5.	RCT302	Fabric Technology-I	3-1-0	70	20	10	100	4
6.	RCT305	Chemical Processing of Textiles-I	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.	RCT351	Yarn Technology-I Lab	0-0-2	50	30	20	100	1
9.	RCT352	Fabric Technology-I Lab	0-0-2	50	30	20	100	1
10.	RCT355	Chemical Processing of Textiles-I Lab	0-0-2	50	30	20	100	1
11.	RME151*	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

\*Students admitted in B.Tech. IInd Year through lateral entry on the basis of B.Sc. qualification have to qualify these subjects as AUDIT COURSES.

**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

**2<sup>nd</sup> 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.	RTT405	Textile Fibre-I	3-0-0	70	20	10	100	3
4.	RCT401	Yarn Technology-II	3-0-0	70	20	10	100	3
5.	RCT402	Chemical Processing of Textiles-II	3-0-0	70	20	10	100	3
6.	RCT403	Fabric Technology-II	3-1-0	70	20	10	100	4
7.	RCT451	Textile Fibre Lab	0-0-2	50	30	20	100	1
8.	RCT452	Yarn Technology-II Lab	0-0-2	50	30	20	100	1
9.	RCT453	Chemical Processing of Textiles-II Lab	0-0-2	50	30	20	100	1
10.	RCT454	Fabric Technology-II Lab	0-0-2	50	30	20	100	1
11.	RME251*	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

CT: Class Test

TA: Teacher Assessment

L/T/P: Lecture/ Tutorial/ Practical

\*Students admitted in B.Tech. IInd Year through lateral entry on the basis of B.Sc. qualification have to qualify these subjects as AUDIT COURSES.

**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

## **RCT301: YARN TECHNOLOGY-I**

### **UNIT-I**

Picking and cotton harvesting. Ginning, pre-cleaning of cotton .Pre and post ginning. Description and working of knife roller, mecarthy and saw gins, kinds of mixing. Principles of selection of cotton for mixing hand, bin, stack mixing, auto mixer, different cotton varieties advantage and disadvantage of mixing.

### **UNIT-II**

Object of opening and cleaning. Types of openers, beaters, Lap forming mechanism. Lap rejection and lap defects. Production and efficiency of different m/c. Chute feed system, latest openers and beaters.

### **UNIT-III**

Objects of carding, working principle of carding machine, stripping ,carding and doffing actions. Specification of different parts of card & card clothing, Coiling mechanism, card setting, stripping grinding, neps/hooks formation, Production, draft and efficiency calculation.

### **UNIT-IV**

Objects of drawing, different drafting systems, ideal drafting, drafting waves roller slip, eccentricity of rollers, roller setting, Production monitoring and control, draft and efficiency calculation.

### **UNIT-V**

Sliver blending on Drawframe. Auto levelers in card and Drawframe.

### **References:**

1. Man made fibre and their processing by W. Kiein.
2. Spinning of man made and blends on cotton systems by KR Solholore.
3. Manual of cotton spinning by Frank Fharnley.
4. Technology of carding by R. Chattopadhyay.
5. Spinning blow room and carding by Prof. K.R. Solholora.

## **RCT302: FABRIC TECHNOLOGY-I**

### **UNIT-I**

Introduction to weaving and weave design: Yarn numbering system, average and resultant count of plied yarns. Objects of various weaving preparatory processes; machine sequence for various woven products such as suiting – dress materials- printed; checks and stripes, etc. Weave designs, draft and Peg planand denting plan for simple plain, twill, sateen etc.

### **UNIT-II**

Winding: classification of winding m/c's. various mechanisms: tensioners, yarn clearers, traverse mechanism. Rotoconer & Auto-coner: Object, essential parts and their functions, concept of knotter and splicers, production calculation, package faults. Weft winding m/c, working principle and various mechanisms. Study of types of knots, winding faults and remedies.

### **UNIT-III**

Warping : Classification of warping m/c with Objects of each type. Beam warping machines; passage, working of various motions, Warping calculation, efficiency and production calculation, warping beam defect with remedies. Sectional warping machines, passage, warping calculation of section building and traverse/ cone height and its setting.

### **UNIT-IV**

Sizing: Object, sizing ingredients, size preparation, classification of sizing m/c, working principles of various controls used on sizing m/c, size-recipe for cotton, PV, PC warp, sizing defects and remedies.

### **UNIT-V**

Looming in: Looming in process, Drawing in : accessories and tools, manual drawing in process, heald and reed calculation, semi automatic and fully automatic drawing in machines. Beam gaiting process, warp Tying in: essential requirement, tying in stand, knotters, warp tying in process. Warp welding, QSC.

#### **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
6. Textile mathematics vol 3 by J E Booth
7. Industrial practices in weaving preparatory by Mukesh Kumar Singh

## **RCT305/ RCT405: CHEMICAL PROCESSING OF TEXTILES-I**

### **UNIT-I**

PRETREATMENTS: Introduction of pretreatments in wet processing. Introduction to shearing and cropping machines. Objects, working principle, types of shearing, Objects of singeing, Methods of singeing - gas singeing for woven & knitted fabrics, Introduction to efficiency of singeing, Evaluation & efficiency of singeing.

### **UNIT-II**

DESIZING: Objects of desizing, Mechanism of desizing. Inter-relation of desizing with singeing and sizing, Various methods of desizing: Hydrolytic & oxidative method of desizing, Evaluation of efficiency of desizing.

### **UNIT-III**

SCOURING: Object of scouring, Scouring with alkali & solvent assisted desizing, Inter-relation between desizing and scouring, Study of batch-wise & continuous methods of scouring, Concept of bio-scouring, Evaluation of efficiency of scouring.

### **UNIT-IV**

BLEACHING: Objects of bleaching, Introduction to bleaching agents like sodium hypochlorite ,hydrogen peroxide & per-acetic acid, Bleaching of cotton, polyester & its

blends, Batch-wise & continuous machinery for bleaching, Bleaching of wool ,silk, Concept of AOX, Evaluation of efficiency of bleaching. Continuous scouring and bleaching: Pre-treatment Range

### **UNIT-V**

**MERCERIZATION:** Introduction & objects of mercerization, Effect of mercerization on structure of cellulose, Machinery used for yarn, woven and knit fabrics, Concept of hot mercerization & liquid ammonia mercerization, testing methods to evaluate efficiency of mercerization like Barium Activity, Number, Axial Ratio & Luster index.

Objects of finishing, classification of finishes. Heat setting principle & mechanism & machines stenter.

#### **References:**

1. Chemical technology of fibrous materials by F. Sadov.
2. Chemical processing of polyester I cellulosic blends by RM Mittal & SS Trivedi.
3. Chemical processing of synthetic blends by KV Datye& AA Vaidya.
4. Mercerization by JT Marsh.
5. Introduction to Textile Bleaching by JT Marsh.
6. Bleaching, Dyeing & Chemical technology of textiles fibres by S. R. Trotman.
7. Technology of Bleaching by VA Shenai.
8. Bleaching & mercerizing by BTRA Silver Jubilee Monograph Series.
9. Chemical Technology in the pretreatments of textiles by SR Karmarkar

## **RCT351: YARN TECHNOLOGY-I LAB**

### **BLOW ROOM**

To study mechanism of various blow room line, gearing - production calculation. piano feed regulating motion

### **CARDING**

To study the different parts of carding machine and calculate the speed, cleaning efficiency, total draft and draft distribution, settings, various stop motions incorporated and their function of LC 300, its production per hour & process parameters from industry.

### **DRAWFRAME**

To study the parts, stop motion, gearing diagram, settings and calculation of total draft and distribution of draw frame and calculate the speed and production for given hank. Collection of data on machine parameters & process parameters from industry.

## **RCT352: FABRIC TECHNOLOGY-I LAB**

1. Calculation of yarn count, Different weave designs, Fabric analysis.
2. supply and delivery pkgs for winding, passage of winding m/c, rotary traverse, thread stop motion, drive and production calculation,
3. shuttles and pirns, pinn winder- study of various mechanisms, drive and production calculation
4. warping m/c-passage, beaming mech. warping calculation
5. manual drawing in process, various types of reed, healds, and drop pins, beam gaiting process

6. passage of warp and weft on plain power loom, drive to loom, speed and production calculation

## **RCT355/ RCT455: CHEMICAL PROCESSING OF TEXTILES-I LAB**

1. Desizing of cotton fabric using various types of desizing agents.
2. Scouring of natural fibres viz. cotton in form of yarn or fabric and find the scouring loss.
3. Scouring of wool in fibre.
4. Degumming of silk and calculation of weight loss percentage.
5. Bleaching of cotton by sodium Hypochlorite.
6. Bleaching of cotton by sodium Chlorite.
7. Bleaching of cotton by hydrogen peroxide.
8. Bleaching of silk by sodium hydrosulphite.
9. Dyeing of Cotton Yarn with Direct Dyes.
10. Dyeing of Cotton Yarn with Basic Dyes.

## **RCT401: YARN TECHNOLOGY-II**

### **UNIT-I**

Objectives of combing, system of lap preparation, sliver lap, ribbon lap and super lap machines, configuration of fibre feed and its effect on the quality of product and efficiency of comber, combing cycle.

### **UNIT-II**

Important parts of comber and their functioning, Combing cycle, concept of forward and backward feed, concept of comber waste, calculation pertaining to production and noil percentage.

### **UNIT-III**

Objectives of speed frame, important parts of speed frame and their functioning, Mechanism involved in drafting, twisting, and winding, different types of roller drafting systems, Common defects in roving package, calculations pertaining to gearing, draft, t.p.i. and production, twist multiplier and roving twist.

### **UNIT-IV**

Introduction and objective of ring frame, important parts of ring frame and their functions, principle and mechanism involved in drafting, twisting and winding, Spinning Geometry, Types of rings and travelers, mechanism of cop formation, common package size.

### **UNIT-V**

Control in yarn faults, ring frame calculations pertaining to TPI, production and draft, Doubling - Objects and terminology, study of ring doublers, TFO. Reeling: Objects and terminology, types of reeling construction and working of a reel yarn bundling.

### **References:**

1. Man-made fibre and their processing by W. Kiein

2. Spinning of man-made and blends on cotton systems by K.R. Solholore
3. Manual of cotton spinning by Frank Fharnley
4. Technology of carding by R. Chattopadhyay

## **RCT402: CHEMICAL PROCESSING OF TEXTILES-II**

### **UNIT-I**

Dye structure: Chromophores, auxochromes, Dyeing – Principles of dyeing, Classification of dyes based on the method application, dye-fibre interactions and concepts like exhaustion, expression, percentage shade, affinity and substantivity, Dyeing of cellulosic fibres with direct, vat, reactive and sulphur dyes.

### **UNIT-II**

Dyeing of silk, wool and nylon. Dyeing of Acrylics. Dyeing of Polyester and its blends like polyester-cotton, polyester-viscose, polyester-wool. Evaluation of fastness properties like wash fastness, rubbing fastness and light fastness.

### **UNIT-III**

Introduction to Loose fibre dyeing machines, package dyeing machine. Jigger dyeing machines, winch dyeing machine, padding mangles, jet dyeing and soft flow dyeing machines.

### **UNIT-IV**

Concept of printing. Various ingredients used in preparation of printing paste. Various styles of printing such as Direct, Resist and Discharge by using direct, reactive and disperse dyes. 9. Printing with pigments. Various methods of printing such as table, flat bed and rotary screen printing., Concept of inkjet / digital printing.

### **UNIT-V**

Resin finishing, mechanism of resin finishing. Concept of anti crease, wash-n-wear and durable press, Concept of specialty finishes like soil release, water proof & water repellent finishes, flame proof & flame retardant finishes, Various finishing machinery such as, sanforising, padding mangle.

### **References:**

1. Dyeing of Polyester and Its Blends by M.L. Gulrajani.
2. Dyeing of Chemical Technology Of Textile Fibres by E.R. Trotman.
3. Technology of Dyeing by V.A. Shenai.
4. Textile Printing by L.W.C. Miles.
5. Technology of Printing by V.A. Shenai.
6. An Introduction io Textile Printing by W. Clarke.
7. Textile Finishing by A.J. Hall.
8. Introduction to Textile Finishing by J.T. Marsh
9. Technology of Finishing by V.A. Shenai.



## **RCT403: FABRIC TECHNOLOGY-II**

### **UNIT-I**

Shuttle loom MECHANISMS: Classification of looms, brief idea of each type of loom. Classification of loom motions. Shedding: Types of sheds. Mechanism of tappet shedding and its settings. Positive tappet shedding. Timing and setting of tappets. Picking motion: Mechanism of over pick and under pick motion; Shuttle checking device. Shuttle fly- causes and remedies. Beat up mechanism: Sley beat up mechanism, sley eccentricity and its effect on fabric properties. Loom drive & timing diagram, Efficiency and production calculation. Secondary motion- let off and take up. Auxiliary motion: warp stop, weft stop and warp protector motion.

### **UNIT-II**

Dobby Shedding: Principle of operation of Climax Dobby and Cam Dobby. Dobby pattern card preparation. Jacquard shedding: Classification of jacquards. Working principle of mechanical jacquard. Process of creation of jacquard design and preparation of pattern cards. Jacquard card cutting machine. Brief idea of other fancy jacquard. Introduction to electronic jacquard.

### **UNIT-III**

Automatic shuttle loom and multiple box motion: Features of automatic shuttle looms, type of automatic shuttle looms, Automatic cop change loom mechanism. Weft feeler and transfer mechanism, Mechanism of shuttle change in looms, Introduction to bobbin loader and unifil loom winders. Multiple box mechanism. Pick at will mechanism.

### **UNIT-IV**

Gripper loom: Projectile picking cycle and picking mechanisms, matched cam beat up, continuous take up. Rapier loom: classification, Iwer, dewas and gabler picking cycle, rapier head & rapier drive.

### **UNIT-V**

Jet looms: Airjet loom: essential features, picking cycle, nozzles, confusers. Waterjet looms: essential features, picking cycle, nozzle, pump.

### **References:**

1. Weaving mechanism Vol.1 & II by NN Banarjee.
2. Weaving by ATIRA.
3. Automatic loom by ATIRA (tablet).
4. Weaving calculation by R. Sen Gupta.
5. Weaving Mechanism (Fox).
6. Mechanism/Weaving machine (TALUKDAR).
7. Principle of weaving by Mark and Robinson.

## **RCT451: TEXTILE FIBRE LAB**

Principle of microscopy, preparation and mounting of specimen for longitudinal view, Identification of common textile fibres like cotton, wool, silk, jute, flax, ramie, viscose rayon,

nylon, polyester, acrylic, polypropylene, glass fibres by longitudinal and cross-sectional views & by Burning test.

Identification of common textile fibers (as mentioned above) by solubility test. Standard scheme of analysis of homogeneous fibre and blend by physical and chemical methods, preparation of reagents used for chemical analysis.

## **RCT452: YARN TECHNOLOGY-II LAB**

### **SPEED FRAME**

Study of different parts & stop motions of LF 1400A speed frame, their function, gearing diagram and speed calculation, Calculation of draft constant, total draft & draft distribution in LF 1400A speed frame.

study the builder motion, calculate the twist per inch of a roving from the gearing diagram, production in Kg/Shift for a given roving hank. machine parameters & process parameters from industry.

### **RING FRAME**

Study different parts -drafting system Determination of shore hardness of cots, bottom roller eccentricity, top arm pressure of a Ring Frame and speed frame. Determination of twist constant of a Ring frame and to find twist per inch in yarn, draft constant, Break draft constant and distribution of draft. calculate the production in Kg/Shift for a given yarn count. bobbin building mechanism of a ring frame.

Collection of data on machine parameters & process parameters from industry including snap study on end down and doff quality.

## **RCT453: CHEMICAL PROCESSING OF TEXTILE-II LAB**

1. Development of dye by coupling method.
2. Dyeing of cotton yarn with vat dyes in sample pot dyeing machine.
3. Dyeing of cotton yarn with sulphur dyes.
4. Dyeing of cotton yarn with Remazol dyes.
5. Dyeing of cotton yarn with Procion dyes.
6. Dyeing of cotton yarn with Bi-functional reactive dyes
7. Dyeing of polyester yarn/fibre in laboratory HTHP machine.
8. Application of optical whitening agent on cotton.
9. Determination of washing fastness of dyed material.
10. Determination of washing fastness of dyed material.

## **RCT454: FABRIC TECHNOLOGY-II LAB**

1. Tappet shedding.
2. Picking motion- over pick motion, under pick motion.
3. Sley beat up mech, calculation of sley eccentricity.
4. Loose and fast reed warp protector motion.
5. Take up motion - 5 wheel and seven wheel take up motions.
6. Negative warp let-off mech.
7. Climax dobbie, its card preparation.
8. Warp stop motion and setting, timing diagram.