III Semester

WEAVING TECHNOLOGY-I			
Course Code	21TX32	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3;0;2;1	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits;	4	Exam Hours	03

Course objectives: This course aims at updating the knowledge of students in the fields of weaving preparatory and waving technology.

- Fundamental aspects of warp and weft winding machines. Uster classimat systems and auto winding machines.
- Studies on sizing, sizing ingredients, sizing machines and various aspects of sizing and recent trends in sizing.
- Fundamentals of weaving and basic motions of weaving.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods various types of innovative teaching techniques through videos, working models, animationfilmsmaybeadoptedsothatthedeliveredlessoncanprogressthestudentsintheoretical,applie dand practical skills.
2. Hands on training may be arranged for students to learn practical aspects.
3. Encourage the students to learn machinery operations various settings and maintenance.
4. Support and guide the students for self-study.

Module-1

Necessity, Objects and principles of winding. Classification and general features of winding machines, electronic yarn clearers. Gain, knot factor, clearing efficiency. Uster classimat systems. Classification of auto winding machines. Different types of auto winding machines. Salient features of Autoconer, Uniconer, and Schlrofhast B.C Spooler etc.

Practical component.

Passage of material through winding machines, setting of tensioners, yarn clearers, production and efficiency calculations on winding machines.

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-2

Objects and systems of warping. Study of different types of creels. Study of different types of sectional warping& beam warping machines and their salient features. Special warpers for filament yarns. Special requirements of yarn preparatory for shuttle less weaving machines. Introduction to weft preparation, weft winders. Study of different types of weft winding machines.

Practical component; Passage of material through warping& weft winding m/c production and eff calculations.

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-3

Objects of sizing. Study of Ingredients used for size preparation. Size formulation, study of mixing vessels such as pressure cookers, injection cookers, Techniques of sizing, types of Sizing. Sizing recipes for different fibre yarns. Salient features of modern sizing machines, Drying principles – multi-cylinder drying, hot air drying, radiation drying. Concept of single-end sizing.

Practical component; Study of Ingredients used, Size formulation, size cooking and drying equipments, Salient features of modern sizing machines,

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-4

Controls in sow box - stretch and its control, moisture measurement and temperature control. Recent trends in sizing i.e. foam sizing, solvent sizing, hot melt sizing. High pressure squeezing, migrating behaviour of warp end. Post sizing operations - Drawing-in, leasing, knotting, automatic drawing in machine,

Practical component;

Study of various control in sizing, Practising drawing, denting and knotting.

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-5

Introduction to weaving and looms. Basic motions of weaving. Shedding - Different types of shed. Positive and negative tappet shedding. Merits and demerits of tappet shedding, timing, setting, early and late shedding. Picking - Objectives of picking. Types of picking, picking accessories. Timings & setting methods to alter the timing & strength of picking mechanism. Shuttle checking devices for over & under picking mechanism. Beat-Up- Objects: Crank Beat up. Eccentricity of slay. Factors affecting the sley eccentricity. Cam beat-up mechanism. Different types of reed, reed count. Healds,

Practical component;

passage of material through loom, Calculation of loom speed, Dismantling, assembling, setting and timing of tappet shedding mechanism, various picking mechanisms and Beat up mechanism.

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. To acquire knowledge of principles of warp & weft preparation & Demonstrate Winding operation
2. Summarize and explain systems of warping, warping machines, Special requirements of yarn preparatory for shuttle less weaving machines and weft winding machines.
3. Summarize and discuss the Sizing concepts, ingredients, size cooking M/c, drying principles, controls
4. Analyse and understand the controls in box, new trends in sizing and drawing and denting operations.
5. Interrupt and explain basic motions of weaving, loom accessories settings and timings

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

CIE for the theory component of IPCC

Two Tests each of **20 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Scaled-down marks of two tests and two assignments added will be CIE marks for the theory component of IPCC for **30 marks**.

CIE for the practical component of IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The**15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05**

marks shall be for the test conducted at the end of the semester.

- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test **(duration 02/03 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks**.**

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **20 marks**.

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SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scorded shall be proportionally scaled down to 50 Marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.

Questions mentioned in the SEE paper shall include questions from the practical component).

- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.

SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Suggested Learning Resources:

Text Books:

1. **"An Introduction to Winding and Warping",** Talukdar M K, Talukdar, Bombay Pvt. Circulation.
2. **"Warp sizing mechanisms"**, Ramsbottom Columbia press, Manchester, 1965.
3. **Weaving tablets,** Textiles Association of India, Bombay, 1985.
4. **Yarn preparation,** Sengupta R. –Vol I & II Mahajan Pub. Ahmedabad, 1970.
5. **Modern Preparation and weaving,** Ormerod A. Butterworth publication Co. 1983
6. **Textile Sizing** by B.C.Goswamy
7. **Principles of weaving mechanism** by Robinson &Marks
   Weaving machines, mechanisums, Management.M.K.Talukdar. Mahajan Pub. Ahmedabad

Web links and Video Lectures (e-Resources):

- NPTEL Courses on weaving preparatory.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Demonstration of winding machines, accessories setting of winding machines.
2. Demonstration and setting of pirn winding and warping machines.
3. Collecting various sizing ingredients nearby industries and study their suitability for different yarns.
4. Visiting nearby Textile industries to learn various aspects of weaving preparatory.

CHEMICAL PROCESSING OF TEXTILES-I

Course Code	**21TX33**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3-0-2-1	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03

Course Objectives:

- This subject helps the student to acquire knowledge of Chemical preparatory process
- This subject prepares the student work in chemical processing industry.
- Students are exposed to research field in chemical processing technology.
- Learn the chemistry of the various dyes and dyeing processes carried out in chemical processing department.
- Exposed to actual mechanisms involved in various dyeing operations and processes carried out in the industry.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching methods may be adopted to develop the outcomes.
2. Use PowerPoint/Videos/Animations to explain various concepts.
3. Encourage group discussion in the classes.
4. Ask some creative and higher-order thinking questions in classes which helps critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it
6. Support and guide the students for self-study.

Module-1

Introduction to Chemical processing preparatory operations and sequences, Chemicals and auxiliaries used and their functions.
Shearing and cropping. Objects and working
Singeing, methods and working of various singeing machines,
Desizing, mechanism, objects and various methods of Desizing
Scouring, mechanism, method of scouring of various textile fibers.
Degumming of silk, Scouring of wool and jute.
Practical Demonstration of Desizing, scouring and degumming by various methods

Teaching-Learning Process	Chalk and talk, Power point presentation, NCUTE animated videos, NPTEL video and study materials

Module-2

Bleaching mechanism and methods of various textile fibre and its blend bleaching.
Optical whitening, chemistry and method of application of OBA on various textile fibers.
Quality control methods/methods used for determination of degradation of cotton during scouring and bleaching.
Machines used for Preparatory Process, Batch, Semi-continuous and continuous processes.
Objects of mercerization, history and developments of Mercerization, physical and chemical changes in cotton due to mercerization, various factors affecting mercerization, degree or efficiency of mercerization process.
Practical Demonstration of Bleaching and OBA by various methods

Teaching-Learning Process	Chalk and talk, Power point presentation, NCUTE animated videos,, NPTEL videos and study materials

Module-3

Various methods and Machines used for yarn and fabric mercerization,
Principle of hot mercerization, Latest developments in mercerization.
Brief study on eco-friendly processes. Water and energy management in preparatory processes
Classification of dyes and principles of dyeing. Chemicals and auxiliaries used for textile dyeing and their functions. Chemical constitution of dyes. Effect of fibre structure on dyeing behaviour.

Teaching-Learning Process	Chalk and talk, Power point presentation, NCUTE animated videos, NPTEL study materials

Module-4

Theories of dyeing. Action of electrolytes, effect of dye bath temperature, material to liquor ratio, dye bath pH. Modern concepts of dyeing and selection of dyes for specific end uses. Evaluation of fastness properties of dyed materials
Direct dyes – Classification, properties, application, and after treatments
Reactive dyes – Classification, properties, dyeing conditions, application.
Practical Demonstration of various class of dyeing

Teaching-Learning Process	Chalk and talk, Power point presentation,

Module-5

Vat dyes - Classification, properties, dyeing conditions, application.
Sol-vat dyes - Classification, properties, dyeing conditions, application.
Sulphur dyes - Classification, properties, dyeing conditions, application.
Azoic dyes - Classification, properties, dyeing conditions, application.
Acid dyes - Classification, properties, dyeing conditions and application.
Basic dyes - Classification, properties, dyeing conditions and application.
Practical Demonstration of various class of dyeing

Teaching-Learning Process	Chalk and talk, Power point presentation

Course Outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Explain the fundamental concept of chemical preparatory process, chemicals used and their functions, shearing and cropping, singeing, Desizing, Scouring and Degumming of silk
2. Explain the bleaching process of various textile fibers, Basic concepts of optical whitening, Summarize the various machineries used, Mercerization of cotton, degree or efficiency of mercerization
3. Explain the methods and machines used for mercerization. Test methods, water energy consumption, eco-friendly preparatory process, Classification of dyes, illustrate the use of chemicals and auxiliaries used in dyeing and their functions.
4. Apply theories of dyeing and understand various parameters influencing dyeing process, Explain chemistry, properties and application of Direct and Reactive dyes on Cellulosic fibres
5. Illustrate the chemistry, properties and application of Vat, Sulphur, Azoic, Basic and acid dyes on cotton and protein fibers

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester Two assignments each of **10 Marks**
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- Technology of Textile Processing-Vol. III-A Shenai-Sevak Publications-1975
- Technology of Bleaching and Dyeing of textile fibres-Chakraborthy, -Coxtown Publications-1972
- Chemical Processing of Textiles-Preparatory, Processing and Dyeing-Dr. C.V.Koushik-Mr.Antao-Irwin Josico NCUTE, IIT, New Delhi 2003
- Fundamentals and Practices in Colouration of Textiles J.N. Chakraborty-Woodhead Publishing India Pvt Ltd 2009

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/116102016
- https://www.cbse.gov.in/publications/vocational/Textile%20Design/CBSE%20CIT%20Textile%20Chemical%20Processing-XII%20text.pdf
- http://www.nitttrc.edu.in/nptel/courses/video/116102052/lec1.pdf

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quiz/Group discussion.
- Practical demonstration of preparatory process and dyeing of all five modules content.
- NCUTE and YouTube videos.

SPINNING TECHNOLOGY -I			
Course Code	**21TX34**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3

Course objectives:

The objective of this Course is to describe

- The basic spinning processes in Textile Industry
- To understand the various spinning operations such as Blow Room, Carding and Drawing.
- Students acquire theoretical knowledge about the machineries used.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Use the related videos of Textile machineries so that student can understand more easily.
2. Show the students the working of these machines, by arranging to visit to spinning mills.
3. Inspire the students to have collaborative learning in the class.
4. Support and guide the students for Self-study.

Module-1	
Importance and need of Ginning. Explanation of working of different types of gins. Defects, causes and remedies of ginning. Baling process and bale weights Impurities in the cotton and remedies to minimize impurities in cotton. Important cotton types and trash in those cottons**.** Grading of cottons Definition and objects of mixing and blending. Types of blending and common blends. Influence of fibre parameters namely length, fineness, strength, elongation, chemical deposits and neps on spinning performance	
Teaching-Learning Process	Chalk and talk, power point presentation, videos
Module-2	
Objects of Blow room and identification of its components. Types of opening action in blow room. Brief study Of bale pluckers and bale grabbers. Study of design features and different types of openers and beaters on the Present day Blow room. Modern developments in Blow room. Evaluation of Blow room performance - Hank calculation, production and efficiency calculation. Process Modification required in blow room to process blends of Polyester/cotton and polyester/viscose. Study of blow	
Teaching-Learning Process	.Chalk and talk, power point presentation, videos
Module-3	
Definition and objects of revolving flat card. Study of design features and different types of clothing on licker in, cylinder and doffer and their specifications. Passage of material through revolving flat card. Auto leveler on card and its importance. Types of auto leveler, Setting of different parts of card and gauges used for setting. Definition of draft in card and study of different types of draft and its calculation. Objects of stripping and grinding and their importance.	
Teaching-Learning Process	Chalk and talk, power point presentation, videos
Module-4	
Modern developments and salient features of modern cards. List out specification of the present day cards. Calculation of hank of sliver, production and efficiency in carding. Objects and principle of draw frame. Study of different drafting systems through sketches and name the types of draft in the drafting zone. Types of loading systems. Roller setting and procedure of roller setting. Auto levelers on draw frame.	
Teaching-Learning Process	Chalk and talk, power point presentation, videos
Module-5	

Study of long and short creel draw-frames and their advantages and limitations. Brief study on bercolisation, scouring, buffing, roller eccentricity, shore hardness, calculations of draw frame such as production. Modern developments in draw frame and specifications of the present day draw frame

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1 Explain the Importance of Ginning and Cotton Grading
2.Demonstrate the Working of Openers and Cleaners in Blow room
3 Demonstrate the Working of Carding Machine and its latest updates
4.Explain Working Principle of Draw Frame
5. Demonstrate the Combing Process and Its Importance

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1) First test at the end of 5th week of the semester
2) Second test at the end of the 10th week of the semester
3) Third test at the end of the 15th week of the semester Two assignments each of **10 Marks**
4) First assignment at the end of 4th week of the semester
5) Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6) At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks** (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1) The question paper will have ten questions. Each question is set for 20 marks.
2) There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be proportionally reduced to 50 marks

Suggested Learning Resources: Books

1 **Manual of Cotton Spinning** Coulson Textile Institute,Manchester 1958
2 **Series on Textile processing** Zaloski. S Institute of Textiles Technology USA, 1983
3 **Technology of short-staple spinning** Klein. W Textile Institute Pub., Manchester**,** 1989
4 **Spun Yarn Technology** Oxatoby Butterworths, London 1987.
5 **Contemporary Textile Engineering** Happey. F Academic Press Inc 1981.
6 **Cotton Spinning Calculations** Pattabhiraman. T.K Soumya Pub., Bombay 1979
7 **Cotton Opening & Carding** Merril G.R G.R. Merill, Lowell Mass 1955
8 **Blowroom and carding** --- NCUTE 2000

Web links and Video Lectures (e-Resources):

SPINNING TECHNOLOGY LAB-I			
Course Code	**21TXL35**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Credits	1	Exam Hours	03

Course objectives:

- To understand the various spinning operations such as Blow Room, Carding and Drawing.

Students acquire theoretical knowledge about the machineries used.

Sl. NO	Experiments
1	Passage of material through the blow room and different openers and beaters of blow room. and calculations of speeds of different parts of each machineries
2	Calculation of cleaning efficiency at all beaters and openers. Working on Trash Analyzer and related Calculations
3	Study of piano feed regulating motion and calculation of cone drum speed, feed Roller speed and beats/inch
4	Calculation of Shell roller speeds at normal & doffing time. Calculation of Tension draft at Scutcher.
5	Speed and draft calculation of different parts of carding with the help of gearing and driving
6	Draft constant and its calculation of card. Draft change pinion calculation and machine operation to get different hank of slivers.
7	Break draft, main draft and total draft calculation Drawframe.
8	Production, delivery speed, calculation of hank of sliver, efficiency calculation of draw frame
	Demonstration Experiments (For CIE)
9	Driving arrangements and demonstration of all machineries of Blow room
10	Settings of different parts and gauges used setup the machines
11	Passage of material through draw frame and list the parts and their functions.
12	Setting of drafting zone and processing of material as per the hank required in Draw frame.

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

1. Explain the Passage of Material and Working of Various Machines in Blow Room Line
2. Explain the Speed Calculations of Various parts of Blow Room Machineries
3. Demonstrate the Various settings and Quality Studies in Blow room
4. Explain the Working of Carding Machine and its settings
5. Explain the Calculations pertaining to Revolving Flat Card

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE).

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.

- Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- Weight age to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weight age of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

Rubrics suggested in Annexure-II of Regulation book

Suggested Learning Resources:

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A E C

INTRODUCTION TO POLYMERS			
Course Code	**21TX383**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	2

Course objectives:

1. As the basic building block of all textile products is polymers, acquiring knowledge in this subject is necessary for all undergraduate Textile Technology students.
2. This subject deals with basics of polymer science & Technology, general aspects of polymer production and applications

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Quizzes, group discussions ,seminars and report writing on various mathematical concepts of textiles
2. Effect of polymers on environment can be discussed.

Module-1	
Introduction and definition of monomers and polymers. History and Classification of polymers. Characteristics of fibre forming polymers and their general applications.	
Teaching-Learning Process	Chalk and talk, power point presentation, videos
Module-2	
Study of synthesis of polymers by chain, step and co-ordination polymerization. Techniques of polymerization, comparison of various Techniques. Study of various types of initiators for addition polymerization	
Teaching-Learning Process	Chalk and talk, power point presentation, videos
Module-3	
Comparison of different types of polymerization methods and techniques. Co-polymerization - Concept of co-polymerization	
Teaching-Learning Process	Chalk and talk, power point presentation, videos
Module-4	
Kinetics of polymerization - estimation of kinetic chain length, illustration of effect of various parameters on kinetics of polymerization. Functionality in polymers. Carothers equation and extent of polymerization	
Teaching-Learning Process	Chalk and talk, power point presentation, videos
Module-5	
Concept of molecular weight and molecular weight distribution and determination of molecular weight.	
Teaching-Learning Process	Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Define the basic concepts in polymers with special reference to textile polymers and classify different types of polymers.
2. Explain about synthesis of polymers and polymerization methods and techniques
3. Interpret and compare polymerisation techniques and methods, copolymerization
4. Illustrate kinetics of polymerization
5. Analyse of polymers for molecular weight

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous internal Examination (CIE)

Three Tests (preferably in MCQ pattern with 20 questions) each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

1. First assignment at the end of 4th week of the semester
2. Second assignment at the end of 9th week of the semester

Quiz/Group discussion/Seminar, any two of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

The sum of total marks of three tests, two assignments, and quiz /seminar/ group discussion will be out of 100 marks and shall be **scaled down to 50 marks**

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure minimum of 35% of the maximum marks meant for SEE.

Suggested Learning Resources: Text Books:

1. **Text book of polymer Science**, Billmeyer.W., Wiley Int.Sc. New York 1984.
2. **Polymer Science,** Gowarikar V.R., Vishwanathan N.V., Jayadev Sridhara, Wiley Eastern Ltd., New Delhi, 1995.
3. **Principles of polymerization,** Odian G., John Wiley & sons, NY, 1976.
4. **Mechanical properties of polymers,** Ward I.M. John Wiley & sons, NY, 1971.

References:

1. **Properties and structure of polymers,** Tobolski, John Wiley & sons, NY, 1960.
2. **Mechanical Properties of polymers,** Nielson L.E., Marshal Dekkar, NY, 1974.
3. **Polymer characterization**, Cambel and White, Chapman& Hall, London.

Web links and Video Lectures (e-Resources):

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Quizzes, group discussions ,seminars and report writing on various aspects of polymers
2. Practical exposure to production of polymers and discussion on harmful effects of synthetic polymers

IDENTIFICATION OF FIBRES & FIBRE MIXTURES			
Course Code	**21TX384**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1-0-0-0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01

Course Objectives:

- This subject helps the student to acquire knowledge of various fiber identification by different techniques
- This subject helps to students identify the blend and its percentage of fibers in textile manufacturing industry.
- Students are exposed to research field in different fibers and their applications in various industries.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching methods may be adopted to develop the outcomes.
2. Use PowerPoint/Videos/Animations to explain various concepts.
3. Ask some creative and higher-order thinking questions in classes which helps critical thinking.
4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it
5. Support and guide the students for self-study.

Module-1	
Natural cellulosic fibers- identification of different fibers by Physical test, burning test and chemical test and analysis of morphology of different fibers	
Teaching-Learning Process	Chalk and talk, Videos and Practical analysis
Module-2	
Protein fibers- identification of different fibers by Physical test, burning test and chemical test and analysis of morphology of different fibers	
Teaching-Learning Process	Chalk and talk, Videos and Practical analysis
Module-3	
Regenerated fibers- identification of different fibers by Physical test, burning test and chemical test and analysis of morphology of different fibers	
Teaching-Learning Process	Chalk and talk, Videos and Practical analysis
Module-4	
Synthetic fibers- identification of different fibers by Physical test, burning test and chemical test and analysis of morphology of different fibers	
Teaching-Learning Process	Chalk and talk, Videos and Practical analysis
Module-5	
Blend analysis fibers- identification of different blend fibers by Physical test, burning test and chemical test.	
Teaching-Learning Process	Chalk and talk, Videos and Practical analysis

Course Outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Explain the Identification of various Natural textile fibers by different methods
2. Summarize the Identification of various Protein textile fibers by different methods
3. Explain the Identification of various Regenerated textile fibers by different methods
4. Explain the concept of Identification of various synthetic textile fibers by different methods
5. Illustrate the various blend analysis of textile fibers by different techniques

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous internal Examination (CIE)

Three Tests (preferably in MCQ pattern with 20 questions) each of **20 Marks (duration 01 hour**)

4. First test at the end of 5th week of the semester
5. Second test at the end of the 10th week of the semester
6. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

3. First assignment at the end of 4th week of the semester
4. Second assignment at the end of 9th week of the semester

Quiz/Group discussion/Seminar, any two of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

The sum of total marks of three tests, two assignments, and quiz /seminar/ group discussion will be out of 100 marks and shall be **scaled down to 50 marks**

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure minimum of 35% of the maximum marks meant for SEE.

Suggested Learning Resources:

Books

- Textile fibers by BITRA
- Textile Fibers by by James Gordon Cook
- Identification of Textile Fiber by Max M Houck

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=e2RyE7i0sCk
- https://www.youtube.com/watch?v=Rj82EPee0VA
- https://www.youtube.com/watch?v=btduP2TvoMs

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quiz/Group discussion.
- Practical demonstration of Fiber Identification
- NCUTE NPTEL and YouTube videos.

STATISTICAL APPLICATIONS TO TEXTILES			
Course Code	**21TX41**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives: This Course aims at updating knowledge of students in following fields of statistical quality control

1. Concepts of statistics and quality control
2. Analyse the data, use suitable statistical tool to draw suitable conclusions
3. Comparing different processes, parameters etc. for quality control

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
3. Encourage the students for group learning to improve their creativity and analytical skills.
4. Support and guide the students for self-study.

Module-1

The concept of individual population and samples-Frequency distribution and its representation-Construction of frequency diagrams with applications, probability curves.
Statistical measures and their practical applications. Measures of central tendency-different types of means, Measures of dispersion. Skewness, kurtosis

Teaching-Learning Process	Chalk and talk, power point presentation, Charts & videos

Module-2

Random sampling errors, relations between samples and populations, confidence interval.
Determination CI for means, SD and difference in mean and SD. The normal distribution,

Teaching-Learning Process	Chalk and talk, power point presentation, Charts & videos

Module-3

Control charts, their uses and limitations in control of quality, concept of control limits, specification limits, ẌR, P, nP and C chart.
Time series, setting up of trend line, components of time series trend line by straight line quadratic and exponential method.

Teaching-Learning Process	Chalk and talk, power point presentation, Charts & videos

Module-4

Test of significance. Setting up of hypothesis. Significant tests for means and dispersions, chi- square test.

Teaching-Learning Process	Chalk and talk, power point presentation, Charts & videos

Module-5

Analysis of variance-One way & two way.
Correlation and Correlation co- efficient. Regression Analysis

Teaching-Learning Process	Chalk and talk, power point presentation, Charts & videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Define and apply basic concepts of statistics, data collection presentation and measures of central tendency
2. Make use of various statistical distribution and confidence interval

3. Inspect quality, control quality and predict and analyse time series
4. Analyse and choose significance of results and statistical hypothesis
5. Apprise, approve and compare variance analysis, correlation and regression

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester,

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks** (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be proportionally reduced to 50 marks

Suggested Learning Resources: Text Books:

1. **Textile Testing,**-J.E. Booth, CBS Publishers, New Delhi, 1996
2. **Handbook of Textile Testing and Quality control**- Hamby Grower, Wiley Eastern Pvt. Ltd.Delhi 1969.
3. **Practical Statistics for Textile Industry**-Part-1 & 2, Gave-Leaf, Textile Institute, 1984

References::

1. **A Textbook of statistics**, Rajamohan 1995 **Statistics For Textile Technologists-** L.H. C. Tippet, Textile Institute, Manchester 1973

Web links and Video Lectures (e-Resources):

NPTEL course on Evaluation of textile materials-Module- 2

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Collection of existing data on textile materials from literature and applying statistical tools for the same
2. Collecting data from textile testing lab of the department and applying statistical concepts
3. Collecting various data related to textiles from nearby industries (case study) and applying statistical tools
4. Seminars, quizzes, group discussions, seminars and report writing on various statistical concepts.

WEAVING TECHNOLOGY-II			
Course Code	21TX42	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:1	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03

Course objectives: This course aims at updating the knowledge of students in the fields of, dobby, Jacquard and unconventional methods of weaving.

- Fundamental aspects of Secondary and auxiliary motions of weaving.
- Demonstrate weft patterning, automatic looms, fabrics defects; causes and remedies
- Principle of working of different types of dobby and jacquards.
- Interpret and explain unconventional methods of weaving.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods various types of innovative teaching techniques through videos, working models, animationfilmsmaybeadoptedsothatthedeliveredlessoncanprogressthestudentsintheoretical,applieda nd practical skills.
2. Hands on training may be arranged for students to learn practical aspects.
3. Encourage the students to learn machinery operations various settings and maintenance of weaving machines.
4. Students can visit nearby weaving industries to learn more of loom operations.
5. Support and guide the students for self-study.

Module-1

Introductions to Secondary motions –Objectives and importance. Take up motion - Objects - types of Take up motions, Intermittent, continuous Take up motion, 5 wheel take up and 7 wheel take up motions, comparisons and dividend calculations. Continuous worm & worm wheel take up motion, anti-crack motion. Let-off motions – Types of let- off motions. Negative and positive let off: construction & working, Positive let off motions. Basic requirements, advantages, Roper, Toyoda, Ruti let-off mechanisms. Construction & working of electronic let off motion.

Practical component;

Assembling and dismantling of 7 wheel take-up motion, let-off motion, timing and settings, construction & working and dividend calculations.

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-2

Auxiliary Motions- Objects, Necessity & different types. Warp protector motions, objects, types - loose reed and fast reed. Electromagnetic warp protector. Warp stop motions, drop wires – mechanical & electrical type. Weft stop motions - side weft fork and centre weft fork motions. Construction & working comparisons. Warp easing motions loom banging off. Study of temples, Functions, different types of temples, choice & suitability.

Practical component;

Assembling and dismantling of loose reed and fast reed mechanisms, side and centre weft fork motions, temples, Construction & working.

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-3

Multiple box motions: weft patterning, 2x1, 4x1, 4x4 motions - construction & working. Automatic Looms - Different types - Cop changing, shuttle changing looms, feelers, types of feelers, shuttle eye cutters, temple eye cutters, construction & working. Dobby shedding different types, working of different types of dobbies, keighly dobby, cam dobby, paper controlled dobby, cross border dobby, lattice preparation for left and right dobby.

Practical component Weft patterning, 2x1, 4x1, 4x4 motions - construction & working. Automatic Looms, working of different types of dobbies, lattice preparation for left and right dobby.	
Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-4

Jacquard shedding, Principle of working of different types of jacquards, cross border jacquard, special jacquards, tie ups, Open shed jacquards, electronic jacquard, card cutting, Fabric defects causes& remedies. Filament weaving. Introduction to unconventional looms, classification of shuttle less looms, weft accumulators ,Introduction to projectile looms, Weft insertion by Projectile, salient features, Weft insertion stages. Torsion bar picking.

Practical component

Principle and working of different types of jacquards, tie ups, study of weft insertion stages of projectile looms.

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-5

Classification of Rapier looms salient features. Weft insertion stages in Dewas&Gabler system two phase rapier. Air quality requirements for Air Jet looms, system of air jet weaving, method of weft insertion in Air jet, water Jet looms, water quality requirements. Air Jet weaving, method of weft insertion in Air jet,Air quality requirements for Air Jet looms. Water Jet looms, water quality requirements. Merits and demerits, comparisons of air jet and water jet looms. Multiphase weaving, circulars looms, Narrow looms, Triaxial looms. Applications

Practical component.

Study of weft insertion stages of rapier looms, air jet, water jet looms ,multiphase looms

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

- Demonstrate the secondary motions of weaving, settings, constructions.
- Define the importance of various auxiliary motions, demonstration, working &settings.
- Demonstrate the different types of box motions, dobby mechanisms, working, and lattice preparation.
- Summarize the different jacquard mechanisms and also weft insertion stages of projectile looms.
- Explain weft insertion stages in rapier, jet looms and multiphase looms.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

CIE for the theory component of IPCC

Two Tests each of **20 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Scaled-down marks of two tests and two assignments added will be CIE marks for the theory component of IPCC for **30 marks**.

CIE for the practical component of IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The**15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test **(duration 02/03 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks**.**

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **20 marks**.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours)

4. The question paper will have ten questions. Each question is set for 20 marks. Marks scorded shall be proportionally scaled down to 50 Marks
5. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
6. The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be proportionally reduced to 50 marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.

Questions mentioned in the SEE paper shall include questions from the practical component).

- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.

SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks scored out of 100 shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Text Books:

1. **Weaving machines, mechanisms, Management.**M.K.Talukdar. Mahajan Pub. Ahmedabad.
2. **Principles of weaving mechanism** by Robinson &Marks
3. **Weaving Mechanism,**Fox
4. **Weaving mechanism**, BannerjeeN.N
5. **Weaving tablets,** Textiles Association of India, Bombay,1985.
6. **Cotton weaving**, Gordev. V and Volkov. P., Mir Pub., Moscow1987.
7. **Automatic weaving,** Aitken, Colombia press, Manchester1969.
8. **An Introduction to Automatic weaving,** Bennet G.A. - Bennet G.A. 1958.
9. **Modern preparation and weaving machinery,** Orme rod. A., Butterworth publication Co.1993

Web links and Video Lectures (e-Resources):

.NPTEL course on weaving Technology-1

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Apart from conventional lecture methods various types of innovative teaching techniques through videos, working models, animationfilmsmaybeadoptedsothatthedeliveredlessoncanprogressthestudentsintheoretical,appliedand practical skills.
- Hands training may be arranged for students to learn practical aspects.
- Encourage the students to learn machinery operations, various settings and maintenance of weaving machines
- Students can visit nearby weaving industries to learn more of loom operations.
- Support and guide the students for self-study.

SPINNING TECHNOLOGY-II			
Course Code	**21TX43**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	4	Exam Hours	3

Course objectives:

- The objective of this Course is to explain the students the basic spinning process in Textile Industry
- To understand the various spinning operations such as Combing, Speed frame ring frame, doubling, rotor and unconventional spinning techniques.
- Students will acquire theoretical knowledge about the machineries used.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Use the related videos of Textile machineries so that student can understand more easily.
2. Show the students the working of these machines, by arranging to visit to spinning mills.
3. Inspire the students to have collaborative learning in the class.
4. Support and guide the students for Self-study.

Module-1

Hook theory and preparatory processes to comber. Objects of combing and study of combing cycle with the help of sketches and also index numbers. Detachment setting and its importance. Gauges used for setting the comber. Calculations in comber. Modern developments at comber and salient features of the present day comber. Production, speed, efficiency, draft calculation of comber. Demonstration of comber working

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-2

Objects of speed frame, study of different drafting systems and importance of apron drafting system. Principle of twisting and winding in speed frame. Study of different types of flyers, building mechanism, lift, chase length and their importance. Study of differential gearing mechanism and its importance. Different types of change point at speed frame. Modern developments in speed frame and salient features of the modern speed frame Break draft, main draft, total draft and draft constant calculations. Spindle speed drafting rollers speed calculations. TPI and twist constant calculations. Bobbin speed calculation with the help of differential gear mechanism. Building mechanism. Production, delivery speed, hank of roving and efficiency calculations of speed frame and their demonstration

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-3

Objects of ring spinning, study of different drafting systems and type importance. Principles of twisting, factors affecting the twist Calculation, Difference between Actual and Practical TPI. Principal of winding. Types of builts Roller setting, draft and its calculation. Rings and Travellers. Different types of rings, selection of rings and manufacture of rings. Types of travellers, traveller numbering both in direct and indirect system. Manufacture of travelers. Forces acting on traveller. Faulty packages of Ring frame and remedial measures. Modern developments of Ring frame and salient features of the present day ring frame. Calculations of Ring frame such as production, efficiency, Traveller speed and count etc Calculation of spindle speed, front roller speed TPI through gearing diagram and also by changing the pulleys and concerned change wheels. Calculation of Twist constant through gearing and also TPI calculation for different TCP. Break Draft, Main Draft and Total draft calculation through gearing diagram.

Teaching-Learning Process	Chalk and talk, power point presentation, videos

Module-4	
Doubling frame – objects of doubling and conditions to get balanced double yarn. Preparation of doubling, Types of doubling systems. Study of Two for one twister. Threading through different types of wet doubling systems. Defects in doubling and remedies Study of Types of Sewing threads and their applications. Open-end spinning – principle and objects of open-end spinning. Classification of open-end spinning. Principle and Technique of rotor spinning and detailed study of rotor spinning such as initial drafting, transport zone, twisting and yarns formation Types of opening rollers and rotors and their effect on the performance of OE machine. Calculations of Open end spinning machines. Modern developments in OE machine Calculation of Spindle Speed, TPI through gearing on doubling frame. Demonstration and calculation on O.E. Spinning machine.	
Teaching-Learning Process	Chalk and talk, power point presentation, videos
Module-5	
Fancy yarns and their production and applications. Study of Advanced Spinning systems such as DREF spinning, Air jet spinning, Twist less spinning, Bob-Tex Spinning, Core and Cover spun yarn spinning. Quality studies of all unconventional methods of spinning. Comparison between conventional and unconventional methods of spinning.	
Teaching-Learning Process	Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Demonstrate the Working of Comber & Explain the Latest Developments in Combing Technology
2. Explain & Demonstrate about the Processing and developments in Speed frame
3. Demonstrate & Explain the Working Principle of Ring Spinning Technology
4. Demonstrate the Working Principle of Doubling Machine & O.E.Spinning
5. Explain the Production of Yarn on Unconventional Methods of Spinning Technology

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

CIE for the theory component of IPCC

Two Tests each of **20 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Scaled-down marks of two tests and two assignments added will be CIE marks for the theory component of IPCC for **30 marks**.

CIE for the practical component of IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The**15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test **(duration 02/03 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks**.**

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **20 marks**.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours)

7. The question paper will have ten questions. Each question is set for 20 marks. Marks scorded shall be proportionally scaled down to 50 Marks
8. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

9. The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be proportionally reduced to 50 marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).

- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.

SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks scored out of 100 shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1 **Manual of Cotton Spinning** Coulson. A.F.W.(Ed.),Vol. I to IV Textile Institute, Manchester,1958
2 **Series on Textile processing** Zaloski.S ,The Institute of Textile Technology, USA1983
3 **Technology of short-staple spinning,** Klein.W. Vol .I, II, III and IV**,** Textile Institute Pub., Manchester**,**1989
4 **Spun Yarn Technology** Oxtoby Butterworths, London 1987
5 **Contemporary Textile Engineering** Happy. F. (Ed.), Academic Press, Inc 1981
6 **Hand Book of Cotton Spinning,** TaggartWilliam Universal Pub. Cor 1979
7 **Essential Facts of Practical cotton spinning** Pattabhiraman T.K Soumya Pub., Bombay 1979
8 **Cotton Spinning Calculation** Soumya Pub., Bombay 1979
9 **Cotton Opening & Carding** Merril. G.R. G.R. Merril, Lowell Mass 1955

Web links and Video Lectures (e-Resources):

- https://archive.nptel.ac.in/courses/116/102/116102055/#watch
- https://archive.nptel.ac.in/courses/116/102/116102038/

CHEMICAL PROCESSING OF TEXTILES-II

Course Code	**21TX44**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2-2-0-1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Objectives:

- This subject helps the student to acquire knowledge of Textile Chemical process
- This subject prepares the student work in chemical processing industry.
- Students are exposed to research field in chemical finishing technology.
- Learn the chemistry of the various finishing and dyeing processes carried out in chemical processing department.
- Exposed to actual mechanisms involved in various dyeing and finishing operations and processes carried out in the industry.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching methods may be adopted to develop the outcomes.
2. Use PowerPoint/Videos/Animations to explain various concepts.
3. Ask some creative and higher-order thinking questions in classes which helps critical thinking.
4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it
5. Support and guide the students for self-study.

Module-1

Mordant dyes - Classification, properties, dyeing conditions and application
Metal Complex Dyes - Classification, properties, dyeing conditions and application
Introduction to natural dyes and their methods of application.
Disperse dyes - Classification, properties, dyeing conditions and application
Modified basic dyes - Classification, properties, dyeing conditions and application
Various after treatments given to synthetic dyed goods.
Concepts in dyeing of P/C, P/V and P/W blends

Teaching-Learning Process	Chalk and talk, Power point presentation, NPTEL video and study materials

Module-2

Preparatory process for garment dyeing, specialty chemicals and dyes used for garment dyeing. Different types of dyeing practices for various types of garments, precautions to be taken for effective dyeing of garments. Quality control in garment dyeing and garment dyeing machines. Working principles of dyeing machines for yarns and fabrics such as Winch, Jigger, Jet dyeing, HTHP dyeing machines etc. Latest developments in dyeing machinery.
Introduction to colour measurement and computer colour matching concepts. Spectrophotometers and determination of K/S value, Yellowness, Whiteness and Brightness indices

Teaching-Learning Process	Chalk and talk, Power point presentation, NCUTE animated videos,, NPTEL videos and study materials

Module-3

Introduction to Textile Printing. Selection of dyes/pigments/auxiliaries and textile substrate to suit the end use of the printed textile materials. The constituents and characteristic of printing paste. Brief study of different binders, thickeners, solvents, discharging agents and other ingredients of printing paste. Styles of Printing-Chemicals and mechanisms used for the various Styles of Printing Methods of Printing-Hand block, Roller, Development of screens, hand screen, semi -automatic screen, flatbed and rotary screen printing methods. Transfer Printing-Principle, mechanisms of transfer printing and various

methods. Methods of Print Fixation-Drying, curing by dry heat, steam fixation etc. Introduction to Textile Digital Printing.	
Teaching-Learning Process	Chalk and talk, Power point presentation, NCUTE animated videos, NPTEL study materials
Module-4	
Textile Finishing. Need of textile finish. Classification of various finishes based on Functional, Aesthetic, chemical, Mechanical and degree of performance. Classification of Various finishing chemicals and their properties. Calendaring-Need and its Principle, various types of calendaring machines used based on its end uses and their working principle. Sanforization-Need and its principle, working of Pre-shrinking machine Wrinkle Recovery Finish-Selection of fibers, Mechanism of Crease formation, various types of cross linking agents and its suitability, types of catalyst used, Method of application on various types fabrics.	
Teaching-Learning Process	Chalk and talk, Power point presentation, NPTEL video and study materials
Module-5	
Water repellency finish-Principle, various types agents used and Method of Application. Water proof finishes- Principle, various types agents used and Method of Application. Fire retardant finishes-Limiting Oxygen Index and its importance, Various types FR agents and its properties, Method of application. Finishing of Wool-Directional Frictional Effect (DFE) of wool fiber, Milling, Anti-shrink and insect repellent finish on wool. Finishing of silk-Various finishing treatment given to silk fabric, chemicals used and method of application. Heat setting-Need of heat setting, Heat setting of various synthetic fiber and its mechanism De-lustring of various Regenerated fiber and its Mechanism Anti-static Finish-Reasons for static charges generated in textile fibers, Tribo electric series of textile fibers, Theories used to achieve anti-static finish and method of application. Soil release finish-Reasons for textile fibers attracted by soil, relation between soil release and anti-static finish, types of fabric need soil release finish and method of application	
Teaching-Learning Process	Chalk and talk, Power point presentation, NPTEL video and study materials

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Explain the application and properties of various dye class like disperse, Natural dyes and concept of blend dyes
2. Summarize the various dyeing machineries, Garment dyeing and computer colour matching concept.
3. Explain the method of application styles and methods of printing, transfer printing and after treatment to printed goods.
4. Explain the concept of textile finishing, finishing chemicals, Sanforization and other finishes
5. Illustrate the various chemical finishes like water proof, flame retardant and synthetic fiber finishes

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

- Textile Chemistry, Vol. III- The physical chemistry of dyeing-R. H. Peters Elsevier, Amsterdam, The Netherlands 1975
- Chemical Processing of Cotton, Polyester Cotton Blends J.R.Modi and A.R. Garde TAI Publications 1960
- Textile printing V.A.Shenai Sevak publications 1996
- Textile printing L.W.C. Miles Society of Dyers & Colourists 1981
- An Introduction to Textile Finishing J T Marsh Butterworths publications 1979
- Principles of Textile Finishing A K Roy Choudhury Woodhead Publishing 2017

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/116102054
- https://archive.nptel.ac.in/courses/116/102/116102054/
- https://www.slideshare.net/RuchiSardana1/textile-finishes-38312735

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quiz/Group discussion.
- Practical demonstration of dyeing process and finishingof all five modules content.
- NCUTE NPTEL and YouTube videos.

CHEMICAL PROCESSING OF TEXTILES LAB-II			
Course Code	**21TXL46**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	0-0-2-0	SEE Marks	50
Credits	01	Exam Hours	03

Course objectives:

- The students will be able to get hands on experience of dyeing and printing of different classes of fibres, fabrics and garments.
- They will get experience on various dyeing equipment, settings and handling.
- The students will be exposed to work on computer colour matching instruments and related software.
- They will get experience on various types of finishing process

Sl. No	Experiments
1	Dyeing of polyester using disperse dyes with carrier, HTHP and Thermosol dyeing technique.
2	Dyeing of cotton, silk and wool using important natural dyes.
3	Dyeing of garments with various classes of dyes.
4	Preparation of colour charts by light, pigment, chromatic circle and Brewster's theory.
5	Printing practice using Hand blocks and screens with various classes of dyes.
6	Preparation of screens for screen-printing.
7	Resist style (batik) of printing on fabrics.
8	Discharge style of printing on cotton, PET and silk.
9	Anti-crease finishing of cotton using formaldehyde and non-formaldehyde based chemicals.
10	Determination of K/S and matching of shades using spectrophotometer. And Measurement of washing / rubbing fastness of dyed and Printed goods.
	Demonstration Experiments (For CIE)
11	PET Dyeing using Disperse dye
12	Tie and dye printing, and Resist style of printing on fabrics.
13	Preparation of colour charts by light, pigment, chromatic circle and Brewster's theory.
14	Printing practice using Hand blocks and screens with various classes of dyes.

Course Outcomes (Course Skill Set):

At the end of the course the student will be able to:

1. Demonstrate dyeing of acrylic and polyester using basic and disperse dyes
2. Explain the basics of printing of fabrics. Outline various dyes/pigments used,
3. Demonstrate print paste preparation, constituents, their characteristics and suitability.
4. Explain the styles of printing and methods of printing and outline the parameters involved
5. Apply the knowledge of various finishing Treatments on fabric and various finishing chemicals used and outline the concepts of computerized colour measurement and colour matching

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination(SEE).

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

Rubrics suggested in Annexure-II of Regulation book

Suggested Learning Resources:

- https://www.youtube.com/watch?v=uZN0iLLAaww
- https://www.youtube.com/watch?v=g8_GvRoASV0
- https://www.youtube.com/watch?v=9ND67gfwAyg

A E C

PROCESSING OF SYNTHETIC FIBRES AND BLENDS			
Course Code	**21TX483**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	1

Course objectives:

- Student can acquire the knowledge in synthetic fibres their processing on cotton system.
- Study of various blends and their manufacturing technique.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Students get the knowledge in processing of synthetic fibres and their blends
2. After this course student able to join man made fibre processing industry.

Module-1

Introduction to processing of synthetic fibre and their blend, tow to top convertion, importance and their methods, Blending principle and their methods.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-2

Typical sequence of blow room machines and their specifications.
Modification of carding machine for blends.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-3

Draw frame blending, roller setting and their specifications.
Modification in roving frame for blends.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-4

Ring frame modification for processing of synthetic fibers, spinning of dyed fibers.
Open end spinning for blends.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-5

Properties of blended yarn with yarn tenacity and elongation. Blend migration, index of blend irregularity.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Course Outcomes (Course Skill Set):

At the end of the course the student will be able to:

1. Explain the basics processing of synthetic fibre and their blend.
2. Demonstrate sequence of blow room & Carding machines.
3. Demonstrate Draw frame blending with Modification in roving frame for blends.
4. Explain the Ring frame modification for processing of synthetic fibers
5. Apply the knowledge of various Properties of blended yarn.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous internal Examination (CIE)

Three Tests (preferably in MCQ pattern with 20 questions) each of **20 Marks (duration 01 hour**)

7. First test at the end of 5th week of the semester
8. Second test at the end of the 10th week of the semester
9. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

5. First assignment at the end of 4th week of the semester
6. Second assignment at the end of 9th week of the semester

Quiz/Group discussion/Seminar, any two of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

The sum of total marks of three tests, two assignments, and quiz /seminar/ group discussion will be out of 100 marks and shall be **scaled down to 50 marks**

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure minimum of 35% of the maximum marks meant for SEE.

Suggested Learning Resources:

Books

1. Spinning of manmade fibers and blends: K R Salhotra – TAI publications
2. Blended textiles - BITRA

Web links and Video Lectures (e-Resources):

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ECO FRIENDLY PROCESSING OF TEXTILES			
Course Code	21TX484	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	01

Course objectives:

- To introduce students understand eco-friendly processing of textiles aspects in textile and apparel industries.
- To understand environmental management aspects in textile Industries.
- To understand the significance of pollution control measures, quality of water and water treatments

Teaching-Learning Process: (General Instructions)

These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods various types of innovative teaching techniques through videos, animationfilmsmaybeadoptedsothatthedeliveredlessoncanprogressthestudentsintheoretical,appliedand practical skills.
2. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
3. Encourage the students for group learning to improve their creativity and analytical skills.
4. Support and guide the students for self-study.
5. Arrange industrial visits to textile processing industries.
6. Students can be taken to research laboratories to demonstrate about modern equipment's, auxiliaries and Chemicals used for the production of eco-friendly fibers, yarns and fabrics.

Module-1

Modern approaches to eco-friendly preparatory process to dyeing:-Desizing, Scouring, Degumming, Bleaching and Mercerizing process of woven and knitted fabrics.

Teaching-Learning Process :

Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-2

Eco-friendly dyes and their method of dyeing of cellulosic, protein and synthetic fabrics. Red listed textile chemicals, their sources and remedies. Pollution aspects of textile dyeing.

Teaching-Learning Process :

Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-3

Eco friendly printing of natural, protein and synthetic fabrics. Finishing of textiles with various specialty chemicals and auxiliaries.

Teaching-Learning Process:

Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-4

Eco friendly finishing of natural, protein and synthetic fabrics. Eco-labelling and various Eco-standards.

Teaching-Learning Process:

Chalk & talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-5

Methods of extraction of natural dyes. Latest developments in natural dyes and their application on various fibers.

Teaching-Learning Process:

Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Course outcome: (Course Skill Set):

At the end of the course the student will be able to:

1. Students can make their careers in garment and textile wet processing industries by following various processes

Studied in the course.

2. Demonstrate functions of the chemicals used for eco-friendly textile processing.
3. Summarize speciality chemicals used for production of textiles
4. Illustrate methods of manufacturing of eco-friendly processing.
5. Demonstrate eco-friendly natural dyes on textiles.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous internal Examination (CIE)

Three Tests (preferably in MCQ pattern with 20 questions) each of **20 Marks (duration 01 hour**)

10. First test at the end of 5th week of the semester
11. Second test at the end of the 10th week of the semester
12. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

7. First assignment at the end of 4th week of the semester
8. Second assignment at the end of 9th week of the semester

Quiz/Group discussion/Seminar, any two of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

The sum of total marks of three tests, two assignments, and quiz /seminar/ group discussion will be out of 100 marks and shall be **scaled down to 50 marks**

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure minimum of 35% of the maximum marks meant for SEE.

Suggested Learning Resources:

Text books:

1. Dyeing and printing with natural dyes - M.L.Gulrajani.
2. Eco-friendly Textile wet processing-co-ordinator,N CUTE Publication - Dr.R.Ashokan
3. Shenai V A, “Technology of Printing”, Sevak Publishers, Mumbai, 1990.
4.. Shore J, “Colorants & Auxiliaries”, Vol. I & II, Society of Dyers and Colourists, UK, 1990.

5. Schindler W D and Hauser P J, “Chemical Finishing of Textiles”, The Textile Institute,Woodhead Publishing Ltd., Cambridge, 2004.
6. Heywood D., ”Textile Finishing”, Woodhead Publishing Ltd.,2003

Reference books:

1. Environment Problems in chemical processing of Textiles, NCUTE Publication – Dr.A.Asokan, Ms.Yogita
2. Finishing of Khadi Garments - Dr.R.B.Chavan, R.Chattopadhyay, R.P.Tewari, IIT Delhi
3. Holme L, “New developments in chemical finishing of textiles”, Journal of Textile Institute, UK, 2008.
4. Tyler D, “Textile Digital Printing Technologies”, Textile Institute Publication UK, Vol.37, No.4, 2005
5. Ujiie, “Digital Printing of Textiles”, CRC, Wood Head Publishing Ltd, UK, 2006.

Web links and Video Lectures (e-Resources):

- NPTEL course on Textile effluent and its measurement: https://nptel.ac.in/courses/
- NPTEL course on Textile finishing, Textile wet processing, Textile printing and natural dye:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Collection of textile processing effluents data’s from literature and comparing with the various standards
- Collecting textile processing effluentsdata’s from nearby industries (case study) and studying the same
- Seminars, quizzes, group discussions, seminars and report writing on eco parameters concepts.
- Finding out various textile processing effluents parameters of fibre, yarn and fabrics.
- Practical exposure to various eco-friendly dyes and chemicals used for textile processing.

FIBRE TECHNOLOGY			
Course Code	**21TX51**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

This course aims at updating the knowledge of students in the following fields of fibre technology:

1.Different types of Natural Fibres, production, grading etc

2.Fundamental aspects of manufactured fibres and production of commodity fibers like regenerated fibres, PET, Nylon, PP and PAN,

3.Studies on various high performance fibers

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills. Seminars and Quizzes may be arranged for students in respective subjects to develop skills. Encourage the students for group learning to improve the ircreativity and analytical skills. Support and guide the students for self-study. Encourage students to observe working of various textile machineries to understand mechanisms Actual production of natural fibres can be demonstrated to students by taking them to agricultural fields. Arrange industrial visits to manufactured fibre industries

Module-1

Introduction to textile fibres and essential requirements of textile fibres. Classification of textile fibres. Cotton fibres – Origin, History, Cultivation, Grading of cotton fibre, Bast fibres Introduction, Types of bast fibres, Method of extraction of bast fibres, and banana fibres. Flow chart for the conversion of fibres to yarn and fabric. Position of India with respect to world in fibre production.

Teaching-Learning Process : Chalk & Board, Power Point and Animation films

Module-2

Protein fibres: - Introduction to natural protein fibres. Study of life cycle of Silk worm. Extraction of silk fibre, Different verities of silk yarns and brief introduction to wild silk, and spun silk.

Wool – origin, different types of wool, grading of wool

Introduction to manufactured fibres. Types of manufactured fibres, comparison of manufactured fibres with natural fibres. Concept of manufactured fibres spinning, Spin ability concept of polymeric fluids. Brief out line on melt, dry and wet spinning. Comparison of these spinning methods. Process variables in melt spinning. Instabilities in melt spinning...

Teaching-Learning Process : Chalk & Board, Power Point and Animation films

Module-3

Brief outline on special shaped fibres, micro denier, ultrafine and Nano fibres. Spin finish applications- objectives, formulations and methods of application Regenerated fibres - types of regenerated fibres, Chemistry and production of regular Viscose rayon, Di-acetate, Tri acetate, Cuprammonium and Eco-friendly rayon fibres. Studies on modification of viscose rayon. Studies on regenerated Bamboo fibres.

Teaching-Learning Process: Chalk & Board, Power Point and Animation films

Module-4

PET Raw materials for production of PET. Study of production of PET by DMT & TPA routes - study of side reactions, degradation reactions during PET production. Description of Modification of PET fibres.

Polyamide fibres, Discussion on Production of polyamides, nylon-6 study of semi-continuous & integrated continuous process for Production of nylon-6, Production of nylon-66. Composition of N6-N66 production. Modification of nylon fibers. PAN fibers – introduction, Types, Different methods of Production of PAN polymer & Spinning of PAN fibers. Polypropylene fibres

Teaching-Learning Process: Chalk & Board, Power Point and Animation films

Module-5

Introduction to high performance fibres. Classification of high performance fibres. Study of production and properties of carbon, boron, silicon carbide, alumina & glass fibres. Study of Production of UHMWHDPE by GEL Spinning. LCPS, Types of LCPS. Study of Production of aromatic polyamides viz. Nomex, Kevlar. Concept of liquid crystal, thermo tropic & leo tropic polymers fibres. Production and properties of PBZT and PBZO and aromatic polyester fibres. **Elastomeric fibres-** origin, definition and production details.

Teaching-Learning Process: Chalk & Board, Power Point and Animation films

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Illustrate and recall history and growth of textile fibers, textile industry and explain production and properties of cotton and bast fibers
2. Demonstrate production and properties of natural protein fibers and concepts of manmade fibre spinning
3. Classify and apply knowledge on production of regenerated bio based fibers and ecofriendly process for bio based fiber and summerize about different shapes of fibres.
4. Demonstrate concepts synthetic fibers, their effect on environment and explain about most commonly used synthetic fibres.
5. Summarize and compare production of inorganic high performance fibers, LCPs, polyethylene and their applications in various field of engineering.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

10. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
11. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:Text Books:

1. **Hand book of Textile fibre,** Cook J. Vol.1 & II, Marrow Wat Ford, England.
2. **Textile fibres,** Shenai V.A., Sevak Bombay, 1980.
3. **Manufactured fibre technology,** Gupta V.B, Kothari V.K., Chapman Hall, London, 1997.
4. **Introduction to Textile fibres,** Srinivasa Murthy H.V, T.A.I., Mumbai
5. **Handbook of natural fibres**. Vol. - I R.M.Kozlowski Wood-Head. London- 2012.

References

1. **Manmade fibre science and Technology,** Mark Atlas, Vol.I& II, Wiley, NT 1967.
2. **Fundamentals of fibre formation,** Ziabicki A. Wiley NY 1976.
3. **Formation of synthetic fibres,** Walczalk.K. Gordon & Sci. London 1977.
4. **High speed fibre spinning,** Ziabicki A. Wiley NY., 1985.
5. **Manmade fibres,** Moncrief R.W. John Wiley and sons, N.Y. 1966
6. **High Performance fibres**, J.W.S.Hearle, Wood Head,UK-4005.

Web links and Video Lectures (e-Resources):

1. NPTEL course on Textile fibres
2. NPTEL course on Manufactured Fibre Technology
3. NPTEL course on High Performance and Speciality Fibres

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1.Quizzes, group discussions ,seminars and report writing on various aspects of textile fibres.

2. Practical exposure to various natural and manufactured fibres and demonstrating environmental effect of synthetic fibres.

FABRIC STRUCTURE AND DESIGN

Course Code	**21TX52**	CIE Marks	50
Teaching Hours/Week (L : T : P : S)	3 : 0 : 2 : 1	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03

Course objectives:

The objective of this course are

1. To make the students to learn analysis of fabrics for their various construction particulars, calculation of sample analysis data, manufacturing data and basic designs.
2. Students are able to understand the characteristic features and aesthetic qualities of different fabrics.
3. They are able to understand various basic designs in order to impart aesthetic value to the fabrics.
4. Students are able to understand the raw material requirements and machines required for the production of fabrics.
5. Students understands the end uses of different fabrics and their suitability.

Teaching-Learning Process (General Instructions)

The following are the simple strategies, which a teacher can use to accelerate the attainment of the various course outcomes :

1. Apart from conventional lecturer methods various types of innovative teaching techniques through videos, may be adopted so that the delivered lesson can progress the students in theoretical and applied practical analysing skills.
2. Seminars may be arranged for students to develop this subject skills.
3. To encourage the students for group learning so as to improve their creativity and analytical skills.
4. To support and guide the students for self-study.
5. Encourage students to observe working of various weaving machines in order to understand the construction and manufacturing details for making a fabric with help of design, draft, lifting plan and denting plan.

Module-1

Classification of Plain woven cloths - approximately square, warp faced and weft faced fabrics, examples of cloths with construction particulars and their applications. Elements of woven fabric structure - weaves and weave notations. Yarn crimp, cover factor & fabric weight. Repeat, Drawing-in (Draft), Lifting plan and Denting plan.

Experiments :

- Analysis of Plain weave fabrics.

Teaching-Learning Process : Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models, demonstration of samples.

Module-2

Ornamentation of Plain fabrics. Modification of plain weaves – Rib and Matt weaves. Hair cord structures. Twill weaves and fabrics. Angle of Twill. Twist & twill interactions. Derivatives of twill weaves Diamond and diaper designs. Satin & Sateen weaves & fabrics.

Experiments :

- Analysis of Twill weave fabrics
- Analysis of Satin weave fabrics.
- Analysis of Sateen weave fabrics.

Teaching-Learning Process : Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models, demonstration of samples.

Module-3

Simple fancy weaves and fabrics such as Honeycomb, Brighten Honeycomb, Huck – a - back, Mock leno, Crepe & corkscrew weaves. Distorted thread effects. Bed ford cord weaves and fabrics.

Experiments :

- Analysis of Huck back weave fabrics.
- Analysis of Honey comb weave fabrics.
- Analysis of Mock leno weave and other towelling fabrics.

Teaching-Learning Process : Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models, demonstration of samples.

Module-4

Colour & Weave effects. Classification of colour and weave effects, Examples of simple Colour & Weave combinations. Colour & Weave combinations to construct longitudinal stripes, Cross stripes, Check effects etc. Various bases of textile design for figured arrangements.

Experiments :

- Creation of stripes effect on paper using suitable colours.
- Creation of checks effect on paper using suitable colours.

Teaching-Learning Process : Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models, demonstration of samples.

Module-5

Light and pigment colour theory. Classification of colours. Attributes of colours. Modifications of colours. Colour harmony and colour contrast. Mixed coloured effects with the aid of fibre mixture yarns, twist yarn mixtures and combined coloured threads in the fabrics. Brief study of history of textile design. Brief study of various historical designs with respect to their main features

Experiments :

- Creation of floral design on paper by using suitable colours
- Creation of animation patterns and other designs on paper by suitable colours.
- Creation of various historical designs with respect to their main features.

Teaching-Learning Process : Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models, demonstration of samples.

Course outcome (Course Skill Set) On completion of this course, the students will be able to :

1: Classify fabrics on the basis of structure of fabrics with examples of various structures, characteristics and their end uses. Explain elements of woven structures graphical representation of design aspects.
2: Analyse and distinguish characteristic features various fabrics and their design features such as plain, rib, twill, satin etc.
3: Analyse and distinguish various fabric designs in order to impart aesthetic value and fancy effects to the fabrics such as huck a back, mock leno, honey comb, crepe etc..
4: Exhibit the possibilities of ornamentation of fabrics by colour and weave combinations .
5: Illustrate basics of colour, colour combination and their effects on appearance of fabrics.

Assessment Details (both CIE and SEE)(IPCC)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

CIE for the theory component of IPCC

Two Tests each of **20 Marks (duration 01 hour**)

First test at the end of 5th week of the semester

Second test at the end of the 10th week of the semester

Two assignments each of **10 Marks**

First assignment at the end of 4th week of the semester

Second assignment at the end of 9th week of the semester

Scaled-down marks of two tests and two assignments added will be CIE marks for the theory component of IPCC for **30 marks**.

CIE for the practical component of IPCC

On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The**15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.

The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.

The laboratory test **(duration 02/03 hours)** at the end of the 15th week of the semester /after completion of all the

experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **20 marks**.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks. Marks scorded shall be proportionally scaled down to 50 Marks
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
- The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be proportionally reduced to 50 marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).

The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.

SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks scored out of 100 shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Textbook/s

1. **Woven Cloth Construction** ATC Robinson and Marks **T**extile Institute Pub, Manchester,1973
2. **Watson Design and Colour,** Z. J. Grosicki, Universal Pub Corp , 1988.

Reference Books

1. **Grammar of Textile Design,** H. Nisbet, D. B. Taraporewala and sons, 1985
2. **Design of Woven Fabrics,** Blinov, Shibabaw Balay, MIR Pub, 1989
3. **Modern Textile Design and Production,** R. H. Wright, National Trade Press, 1970
4. History of Textile Design**- V. A. Shenai,** Sevak Pub Ltd, 1974.

Web links and Video Lectures (e-Resources):

- https://www.slideshare.net/sakthidamodaran/fabric-structureanddesign-by-n-gokarneshan
- https://www.slideshare.net/txrockers/fabric-structureanddesign-15667875
- https://medium.com/@zahir110199
- https://textilestudycenter.com/tag/textilestudycenter-com/
- https://www.youtube.com/watch?v=RMXgNrSRVfM
- https://www.youtube.com/watch?v=jChb0jxGf_A
- https://www.youtube.com/watch?v=cQlEtSxur78

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- **https://www.slideshare.net/txrockers/fabric-structureanddesign-15667875**
- Seminars, Group discussion, Quiz, analysing and drawing of design, draft, lifting plan and denting plan of various fabrics.
- Practical exposure to various design features, aesthetic values, manufacturing requirements of fabrics with various basic designs and to understand the use of colours and colour combinations in the production of fabric designs.

INTELLIGENT TEXTILE & CLOTHING			
Course Code	**21TX53**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2-2-0-1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Objectives:

- This subject helps the student to acquire knowledge of Intelligent textiles
- This subject prepares the student work on Intelligent textiles and clothing
- Students are exposed to research field in Intelligent textiles and clothing Manufacturing

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching methods may be adopted to develop the outcomes.
2. Use PowerPoint/Videos/Animations to explain various concepts.
3. Encourage group discussion in the classes.
4. Ask some creative and higher-order thinking questions in classes which helps critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it
6. Support and guide the students for self-study.

Module-1

General introduction: Definition and Concepts of Intelligent Textiles Need of Intelligent Textiles, Application of Intelligent Textiles in various fields and classification Multipurpose textile based sensors: Introduction, Conductive polymer textile sensors, Conductive polymer composites (CPCs) textile sensors

Teaching-Learning Process: Chalk and talk, Power point presentation

Module-2

Modelling of intelligent materials: Background, underpinnings of interdisciplinary, scientific practices and research strategies for intelligent garments
Chromic and conductive materials: Photo chromic materials, Thermo chromic materials, Colour changing, Electro chromic materials

Teaching-Learning Process: Chalk and talk, Power point presentation

Module-3

Phase change materials: Heat balance and thermo-physiological comfort, Phase change technology, PCM in textiles, Future prospects of PCM in textiles and clothing Intelligent textiles with PCMs: Basic information of phase change materials, Phase change properties of linear alkyl hydrocarbons, Textiles containing PCM, Measurement of thermo regulating properties of fabrics with micro PCMs

Teaching-Learning Process: Chalk and talk, Power point presentation

Module-4

Temperature sensitive shape memory polymers : A concept of smart materials, Shape memory polymer and smart materials, Some examples of shape memory polymer for textile applications, Potential use of shape memory polymer in intelligent textile, General field of application, Challenges and opportunities

Teaching-Learning Process: Chalk and talk, Power point presentation,

Module-5

Applications- Intelligent textiles for medical and monitoring applications Context aware textiles for wearable health assistants Intelligent garments in pre hospital emergency care, Intelligent textiles for children Wearable biofeedback systems Applications for woven electrical fabrics

Teaching-Learning Process: Chalk and talk, Power point presentation

Course Outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Explain the fundamental concept of Intelligent textile and Multipurpose textile based sensors
2. Summarize the Modelling of intelligent materials and Chromic and conductive materials
3. Analyse the Phase change materials and Intelligent textiles with PCMs
4. Illustrate the Temperature sensitive shape memory polymers
5. Apply the Applications of Intelligent textiles in various fields

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100, shall be proportionally reduced to 50 marks

Suggested Learning Resources: Books

- Intelligent Textile & Clothing by H R Mattila, 1st Edition - July 28, 2006 WoodHead Publishing Limited, Cambridge, England
- Designing with Smart TextilesBook by Sarah Kettley by Bloomsbury
- Smart fibres, fabrics and clothing edited by Xiaoming Tao, Wood head publishing Ltd., Englang
- Clothing bisensory Engineering edited by Y. L. and A. S. W Wang, Wood head publishing ltd. England.
- Analytical electro chemistry in textiles P. Westbrock, G. Priniotakis and P.Kienkens, wood head publishing Ltd, England

Web links and Video Lectures (e-Resources):
• https://www.textileinstitute.org/product/intelligent-textiles-and-clothing/ • https://www.researchgate.net/publication/295573724_Intelligent_Textiles_and_Clothing • https://www.sciencedirect.com/topics/engineering/intelligent-textile • https://www.technicaltextile.net/articles/intelligent-textiles-2506
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning • Quiz/Group discussion. • Practical demonstration of preparatory process and dyeing of all five modules content. • YouTube videos.

TEXTILE TESTING-I			
Course Code	21TX54	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

The objective of this Course is to make students to

- Explain the importance of textile testing and quality control in textile industry.
- Demonstrate and demonstrate different methods, standards, principles and working of instruments used for testing of fibres and yarns.
- Evaluate various properties and characteristics of fibres and yarns, calculate and analyse the test results. Compare and draw suitable conclusions
- Evaluate and analyse effects of various parameters affecting test results
- Demonstrate various settings and calibration of testing equipment
  Explain the use of modern technology in the measurement of properties of fibres and yarns.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods various types of innovative teaching techniques through videos, working models, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Hands on training may be arranged for students to learn practical aspects.
3. Encourage the students to learn machinery operations various settings and maintenance.
4. Support and guide the students for self-study.

Module-1

Introduction to textile testing & quality control. Sampling methods and techniques for fibres, yarns and fabrics. Atmospheric conditions and its measurement. Moisture relations of textile materials. Conditioning of Testing lab and textile materials. Moisture regain and its measurement by various techniques.

Teaching-Learning Process

Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models

Module-2

Fiber dimensions-Fibre length and fineness, importance of these properties, measurement by various methods, principle and instruments. Maturity of cotton fibres and its determination. Neps- causes & effects of nep generation. Nep counting.

Teaching-Learning Process

Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models

Module-3

Fibre strength - Technological importance & determination by various conventional methods. Fibre Quality Index (FQI), its importance & calculations. Study of High Volume Instrument (HVI), modules and fibre quality testing parameters. Application of HVI results in spinning mills.

Teaching-Learning Process

Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models

Module-4

Advanced Fibre Information System (AFIS) - working principle, features. AFIS test data analysis. Study of various systems of yarn count & its measurements by various methods & instruments.

Teaching-Learning Process
Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models

Module-5

Yarn twist & its effects on yarn & fabric properties. Importance of twist multiplier. Principles & measurements of single yarn and double yarn twist. Yarn strength & its importance. Methods and principles of yarn strength testing. Instruments and measurement of yarn strength. Yarn friction and its measurement.

Teaching-Learning Process
Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models

Course outcome (Course Skill Set)
At the end of the course the student will be able to :

1. Explain the importance and necessity of determination of properties and characteristics of textile fibres and yarns
2. Use of suitable equipment for the measurement of properties of fibres and yarns using appropriate method, standard and techniques
3. Demonstrate the principle and working of testing instruments
4. Explain the test parameters and their effects on quality parameters of textile materials
5. Analyse the causes for poor quality of fibres and yarns and their effects on quality of end products

Assessment Details (both CIE and SEE) (PCC/PEC/OEC)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

7. First test at the end of 5th week of the semester
8. Second test at the end of the 10th week of the semester
9. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

10. First assignment at the end of 4th week of the semester
11. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

12. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

15. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
16. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:

Textbook/s

1	**Physical testing of textiles**	B.P. Soville	Wood Head	1999
2	**Principles of Textile Testing**	Booth J. E	Butterworth, Wendon III	
3	**Handbook of Textile Testing**	Grover and	Wiley Eastern Pvt. Ltd.,	1969
4	**Physical Properties of textile**	Morton and	The Textile Institute,	
5	**Textile Testing**	Skinkle –T. B	Tarapurwal sons and co.	
6	**Characteristics of raw cotton**		- Textile Institute.	

Reference Books

7	**B.I.S. Handbook**		BIS publications	1985
8	**B.S. Handbook**		BS publications	1985
9	**Textile Testing**	James Lomak, Longmans	Green and Co. London	
10	**ASTM standard**		ASTM publication	1985
11	**Cotton assessment and appreciation**		SITRA, Coimbatore	

Web links and Video Lectures (e-Resources):

NPTEL lecture series, U Tube simulation videos

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

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24.09.2022

TEXTILE TESTING LAB -I			
Course Code	21TXL55	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	03

Course objectives:

The students are to learn the testing of various fibres and yarns for their various quality parameters. To learn operating instruments, settings, calibration, tabulation of test data, calculations, analysis of teat results and draw conclusions.

	Experiments
	Fibre Tests:
1	Identification of textile fibres by using microscope.
2	Identification of textile fibres by burning and chemical tests
3	Determination of cotton fibre maturity by Causticaire method.
4	Determination of fibre length parameters by Baer sorter
5	Determination of fibre fineness by Air-flow method.
6	Determination of moisture content and regain of textile materials.
7	**Yarn Tests:** Determination of yarn count
8	Determination of single and ply yarn twist.
9	Determination of lea strength and CSP.
10	Determination of single yarn strength, elongation and RKM calculations.
11	Determination of tensile strength of sewing threads.
12	Determination of yarn count, no. of twists, yarn ply and sewability of sewing threads.
	Demonstration Experiments (For CIE)
1	Determination of fibre strength using Stelometer.
2	Determination of cotton fibre length parameters by HVI
3	Blend analysis by chemical methods.

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

1. Analyze dimensions of fibres and identify the fibres
2. Test and analyze moisture and maturity of fibers
3. Determine linear density and twist of yarns
4. Analyze and compare of mechanical properties of fibres
5. Asses and compare mechanical properties of yarns

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination(SEE).

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the

beginning of the practical session.

- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

Rubrics suggested in Annexure-II of Regulation book

Suggested Learning Resources:

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A E C

TEXTURED YARN TECHNOLOGY			
Course Code	**21TX583**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	1

Course objectives:

To enhance the ability of students in post spinning operations of manufactured fibres, especially in texturization.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Quizzes, group discussions ,seminars and report writing on concepts of texturing
2. Teaching can be enhanced by creating awareness on subject using NPTEL course

Module-1

Introduction and history of texturing, general principles involved in manufacture of textured yarns, Broad classification of texturing process and textured yarns.

Teaching-Learning Process : Chalk & Talk, Power point presentation

Module-2

False twist texturing- Principals, mechanism, process and material parameters, characterization and optimization

Teaching-Learning Process : Chalk & Talk, Power point presentation

Module-3

Draw texturing, sequential and simultaneous draw texturing, process parameters and their effects, Friction draw texturing, friction texturing NCV drives, Positorque system.

Teaching-Learning Process : Chalk & Talk, Power point presentation

Module-4

Air texturing, principle, mechanism, texturing jets, process parameters and characterization

Teaching-Learning Process : Chalk & Talk, Power point presentation

Module-5

Interlacement-need and principals, bulked continuous filament yarns (BCF), High bulk yarns, Texturing of spun yarns, solvent texturing. Introduction to edge crimping, Stuffer box crimping, Knit-de-knit texturing gear crimping, turbo-du-twist texturing, bi-component and bi- constituent yarns

Teaching-Learning Process: Chalk & Talk, Power point presentation

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Demonstrate the concept of texturing
2. Summarize false twist texturing and determine characteristics of FTT
3. Illustrate draw and friction texturing methods
4. Summarize air texturing principles and process
5. Explain various minor texturing techniques

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Assessment Details (both CIE and SEE) (AEC)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous internal Examination (CIE)

Three Tests (preferably in MCQ pattern with 20 questions) each of **20 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Quiz/Group discussion/Seminar, any two of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

The sum of total marks of three tests, two assignments, and quiz /seminar/ group discussion will be out of 100 marks and shall be **scaled down to 50 marks**

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure minimum of 35% of the maximum marks meant for SEE

Suggested Learning Resources:

Books

1. Yarn Texturing Technology. D.K. Wilson, J.W.S. Hearle and L. Hillock
2. False Twist textured Yarns- Principle, Process and applications- C. Atkinson

Web links and Video Lectures (e-Resources): NPTEL course on Textured Yarn Technology

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Quizzes, group discussions, seminars and report writing on various techniques involved in texturing.

24.09.2022

FIBRE REINFORCED COMPOSITES			
Course Code	**21TX584**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	1

Course objectives:

This Course aims at updating knowledge of students in following fields of FRCS.

1. Basic concepts of FRCS, comparison metals and FRCS, various term used in FRCS
2. Different raw materials used for composites, detailed technology of manufacturing FRCS and applications of FRCS.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Quizzes, group discussions ,seminars and report writing on fibre reinforced composites
2. Teaching can be enhanced by creating awareness on real examples of composite applications

Module-1

Introduction to composites. Basic nomenclatures – reinforcing phase, continuous phase, matrix, interface etc. Classification of composites with respect to fibre used, matrix used, limitations of engineering metals.

Teaching-Learning Process: Chalk & Talk, Power point presentation

Module-2

Study of mechanical & thermal properties various fibres Viz. Carbon, glass, silicon carbide, boron, Kevlar, polyethylene, thiozole etc. used in the production of fibre-reinforced composites. Study of bio composites, advantages of bio composites. 3D fabrics for composites

Teaching-Learning Process: Chalk & Talk, Power point presentation

Module-3

Classification of resins, thermoset, thermoplastic metal matrix and their production properties, advantages, disadvantages (phenolic, epoxy, polyester, vinyl esters) Meaning of inter phase, types of bond set inter phase, meaning of lamina, laminates, and representation of laminates

Teaching-Learning Process: Chalk & Talk, Power point presentation

Module-4

Composites manufacturing techniques-Introduction- Pre-peg technology, Hand lay-up-spray-up - filament winding. Compression moulding, injection moulding, poltrusion techniques.

Teaching-Learning Process: Chalk & Talk, Power point presentation

Module-5

Study of various applications of composites mainly in the field like Aeroplane, aerospace, medical, sports, ship building, automobiles and industries and medical fields.

Teaching-Learning Process: Chalk & Talk, Power point presentation

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Classify composites and compare metal with composites
2. Demonstrate properties of fibres used for composites and harmful effects of conventional composites
3. Summarize resins used for production of composites
4. Illustrate methods of manufacturing of fibre reinforced composites
5. Summarize the applications of fibre reinforced composites

Assessment Details (both CIE and SEE) (AEC)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous internal Examination (CIE)

Three Tests (preferably in MCQ pattern with 20 questions) each of **20 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Quiz/Group discussion/Seminar, any two of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

The sum of total marks of three tests, two assignments, and quiz /seminar/ group discussion will be out of 100 marks and shall be **scaled down to 50 marks**

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure minimum of 35% of the maximum marks meant for SEE

Suggested Learning Resources: Text Books:

1. **Fibre Reinforced Material Technology-**N.J.Parratt Van Nostrand Reinhold Co, Inc 1972
2. **High Performance Fibre Composites-** J.H.Morely, Academic Press
3. **Composite materials**:- Krishan K. Chawla, Springer 2005
4. **High Performance Fibres:-** J.W.S. Hearle, Woodhead UK 2005
5. **Composites Engineering Hand Book** - Ed. Mallik P.K., Marcell Dekker, N.Y., 1997.

Web links and Video Lectures (e-Resources):

1. NPTEL course on Technical Textiles
2. NPTEL course on Introduction to Polymers and Polymer Composites

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Quizzes, group discussions, seminars and report writing on various concepts of FRCs.
2. Demonstration of production of composites.

TEXTILE CALCULATIONS			
Course Code	21TX61	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

1. To make students to understand basic concepts of mathematics involved in textile technology.
2. This subject deals with major mathematical operations involved in textile technology.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
3. Encourage the students for group learning to improve their creativity and analytical skills.
4. Support and guide the students for self-study.
5. Encourage students to observe working of various textile machineries to understand mechanisms

Module-1

Conversion of units from one basic system to other basic system, Area and volume of regular and irregular shapes, Ratios, proportions, proportional division percentages – machine efficiency, running efficiency, overall efficiency, Application of elemental trigonometry for understanding yarn packages. Plotting of graphs w.r.t textile operations, law of graphs and integration of gradient of graph. Application of vectors in understanding parallelogram, triangle of force. Nomo grams.

Teaching-Learning Process: Chalk & Talk, Power point presentation

Module-2

Fibers: Calculation of length parameters from sorter diagram, weight distribution technique for length measurement. Relation between fineness and linear density. Calculation of linear density from diameter of fibre and use of proportionality in fineness calculation. Calculation of tenacity, elastic recovery, work of rapture, initial modulus, moisture regain, moisture content and moisture swelling of fibres Definition and calculation of denier and Tex of the filament using melt spinning variables, definition of trash and lint content in raw cotton.

Teaching-Learning Process: Chalk & Talk, Power point presentation

Module-3

Basic kinematics, The equations of motion, motion in a circle, Frictional drives, Chain and sprocket drives, driving by gears, planetary mechanisms, Draft calculation in yarn production, different types of drafts, Winding calculation in speed frame, ring frames. Production calculations in yarn spinning, determination of twist in roving, ring spinning, and OE spinning yarn.

Teaching-Learning Process: Chalk & Talk, Power point presentation

Module-4

Yarn numbering, conversion of count from one system to other system, resultant count, number of fibres in yarn cross section, yarn diameter, calculation related to CV of double yarn, calculation of average count. Calculation of index of irregularity, U%, Limit irregularity etc., Calculations related to cone and cheese winding. Winding rate wind and traverse ratio; yarn tension calculations yarn clearer settings warp and warping calculations, calculation related to size percentage, size pickup, sizing machines speed, Efficiency calculation related to warp and weft. Weft consumption on a loom, pirn shape, cheese length, cheese angle, wind of pirn.

Teaching-Learning Process: Chalk & Talk, Power point presentation

Module-5

Calculation on weaving machine, (both shuttle and shuttle less) Time required to weave a known length of fabric, warp length, required per loom, reed count, reed width, production calculation on different types of loom, fabric areal density calculations, fabric cover. Calculations w.r.t primary and secondary variation on loom, Loom efficiency, loom production.

Teaching-Learning Process: Chalk & Talk, Power point presentation

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Define and apply basic concepts of mathematics involved in textiles
2. Solve numerical related fibre properties and interpret fibre geometrical parameters
3. Interpret and explain mechanics and calculations involved in yarn spinning/ weaving
4. Determine various parameters related to yarn and weaving preparatory
5. Analyse mathematical concepts related to weaving and woven cloths

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Text Books:

1. Textile Mathematics Volume 1,2,3 by J.E. Booth

2. Textile Mechanics by Textile Institute Volume 1 & 2

3. **Weaving calculations by Sengupta**.

4. Mechanics and calculations of textile machinery N.Gokarneshan, Wood Head –New Delhi-2015

References:

1. Basic Textile Mathematics by A.K. Khare

2. **Hand book of Cotton Spinning,** William Taggart., and Universal Publ. Corp. 1979.

3. **Essential Facts of Practical Cotton Spinning**, Pattabhiraman. T.K., Soumya Pub., Bombay 1979.

Web links and Video Lectures (e-Resources):

1. NPTEL course on Evaluation of textile materials-Module- 4,5,6,9,10,11
2. NPTEL course on Mechanics of Textile Machineries.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Students

1.Observing machineries in spinning and weaving laboratory and calculating various parameters

2. Finding out various parameters of fibre , yarn and fabrics in textile testing laboratory Seminars,

3.Quizzes, group discussions ,seminars and report writing on various mathematical concepts of textiles

FASHION DESIGN AND GARMENT TECHNOLOGY.			
Course Code.	**21TX62**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	**3:0:2:1.**	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits 4	04	Exam Hours	03

Course objectives:

- This subjects deals with various aspects of Fashion Concepts, Fashion theories and design elements consumer expectation about textiles.
- Sourcing, issues, fabric inspection, procedures, spreading and cutting, different types of sewing machines, seams and stitches, pattern making & garment making process.
- Production and planning, costing, industrial engineering, Garment inspection, SMV calculations.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
3. Encourage the students for group learning to improve their creativity and analytical skills.
4. Arrange visits to nearby garment industries to learn garment processes.
5. Encourage the students to learn pattern preparation, sewing machine operations, and accessories and garment finishing operations.

Module-1

Consumer expectation of textiles. Consumer knowledge about textiles. Fashion Terminologies, elements of design, fashion theories, Factors influence fashion, Fashion cycle, Principles of design. Selection of fabrics for different end uses. Measurement Techniques.

Practical component.

 # Body measurement techniques, Sewing machines, types, components, construction of different types of stitches and seams,

Teaching-Learning Process: Chalk &talk power point presentation, videos, and animations.

Module-2

Sourcing, Global sourcing, Role of sourcing discussion in Apparel firms. Material sourcing process. Fabricinspectionmethods.Principle&practicesofpatternmaking.Grading, Computer aided pattern making spreading, cutting, Numbering & bundling.

Practical component.

 # Study of various buttons, zippers, labels and decorative materials for their characteristics and applications

Teaching-Learning Process: Chalk &talk power point presentation, videos, and animations.

Module-3

Study of different types of stitches & seams. Seams appearance & performance, study of sewing threads. Thread consumption calculation, sewing needles, Fundamentals of swing M/c, different types of sewing M/c.Workaids, puckering, reasons and remedies. Seam strength, seam efficiency, seam slippage - importance and measurement. Sewability, formability. Needle cutting.

Practical component.

Study and Practice of computer aided marker preparation for Men's, Women's and Children's Wear and pattern making of Bermuda, men's shirt salwar Kameez ,kids wear etc and stitching

Teaching-Learning Process: Chalk &talk power point presentation, videos, and animations.

Module-4

Pressing and Fusing processes - Equipment, methods, support materials. Lining, Interlinings, Closures ,Zippers, Buttons, trims, snaps, Hooks, loop tape, Elastics, embroidery etc Apparel production systems. Garment Quality control, Inspection of garments under different AQL standards.

Practical component.

 # Testing of sewing threads: strength, elongation, twist seam strength, seam slippage,

Teaching-Learning Process: Chalk &talk power point presentation, videos, and animations.

Module-5

Concept of production planning, productivity, resource management, Ergonomics, Brief study of garment finishing and denim washing Apparel Engineering, basic concepts, workflow and work study techniques, SMV Calculation. Costing-Procedures, systems of costing, stages of costing, pricing strategies.

Practical component.

 # Inspecting garments using spec sheets, measuring tapes, interlining quality testing packing and identifying faults.

Teaching-Learning Process: Chalk &talk power point presentation, videos, and animations.

Course outcome (Course Skill Set)

1. Develop the Knowledge on fashion, consumer expectation of Textiles, fashion cycle, theories, and factors influences, measurement techniques and fabric selection for different end uses.
2. Develop the knowledge on global sourcing issues, fabric inspection, grading techniques and pattern making techniques
3. Illustrate the different types of stitches, seams and sewing machines and importance of seam strength, seam slippage, sew ability, tailor ability and formability.
4. Analyzing the importance of fusing, pressing, support materials and trims and garment inspection using AQL standards.
5. Summarize the different apparel productions techniques, quality control, and different types of garment finishing SMV calculations and costing of garments.

Assessment Details (both CIE and SEE)(IPCC)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

CIE for the theory component of IPCC

Two Tests each of **20 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Scaled-down marks of two tests and two assignments added will be CIE marks for the theory component of IPCC for **30 marks**.

CIE for the practical component of IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The**15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.

- The laboratory test **(duration 02/03 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks**.**

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **20 marks**.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours)

17. The question paper will have ten questions. Each question is set for 20 marks. Marks scorded shall be proportionally scaled down to 50 Marks
18. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
19. The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be proportionally reduced to 50 marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).

- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.

SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks scored out of 100 shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

Text Books:

1. **The Technology Of Clothing Manufacture**- Carr H. & Latham B., 1988, Blackwell Scientific Publication, Oxford England
2. **Metric Pattern Cutting**- Aldrich W 1992, blackwell Scientific Publication, Oxford England
3. **Apparel Manufacturing**- Ruth E. Glock, Grace I. Kunz PE Publication, UK, 2005.

REFERENCES::

1. **Pattern Cutting for Women's Outwear**- Gerry Cooklin, 1994, Blackwell Scientific Publications, Oxford England.
2. **The NIFT Book of Grading and sizing**- Vol I and II, Published by NIFT, New Delhi
3. **Fashion Source Book**- by Kathryn Mikelvey, 1996, Blackwell Scientific Publication, Oxford England .**Fusing Technology**- Cooklin G, 1990, The Textile Institute, Manchester

Web links and Video Lectures (e-Resources):

- NPTEL video on Science of clothing comfort.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Students

1. Quizzes, group discussions, seminars and report writing on various aspects of apparel production.
2. Practical exposure to various types of seams, stiches, development of various pattern sand attachments of trims to garments.

TEXTILE TESTING-II			
Course Code	21TX63	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

The objective of this Course is to make students to

- Explain the importance of yarn and fabric testing and quality control in textile industry.
- Demonstrate different methods, standards, principles and working of instruments used for testing of evenness of yarns and various fabric properties.
- Evaluate evenness of yarns and fabric properties, calculate and analyse the test results. Compare and draw suitable conclusions
- Evaluate and analyse the effects of various parameters affecting test results
- Demonstrate various settings and calibration of testing equipment
- Explain the use of modern technology in the measurement of yarn evenness and properties of fabrics.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods various types of innovative teaching techniques through videos, working models, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Hands on training may be arranged for students to learn practical aspects.
3. Encourage the students to learn machinery operations various settings and maintenance.
4. Support and guide the students for self-study.

Module-1

Evenness of various textile strands such as sliver, roving & yarns – random variation, periodic variation, Index of irregularity, Variance-length curves and their importance, Methods of measurement of evenness, principles of various evenness testers & measurement of evenness. Mass variation diagram & spectrogram & its importance. Causes & effects of irregularity in textile strands. Yarn hairiness and its measurements.

Teaching-Learning Process

Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models

Module-2

Determination of fabric length, width, thickness, weight, thread density and crimp. Determination of air permeability, water vapour permeability, thermal conductivity and thermal comforts. Flammability of fabrics-Definitions, parameters and measurement. Fabric shrinkage- importance and measurement.

Teaching-Learning Process

Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models

Module-3

Determination of fabric tensile, tearing and bursting strength. Determination of stiffness, crease, drape of fabrics. Fabric hand and its importance, determination and interpretation of fabric hand test results. Measurement of fabric hand by KES and FAST system and its application in apparel production

Teaching-Learning Process

Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models

Module-4

Water & fabric relationship. Study of water penetration, wetting of apparels, water repellence of industrial fabrics. Penetration of fabrics by water under pressure. Serviceability, wear, abrasion resistance and Pilling resistance.

Teaching-Learning Process
Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models

Module-5

Apparel testing and quality control - Fabric inspection, estimation of colour fastness of fabrics. Sewability formability, tailor ability of fabrics. Seams, stitches and determination of seam strength and seam slippage and seam efficiency. Quality control in apparel industry and quality management tools

Teaching-Learning Process
Chalk & Talk, Power point presentation, PDF notes, Video demonstration, live models

Course outcome (Course Skill Set)
At the end of the course the student will be able to :

1. Explain the importance and necessity of determination of evenness of yarns and properties of fabrics
2. Use of suitable equipment for the measurement of yarn evenness and properties of fabrics using appropriate method, standard and techniques. Demonstrate the principle and working of testing instruments
3. Show the calculations, tabulation of test results, and analysis of test data and interpretation of test results.
4. Explain the test parameters and their effects on quality parameters of textile materials
5. Analyse the causes for poor quality of yarns and their effects on end products and the effect of them on performance of fabrics.
6. Evaluate and demonstrate the determination of apparel quality and the parameters involved

Assessment Details (both CIE and SEE)
The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:
Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5^{th} week of the semester
2. Second test at the end of the 10^{th} week of the semester
3. Third test at the end of the 15^{th} week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4^{th} week of the semester
5. Second assignment at the end of 9^{th} week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13^{th} week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:
Theory SEE will be conducted by University as per the scheduled timetable, with common question

papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbook/s				
1	**Principles of Textile Testing**	Booth J. E		
2	**Physical Textile testing of Textiles**	B.P.Soville	Wood Head	1999
3	**Handbook of Textile**	Grover and	Wiley Eastern Pvt Ltd,	1969
4	**Physical properties of Textile Fibre**	Morton and Hearle,	The Textile Institute, London	
5	**Textile Testing**	Skinkle	T.B. Tarapurwala Sons	
6	**BIS Handbook**		BIS PUBLICATION	1985
Reference Books				
1	**B.S. Handbook**	British standards	BS publications	1985
2	**Textile Testing**	James Lomak,	Green and Co. London	
3	**ASTM standard**	ASTM	ASTM publication	1985

Web links and Video Lectures (e-Resources):

NPTEL lecture series, U Tube simulation videos

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

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TEXTILE TESTING LAB -II			
Course Code	21TXL66	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	03

Course objectives:

1. Estimate and analyse yarn evenness
2. Analyze geometry of fabrics. Inspect performance properties of fabrics
3. Test and analyze of low stress mechanical properties of fabrics
4. Evaluate fabrics for comfort properties
5. Estimate the refurbishing properties of fabrics

Sl. NO	Experiments
1	Determination of yarn evenness by visual examination.
2	Determination of geometrical properties of fabrics.
3	Determination of Air Permeability of fabrics
4	Determination of crease recovery property of fabrics.
5	Determination of drape co-efficient of fabrics.
6	Determination of fabric stiffness and its parameters
7	Determination of fabric strength and elongation.
8	Determination of fabric tearing strength.
9	Determination of fabric bursting strength.
10	Determination of abrasion resistance of fabrics.
11	Determination of colour fastness of dyed and printed fabrics for washing
12	Determination of colour fastness of dyed and printed fabrics for perspiration.
13	Determination of Fastness Properties of printed and dyed fabric for rubbing.
	Demonstration Experiments (For CIE)
1	Determination of dimensional stability of fabrics
2	Determination of pilling properties of fabrics.
3	Determination of fastness properties of dyed fabric for artificial light and sun light.

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

1. Evaluate yarn evenness and its effects on fabric quality
2. Analyze the geometry of fabrics and relate them to the fabric properties
3. Inspect performance properties of fabrics and show the parameters influencing
4. Test and analyze of low stress mechanical properties of fabrics and its effects on comfort properties and its application in apparel production
5. Estimate the quality of apparels and the parameters involved

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination(SEE).

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- Weight age to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weight age of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

Rubrics suggested in Annexure-II of Regulation book

Suggested Learning Resources:

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Professional Elective Course-I

HUMAN RESOURCE MANAGEMENT			
Course Code	**21TX641**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

- To understand the HRM concepts and theory.
- To obtain an overview of various HRM functions and practices.
- To gain an insight into the various statutory provisions

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. State the importance of Human Resource through related videos
2. Seminars & Quizzes may be arranged in respective topics to develop skills
3. Inspire the students by giving examples of present day Human resource management in various Textile activities.
4. Support and guide the students for Self study.

Module-1

Human Resource Management: Introduction, meaning, nature, scope and objectives of HRM, Difference between Personnel management and HRM - Importance and Evolution of the concept of HRM – Major functions of HRM - Principles of HRM and impact on Textile Industry.

Teaching-Learning Process

Chalk and talk, power point presentation, videos

Module-2

Environment and Strategies of HRM: Introduction, Strategic management process, Organizational and human resource strategies. Job design, Job analysis, Job description, job specifications and job Evaluation. Uses of job analysis. Human Resource Planning: Introduction, process and levels of HRP.

Teaching-Learning Process

Chalk and talk, power point presentation, videos

Module-3

Recruitment**:** Definition, Constraints and Challenges, Sources and Methods of Recruitment. Selection**:** Definition and Process of Selection. Placement, Induction. Significance, Need, Objectives, Scope and Concept of Human Resource Development

Teaching-Learning Process

Chalk and talk, power point presentation, videos

Module-4

Training: Definition, Stages of training personnel for higher performance and productivity. Different types of Evaluation, basis of promotion, demotion, transfers. Performance Appraisal**:** Meaning, need of Performance Appraisal, Concept of Performance Appraisal, the Performance evaluation, Methods of Performance Appraisal.

Teaching-Learning Process

Chalk and talk, power point presentation, videos

Module-5

Employee Grievances: Employee Grievance procedure, Grievances Management in Indian Industry. Discipline**:** Meaning, approaches to discipline, essential of a good disciplinary system. Recent trends in HRM: Employer's brand, Competency mapping, Business process outsourcing (HR issues). Knowledge management meaning and benefits.

Teaching-Learning Process

Chalk and talk, power point presentation, videos

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

1. Summarize and measure the various importance of human resources and their effective management in organizations.
2. Discuss the various key aspects of forecasting the human resources needs of an organization
3. Analyze the role of recruitment and selection in relation to the organization's business and human resource management.
4. Adapt the organizational and individual benefits of training and development.
5. Apply and discuss the appropriate practices involved in the grievance and discipline process.

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course. Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be proportionally reduced to 50 marks

Suggested Learning Resources:Books

1.Human Resource Management and Industrial Relations, Dr. P.Subba Rao Himalaya Publishing House, Mumbai, 2009
2. Personal Management, Edvin B. Flippe
3. Human Resources Management, Rao V. S. P, Excel BOOKS, 2010
4. Personal Management, Subratha Ghosh
5. Human Resource Management, Dr. T.P Renuka Murthy, HPH
6. Management of personnel in India, N.N Chatterjee.

Web links and Video Lectures (e-Resources):

- . https://youtu.be/C6q-ala_EkU

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Encourage the students to have group discussion taking case study of any textile industry.

FINANCIAL MANAGEMENT			
Course Code	**21TX642**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

1.To familiarize the students with basic concepts of financial management.
2.To understand time value of money and cost of capital.
3.To analyze capital structure, capital budgeting and dividend decision.
4.To understand the short term and long term financing and working capital management.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. State the importance of Subject through related videos
2. Seminars & Quizzes may be arranged in respective topics to develop skills
3. Inspire the students by giving present day Financial management in various Textile activities.
4. Have the exposure to on line trading (NSE & BSE)
5. Support and guide the students for Self study.

Module-1

Finance function, goals of finance management, Financial planning, and Major financial decision areas. Sources of Financing**:** Shares, Debentures, Term loans, Lease financing, Hybrid financing, Venture Capital, Angel investing and private equity, Warrants and convertibles (Theory Only) Capital structure: measure of leverage, effects of lever - I, traditional approaches, MM theory of financial leverage and value of the forms. Designing of capital structure- EBIT- EPS analysis, risk-return trade-off.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-2

Investment decisions– Capital budgeting process, Investment evaluation techniques – Net present value, Internal rate of return, Modified internal rate of return, Profitability index, Payback period, discounted payback period, accounting rate of return.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-3

Capital structure: measure of leverage, effects of lever- I, traditional approaches, MM theory of financial leverage and value of the forms. Designing of capital structure- EBIT- EPS analysis, risk-return trade-off. Dividend policy**:** Factors affecting dividend policy relevance of the dividend policy- Walters model, Gordon's model- M.M. theory, and types of dividend policies- Bonus shares - corporate dividend policy in practice.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-4

Market for corporate securities, trading procedures in stock exchange, financial services, leasing, mutual funds, SEBI and market regulation. Working capital management, receivables, inventories and cash management, Merger and take-overs. Objects of costing-elements of costs, types of overheads, Allocation of factory over heads, Methods determination of selling price. Definition and objects of depreciation-break-even analysis.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-5

Definition and Advantages of Cost Accounting. Elements of cost. Introduction, classification, elements and allocation of Material cost. Labour cost and overhead cost. Process cost calculation- introduction, special features of Textile processing and its cost calculation. Introduction to standard costing and Budgetary control. Statutory guidelines on the maintenance of cost records

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1: Understand the basic financial concepts.
2: Apply time value of money.
3: Evaluate the investment decisions.
4: Analyze the capital structure and dividend decisions.
5: Estimate working capital requirements.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:

Books

1. Financial Management, Rajiv Srivastava and Anil Misra, Oxford University Press,2011
2. Financial Management, Shashi K Gupta and R K Sharma, Kalyani Publishers,2014
3. Financial Management- Theory and Practice-8th Edition, Prasanna Chandra, McGraw Hill Education,2011
4. Financial Management, V K Bhalla, S. Chand Publishing,2014
5. Fundamentals of Financial Management – 12th Edition, Brigham & Houston , Cengage Learning, 2012
6. Financial Management: Principles and Applications-10th Edition, Arthur J.Keown, John H.Martin, John W. Petty and David F. Scott, Prentice Hall, 2004

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=vuC6fYPUuDU
- https://www.youtube.com/watch?v=CCQwz_Gwo6o

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

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MANAGEMENT AND ENTREPRENEURSHIP			
Course Code.	**21TX643**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	**3:0:0:1.**	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits 3	03	Exam Hours	03

Course objectives:

The Course aims at updating the knowledge of students in the following fields of management and entrepreneurship

- Basic concepts of management, organisation in Textile and garment Industry
- Basic concept to become entrepreneurs.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, practical skills. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
2. Encourage the students for group learning to improve their creativity and analytical skills.
3. Support and guide the students for self-study.
4. Motivate and encourage the students to develop the entrepreneurial skills.

Module-1

Management: Introduction Meaning - nature and characteristics of management, Management and Administration roles of management, levels of management, Functions of management, Role of management in improving work quality

Planning: Nature importance and purpose of planning, process types of plans, steps in planning, decision making. Steps in decision making. Planning in Textile and Garment industry

Teaching-Learning Process:

Chalk and talk, Power point presentation, NPTEL videos and study materials

Module-2

Organising and staffing: Nature and purpose of organization principles of organization - Types of organisation, Depart mentation, span of control - MBO and MBE, Nature and importance of staffing. Process of selection and recruitment procedure, Concept of team work, smart work and SWOC analysis in Textile industry.

Directing and controlling: Meaning and nature of directing. Leadership types, Motivation theories,

Teaching-Learning Process

. Chalk and talk, Power point presentation, NPTEL videos and study materials

Module-3

Business planning process: Meaning of business plan, Business plan process, advantages of business planning, Marketing plan, production / operations plan, Organization plan, Financial plan and final project report with feasibility study, preparing a model project report for starting a new venter. Business planning in Textile & Garment Industry. Study of MBO, MBE, Importance of decentralization. Lean Manufacturing: History and definition. Objectives, Principles and benefits. Tools, Base for apparel industry 5M, 7waste, Concepts, Kaizan, Kamban, 5S, JIT just in time, PDCA, SQCD. Comparison of lean and 6-sigma.

Teaching-Learning Process

Chalk and talk, Power point presentation, NPTEL videos and study materials

Module-4

Entrepreneurship: In Textile and Garment industry: Meaning of entrepreneur, Evolution of the concept, Functions of an entrepreneur, Types of Entrepreneur, In entrepreneur- an emerging class, Concepts of Entrepreneurship, Evolution of Entrepreneurship, stages in entereprnearuial process,

different source of finance for an entrepreneur- Central and state level financial Institutions. Micro, Small & medium Enterprises (MSME): Definition Characteristics, Objectives, Scope, role of MSME in Economic Development, Advantages of MSME steps to start an MSME, Different schemes : TECKSOK, KIADB, KSSIDC, DIC Single window agency: SISI, NSIC, SIDBI, KSFC. Concept of GST and its importance.

Teaching-Learning Process
Chalk and talk, Power point presentation, NPTEL videos and study materials

Module-5

International Entrepreneurships Opportunities: The nature of international entrepreneurship, importance of international business to the firm, International versus domestic entrepreneurship, Stages of economic development, entrepreneurship entry in to international business, exporting, direct foreign investment, Barriers to international trade

Teaching-Learning Process
Chalk and talk, Power point presentation, NPTEL videos and study materials

Course outcome (Course Skill Set)
At the end of the course the student will be able to:

1. **1.** Define and explain the management and planning in textile and garment industry.
2. **2.** Utilize and analyse the management skills.
3. **3.** Summarize and discuss the business plan process.
4. **4.** Assess and explain the importance of entrepreneurship characters to develop entrepreneurship qualities.
5. **5.** Identify, discuss and adapt the international entrepreneur opportunities.

Assessment Details (both CIE and SEE)
The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:
Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:
Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a

maximum of 3 sub-questions), **should have a mix of topics** under that module.
The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:

Text Books:

1. Principles of management by Tirpathi P.C and P.N.Reddy MCgraw Hill education 2012
2. Entrepreneurship by Poornima Charinthimath Pearson india Ltd. 2005
3. Management by P.N.Reddy
4. Management & Entrepreneurship by Prof: Ramesh Burbure Rohan publishers 2008

REFERENCES::

1. Project management and control by Narendra Singh Himalaya publishing house 2005
2. Work Quality management in textile industry by B. Purushottam Woodhead publishing Ltd.

Web links and Video Lectures (e-Resources):

- **NPTEL video on Innovation, Business Models and Entrepreneurship**

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Students

1. Quizzes, group discussions, seminars and project report writing.

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KNITTING AND NON WOVEN			
Course Code	**21TX644**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3

Course objectives:

- The objective of the course gives the knowledge to the students in Production technology of knitted fabric, structure, machines and their parameters.
- It also helps acquire the knowledge in nonwoven fabric, production, uses and processing parameters

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. **Student can able to work in knitting industry as production engineer, quality controller, industrial engineer, managers etc.**

Module-1

Knitting industry position in India, basic terms and principles used in knitting technology, knitting elements, fundamentals of knitted structure, comparison between warp and weft knitting.
Primary weft knit structures-plain, pearl and interlocks production and their properties.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-2

Types of knitting machines-circular and flat bed machine.
Study of knit, float and tuck stitches- effects and there uses.
Ornamentation of basic weft knit structure.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-3

Double knits, needle selection devices like pattern wheel pattern drum.
Knit fabric geometry, tightness factor, robbing back and needle bounce.
Types of positive feeders and their importance.
Introduction to warp knitting.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-4

Introduction to nonwoven fabric and other fabric forming methods. Classification of nonwoven fabric, fibres used.
Manufacture of nonwoven fabric, needle punched fabric, spun-bonded fabric.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-5

Applications of nonwoven fabric, stitch bonded fabric and their characteristics, testing of nonwoven fabric.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Explain in depth about knitted fabric and their properties, uses.
2. Demonstrate different types of knitting machines.

3. Define and explain the basic elements and structures knitting.
4. Explain in depth about non woven production methods.

Summarize and discuss the Applications of nonwoven fabric

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:

Books

4. Knitting technology- David Spencer.
5. Essentials of knitting- D B Ajagoankar.
6. Nonwovens manufacture – Proof. N N banerjee.
7. Nonwoven manufacture Encyclopedia of Textiles, Textile institute London.

Web links and Video Lectures (e-Resources):

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Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

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Open Elective Course-I

FIBRE TO FABRIC			
Course Code	**21TX651**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

- Complete knowledge of textiles will facilitate the ability to distinguish quality in fabrics.
- Students will know how to buy textile product and what to buy.
- Information can be easily understood and consequently very useful to the students in business and personal life.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes. .

1. Use the related videos of Textile machineries so that student can understand more easily.
2. Show students the different samples of the fabric and ask them to identify the fibres.
3. Inspire the students to have collaborative learning in the class.
4. Support and guide the students for Self-study.

Module-1

FIBRES TO YARNS: Introduction to Fibres. Yarn Formation: Brief introduction of all spinning process including Open end spinning.(No passage of material & calculation).Introduction to count system and calculations .Textured & stretch yarns: comfort, service & appearance.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-2

YARNS TO FABRICS : Introduction to weaving with the mechanisms. Brief study about weaves such as Plain, Twill,satin,etc. Different types of selvedge. Introduction to Knitting & Non woven fabric formation.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-3

Fabric preparation for consumer goods : Finishing processes like preparatory, stabilizing & texturizing with their functional effects .Dyeing and Printing

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-4

Introduction to Natural fibres : Cotton , Linen , Wool & Hair , Silk , Vegetable and mineral fibres

Teaching-Learning Process : Chalk and talk, Power point presentation,

Module-5

Introduction to Manmade Fibres: Rayon , Acetate & Triacetate , Nylon , Aramid , Polyester , Acrylic , Modacrylic , Spandex, Polypropylene.

Teaching-Learning Process : Chalk and talk, Power point presentation,

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:

Books

1. TEXTILES ,Fiber to Fabric ,Bernard P Corbman, McGRAW-HILL publication
2. **Manual of Cotton Spinning** Coulson. A.F.W.(Ed.),Vol. I to IV Textile Institute, Manchester,1958
3. **Series on Textile processing** Zaloski.S ,The Institute of Textile Technology, USA1983
4. **Technology of short-staple spinning,** Klein.W. Vol .I, II, III and IV**,** Textile Institute Pub., Manchester**,**1989

Web links and Video Lectures (e-Resources):

- https://youtu.be/7h4MvoZt60E

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Ask the students to collect different fabrics having different weaves.
- Obtain different samples of fabrics used in cotton clothing. Attach to each a record showing the name of the fabric, kinds of yarns, weave, thread count, and finish .State the uses and relative durability of each sample.

GLOBAL TRADE PRACTICES			
Course Code	**21TX652**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Course objectives:

- To acquaint students understand the basic concepts of global business practices followed in textile and garment industries.
- To impart knowledge of international business scenario, business communication, international trade practices, export documentation and legalities concerned etc.

Teaching-Learning Process: (General Instructions)

These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
3. Encourage the students for group learning to improve their creativity and analytical skills.
4. Support and guide the students for self-study.
5. Encourage students to observe trading of various textiles to understand trading process.
6. Students can be taken to trading industries to demonstrate about trading procedures for various textiles.

Module-1

Introduction: Definition – trade and investment flow – economic theories – forms of international business – Trade procedures and documents – FOREX Policy – Export promotion – Export management –exchange rate determination – Exchange risk – Managing exchange rate.

Teaching-Learning Process

Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-2

International business environment: Globalization of business – economic, political and cultural environment of international business – WTO and trade liberalization – emerging issues – implications for India –regional trade blocks – inter – regional trade among regional groups.

Teaching-Learning Process

Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-3

Global strategic management: Structural design of MNEs – strategic planning – strategic considerations – national Vs global competitiveness.

Control and evaluation of international business: Control of MNEs –approaches to control – the role of information systems –performance measurement – mechanics of measurement– various performance indicators – evaluation and evaluation systems.

Teaching-Learning Process

Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-4

Conflict in international business & negotiations: Factors causing conflict –conflict resolution actions – the role of negotiations in international business – the role of international agencies in conflict resolution. **Communication in business:** Systems approach, forms of business communication, management and communication, factors facilitating communication.

Teaching-Learning Process

Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-5

Communication process: Interpersonal perception, selective attention, feedback, variables, listening barriers to listening, persuasion, attending and conducting interviews, participating in discussions, Debates and conferences, presentation skills, paralinguistic features, oral fluency development.

Business correspondence: Business letter, Memos, minutes, agendas, enquiries, orders, sales letters, notice, tenders, letters of application, letter of complaints.

Teaching-Learning Process

Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Course outcome: (Course Skill Set):

At the end of the course the student will be able to:

1. Acquire the concepts of international trade practices in textile and apparel business activities.
2. Start individual enterprises and carry out international trade practices.
3. Exposed global business scenario, business communication skills etc.
4. Apply the concepts in the actual work environment for maximum benefits.

5.Understand International market for fibre, yarn and woven fabric and Knowledge on marketing strategies and export finance

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

Text books:

1. 'International Business', John. D. Daniels and Lee H. RadebaughPearson EducationAsia, New Delhi, 4000.
2. International Management', Richard M. Hodgetts and Fred Luthans, Tata McGraw Hill,New Delhi, 4003.
3. 'International Business', Charles W.L. Hills, Tat a McGraw Hill, New Delhi, 4005.
4. International business, Francis Cherunilam, wheeler publication.
5. "Export Management", Kapoor D.C., Vikas Publishing House Pvt. Ltd., 2009, ISBN:8125909397 / ISBN: 978- 8125909392

Reference books:

1. 'The International Business Environment',Anand K. Sundaram and I. Stewart Black, Prentice Hall of India, New
Delhi, 4001.
2. 'InternationalBusiness', Michael R. Czinkota, IIkka A. Ronkainen and Michael M. Moffett Thompson, Asia,
Bangalore, 4003.
3. 'International Business', Don Ball and Wendell McCulloch, Irwin McGraw Hill, NewYork, 1999.
4. 'International Business', Roger Bennett, Pitman publishing, New Delhi, 4000.
5. 'International business',Vyuptakeshgaram, Pearson Education, New Delhi, 4006.
6. "International Business", John D. Daniels., and Lee H. Radebaugh., 15th Edition, Pearson Education Asia,New
Delhi, 2014, ISBN: 0133457230 / ISBN: 978-0133457230.
7. "International Business", Aswathappa K., 6th Edition, Tata McGraw Hill, 2015, ISBN: 933922258X / ISBN: 978-9339222581.

Web links and Video Lectures (e-Resources):

- International trade practices and policies:https://www.slideshare.net/mariz_rose04/chap-12-international-trade-practices-and-policies-14717286
- International trade:https://www.slideshare.net/ShubhamAhirwar3/international-trade-

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Collection of global textile trade data from literature and studying the same.
- Seminars, quizzes, group discussions, seminars and report writing on global textile trade concepts.
- Understand on marketing strategies and export finance for textile trade.

SMART TEXTILES			
Course Code	**21TX653**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

1. Recall and Recognize smart technology for textiles and clothing.
2. Recognize and demonstrate the intelligent systems of incorporating the sensor, processor and the actuator into textiles.
3. Define, Recognize and demonstrate PCMs and their properties and uses.
4. Recognize and apply and analyze the functions and applications of smart textiles.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Use the related videos of Smart Textiles so that student can understand more easily.
2. Show students the different samples of the Smart Textiles Clothing's.
3. Inspire the students to have collaborative learning in the class.
4. Support and guide the students for Self study.

Module-1

Smart technology for textiles and clothing – Introduction and Overview, development of smart technology for textiles and clothing – sensors/actuators, for signal transmission, processing and controls. Electrically active polymer materials – concepts of autonomic systems and materials, polymer materials as actuators or artificial muscle, peculiarity of polymer gel actuator, triggers for actuating polymer gels, electro active polymer gels as artificial muscles, from electro active polymer gel to electro-active elastomer with large deformation.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-2

Introduction to phase change materials – Heat balance and thermo-physiological comfort, phase change technology, PCMs in textiles, textile treatment withPCM microcapsules, thermal performance, test methods,applications, future prospects of PCM in textiles andclothing.
Intelligent textiles with PCMs – Basic information on PCMs, phase change properties of linear alkyl hydrocarbons, textiles containing PCM, Functions of Textile Structure with PCM.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-3

Mode of PCM performance in clothing, Manufacturing of textiles containing micro PCMs, Applications of textiles containing PCMs are Domestic textiles, Medical products, Automotive textiles, Air conditioning buildings with PCMs.
Tailor made intelligent polymers for biomedical applications- Introduction, Fundamentals aspects of shape memory materials, concepts of biodegradable shape memory polymers, degradable thermoplastics elastomers having shape memory properties, degradable polymer networks having shape memory properties.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-4

Embroidery and Smart textiles-Introduction, basics of embroidery technology-combined embroidery Techniques. Embroidery machines, Embroidery for technical applications – tailored fibre placement, Embroidery technology used for medical textiles. Embroidered stamp – gag or innovation. Adaptive and responsive textile structures – Introduction, textiles and computing – the symbiotic relationship, the three dimensions of clothing and wearable information infrastructure, textiles and information processing, Georgia tech wearable motherboard,

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-5

Wearable technology for snow clothing. Bio processing for smart textiles and clothing - treatment of wool with enzymes, treatment of cotton with enzymes, enzymatic modification of synthetic fibres, spider silk, intelligent fibres. Textile scaffolds in tissue engineering – ideal scaffold system, scaffold materials, textile scaffolds

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Define and explain about Electrically active polymer materials.
2. Explain about Intelligent textiles with PCMs.
3. Explain about Manufacturing & applications of textiles containing micro PCMs.
4. Summarize and discuss Adaptive and responsive textile structures.
5. Illustrate and discuss about Wearable technology for snow clothing.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources: Books

1. Smart fibres, fabrics and clothing, By Xiaoming Tao, Woodhead Publishing Limited, Cambridge, England.

2. Intelligent textiles and clothing, By H.R.Mattila, Woodhead Publishing Limited, Cambridge, England
3. Wearable electronics and photonics, By Xiaoming Tao, Woodhead Publishing Limited, Cambridge, England.
4. New fibres , By Tatsuya Hongu and Glyn O Phillips, Ellis Horwood, New York, London, Toronto, Sydney, Singapore.

Web links and Video Lectures (e-Resources):

- https://www.researchgate.net/publication/286459263_Smart_Textiles-New_Possibilities_in_Textile_Engineering
- https://www.researchgate.net/publication/328672603_SMART_TEXTILES_AND_THEIR_APPLICATIONS_-_VISUAL_PERCEPTIONS
-

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Students can collect samples of smart textiles used in medical , Defence, Aero space etc.

TEXTILE FIBRE PHYSICS

Course Code	**21TX71**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

This course aims at updating the knowledge of students in the following fields of fiber physics:

1. Basic concepts of fiber structure, properties and investigation of fiber structure
2. Basic concepts various mechanical, thermal, moisture, optical, electrical and frictional behaviour of fibers.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
3. Encourage the students for group learning to improve their creativity and analytical skills.
4. Support and guide the students for self-study.
5. Encourage students to observe working of various textile machineries to understand mechanisms
6. Students can be taken to research laboratories to demonstrate about modern tools used for characterizing fibre structure

Module-1

Introduction to structure of fibers. Approaches to polymer fiber structure. List of parameters for reasonable specification of fiber structure analysis of solid state structure of textile fibres using DGC, X-rays, IRS, NMR, SEM and TEM. Study of two phase and one phase model of fibre physical structure

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-2

Descriptive studies on of physical structure of Cotton, Wool, Silk, PET, Nylon and Acrylic fibres. Moisture relations: Concept of moisture equilibrium, moisture hysteresis, moisture regain, heat of absorption, swelling of textile fibres. Effect of moisture on various properties of fibres. Calculations of Mr and Mc of fibres invoice weight.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-3

Mechanical properties: Analysis of Stress and strain behaviour, Expression of results of tensile properties, factors affecting tensile behavior, structure and tensile property correlation, Elastic recovery and weak-link effect. Stress relaxation, creep, factors affecting stress relaxation and creep.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-4

Dynamic mechanical properties and their applications. Boltzmann super position principal. Maxwel and kelvin models, Burgers four element model Directional effects- Bending of fibers, Twisting of fibers, Shear modulus, Shear stresses and compression fiber masses. Frictional properties, Amonton's laws of friction, deviation of these laws in fibre friction. Nature of fiber friction, the friction of wool fibers

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-5

Introduction of Optical properties, measurement of birefringence, lustre. Importance of optical properties Electrical properties: Electrical resistance, static electricity, dielectric properties and measurement of these properties. Thermal properties: Tg, Thermal conductivity, specific heat, thermal expansion and directional dependence of thermal properties. Thermal characterization of fibres using Dilatometer, TGA, DTA, DSC and TMA.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Demonstrate about fundamental concept of fiber structure and characterization of fine structural details of textile fibers.
2. Summarize and explain physical structure of all the textile fibers and importance of moisture absorptions in textiles
3. Analyse stress/strain behaviour of fibers and behaviour of fibers in actual usage
4. Analyse of behaviour of fibers for multidirectional and cyclic forces
5. Classify & demonstrate various secondary properties of fibers like electrical, optical, thermal etc

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources: Text Book:

1. **Physical properties of Textile fibres,** Morton & Hearle, J.W.S., TI, London,4008.
2. **Manufactured fibre technology,** V.B.Gupta and Kotari V.K., Chapman & Hall,London.
3. **Mechanical properties of polymers,** Ward I.M., John wiley & sons, NY1971.

References:

1. **Mechanical properties of polymer,** Neilson L.E., VolI,II, III, Marcel Dekkar, NY, 1974.
2. **Polymer Characterization,** Cambel and White, Chapman & Hall, London1989.
3. **Moisture relations in textiles,** Hearle J.W.S., Textile Institute, London.

Web links and Video Lectures (e-Resources):

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Quizzes, group discussions, seminars and report writing on various aspects of fibre physics.
2. Practical exposure to testing of structure and related properties of fibres.

APPAREL QUALITY ASSURANCE			
Course Code	**21TX72**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	2	Exam Hours	03

Course objectives:

- To import skills for analysis of garment specification sheets and to translate them into quality output.
- To familiarize students with advanced apparel quality tests and standards.
- To make students to understand the importance of quality assurance in the manufacture of apparels in apparel industry.
- To enable the students to understand the production planning in garment industry.
- To emphasis on the improved methods of material control in apparel production
- To acquaint student with quality concepts for implementing quality in apparel production

Teaching-Learning Process: (General Instructions) : These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
3. Encourage the students for group learning to improve their creativity and analytical skills.
4. Support and guide the students for self-study.
5. Encourage students to observe working of various apparel manufacturing machineries to understand quality aspects.
6. Actual production of apparels can be demonstrated to students by taking them to apparel industries.
7. Encourage students to observe quality control tools used in the apparel manufacturing industries.

Module-1

Introduction to quality control: Definition of quality, importance of quality assurance, evaluation of quality, quality planning, quality control, total quality management, IPQC, AQL, IMIL standard and final inspection.

Teaching-Learning Process:
Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-2

Quality management systems- organising, planning and implementation. Importance of quality assurance in textile and apparel industries, various tools used for quality assurance.7 tools for quality assurance

Teaching-Learning Process:
Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-3

Care labelling: Introduction, labelling parameters, fibre content, wash care labels. Labelling systems- Canadian, American, European, Australian, Sweden, UK, Germany, Japan and Indian. Regulations for labelling parameters. Eco-labelling.

Teaching-Learning Process:
Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-4

Accessories testing, inspecting garments using spec sheets, inspecting garments using measuring tapes/without using measuring tapes, Button quality testing, interlining quality testing, packing a shirt and identifying faults.

Teaching-Learning Process:
Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Module-5

Applying quality assurance programmes in fabric department, cutting department, sewing production department and finishing department. Garment quality tests for dimensions, fabric constructions, weight, stitch lines, seams, special stitches, and finishes.

Teaching-Learning Process:
Chalk &talk method/PowerPoint presentation/ Seminars, Group Discussion and Quiz

Course outcome: (Course Skill Set):
At the end of the course the student will be able to:

1. Method and principle involved in inspection/testing of fabric, zippers, buttons, sewing threads etc.
2. Understand the quality parameters of textile materials.
3. Understand Production planning in apparel industry
4 Accessories testing and quality control in apparel industry
5. Summarize the applications of quality assurance in apparel industries.

Assessment Details (both CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:
Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**
(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).
CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:
Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources: Text books:

1. Pradip V Mehta, Quality Control in Apparel Industry, NIFT Publication, New Delhi, 2001.
2. Sara J Kadolph, Quality Assurance for Textiles and Apparels, Fairchild Publications, 2nd Edition, 2007.
3. Harold Care & Barbar Latham, The Technology of Clothing Manufacture, Oxford Publication, USA, 1994.
4. Ruth E C, Apparel Manufacturing and Sewn Product Analysis.
5. Pradip V Mehta, Introduction to Quality Control, ASCQ quality Press, Marcel Dekker Inc., New York, 1992.

Reference books:

1. Garry Cooklin, Introduction to Clothing Manufacture, Blackwell Science, UK, 1991.
2. Chulter A J, Introduction to Clothing Production Management, Blackwell Science, UK, 1998.
3. "Apparel Production Handbook", Jacob Solinger., Reinhold Publications, 1998, ISBN:1879570009 / ISBN: 978- 1879570009
4. "Introduction to Clothing Production Management", Chuter A.J., Blackwell ScientificPublications, Oxford, 2001, ISBN: 0632039396 | ISBN-13: 9780632039395

Web links and Video Lectures (e-Resources):

- NPTEL course on quality assurance: https://nptel.ac.in/courses/
- NPTEL course on total quality management: https://nptel.ac.in/courses/
- NPTEL course on quality control: https://nptel.ac.in/courses/
- Apparel quality control & quality assurance: https://www.slideshare.net/SAMultimedia/apparel-quality-control-quality-assurance
- Apparel quality assurance: https://textilelearner.net/?s=Apparel+quality+assurance

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Collection of apparel quality assurance data from literature and studying their quality assurance concepts.
- Seminars, quizzes, group discussions, seminars and report writing on various apparel quality assurance concepts.
- Observing machineries in apparel manufacturing industries and calculating various apparel quality assurance parameters.
- Practical exposure to various apparel quality parameters and demonstration.

TECHNICAL TEXTILES			
Course Code	21TX731	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3-0-0-1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Objectives:

- This subject helps the student to acquire knowledge of various technical textiles used in industries
- This subject prepares the student work in technical textile manufacturing industry.
- Students are exposed to research field in technical textiles and their applications in various industries.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching methods may be adopted to develop the outcomes.
2. Use PowerPoint/Videos/Animations to explain various concepts.
3. Ask some creative and higher-order thinking questions in classes which helps critical thinking.
4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it
5. Support and guide the students for self-study.

Module-1

Introduction to Technical Textiles-Requirements of fibres, yarns and fabrics for technical textiles. Classification of technical textiles. Study of properties of various fibres used for technical textiles. Automotive Textiles- Use of textiles in tyres, requirements of fibres used for tyres, various fibres used for tyre cords, tire building, different types of tyres. Upholstery in automobiles: vehicle top covers, seat covers, headliners, carpets etc. Safety devices in automobiles: seat belts, airbags, helmets etc. Textiles used in Aerospace industry.

Teaching-Learning Process

Chalk and talk, Power point presentation, NPTEL video and study materials

Module-2

Medical Textiles-Medical application of Textiles, requirements, classification, detailed study of application of textiles in implantable, non-implantable, extra corporal devices and health care hygienic products. Geo Textiles-Definition, textile fibres and fabrics used, functions of geo-textiles. Applications of geo textiles and geo-membranes in civil engineering i.e. roads, railways, bridge, dam construction, soil erosion etc.

Teaching-Learning Process

Chalk and talk, Power point presentation, NPTEL video and study materials

Module-3

Textiles in Filtration-Introduction, types of filtration requirements, filtration mechanisms, Effect of yarns and fabric construction on filtration. Methods/types of filtration. Coated Fabrics-Introduction, chemistry of coated textiles, thermoplastic polymers for coating, coating techniques, fusible interlining. Agriculture Textiles: Textiles used for agriculture, Horticulture and animal husbandry.

Teaching-Learning Process

Chalk and talk, Power point presentation, NPTEL video and study materials

Module-4

Smart Textiles-Introduction, concept of smart textiles, various applications of smart textiles. Introduction to nanotechnology in textiles. Application of Nano textiles in various field. Production and properties of Nano-fibres. Fibre Reinforced Composites – meaning, classification, brief outline on raw materials, production techniques and applications.

Teaching-Learning Process

Chalk and talk, Power point presentation, NPTEL video and study materials

Module-5

Textiles in Defence-Introduction, historical back ground, criteria for modern military textiles, textiles for environmental protection, Ballistic protective materials, water proof materials, application of textiles in camouflage. Application of Textiles in Packing, Power transmission, fish nets, sports. Etc

Teaching-Learning Process

Chalk and talk, Power point presentation, NPTEL video and study materials

Course Outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Define and explain various technical textiles, and their applications in Automobile industries
2. Classify and discuss various applications in Medical and Geotextiles
3. Explain the various applications of textile filtration. coated fabric and agriculture
4. Discuss various applications of smart textiles
5. Classify and discuss textiles in defence application, Sports, Packing and in other fields

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

7. First test at the end of 5th week of the semester
8. Second test at the end of the 10th week of the semester
9. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

10. First assignment at the end of 4th week of the semester
11. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

12. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

3. The question paper will have ten questions. Each question is set for 20 marks.
4. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:Books

- Hand book of Technical Textiles A R. Horrocks, S.C. Anand Wood Head Pub., England 2000
- Smart Fibres - Fabrics & Clothing Xiaoming Tao Wood Head Pub., England 2001
- International Seminar on Technical Textiles SASMIRA 2000 Industrial Textiles P.K.Badami

Web links and Video Lectures (e-Resources):
• https://www.jasonmills.com/technical-textiles/ • https://nptel.ac.in/courses/116102057 • https://www.sciencedirect.com/book/9781782424581/handbook-of-technical-textiles
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning • Quiz/Group discussion. • Practical demonstration of Technical Textile product application • NCUTE NPTEL and YouTube videos.

OPERATIONS RESEARCH & RETAIL MANAGEMENT			
Course Code	21TX732	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

- The objective of this Course is to make students understand the basic objectives of operation research and phases of operation research technique and its applicability in textile and garment industries.
- To highlight the importance of retailing and its role in the success of modern business

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1.State the importance of O.R & Retail management through related videos

2.Seminars & Quizzes may be arranged in respective topics to develop skills

3.Inspire the students by giving examples of Retail management in various Textile activities.

4.Support and guide the students for Self study.

Module-1

Definition of OR. Phases of OR technique. Linear programming problem by graphical and simplex method. Assignment problem by Hungarian method. Balanced and unbalanced matrix. Profit and cost matrix. Problems pertaining to these matrix.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

TRANSPORTATION PROBLEM: Vogel's approximation method – Determination of Optimal solution by MODI method, North west corner Rule and- Least cost entry method.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-3

Replacement: . Objects of replacement. Types of Replacement such as Individual replacement, Group replacement. Problems pertaining to these types of replacement problems.

Module-4

Queuing theory, queue, Waiting line FIFO and LIFO with examples. Customer's behavior in queue. M/M/I System and its details. Brief study about CPM and PERT.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-5

Introduction and Perspectives on Retailing World of Retailing, Retail management, introduction, meaning, characteristics, emergence of organizations of retailing - Types of Retailers (Retail Formats) – Multichannel Retailing -Customer Buying Behavior, Historical Perspective, role of retailing, trends in retailing, FDI in Retail - Problems of Indian Retailing - Current Scenario

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1: Explain the meaning, definitions, scope, need, phases and techniques of operations research. Formulate L.P.P and derive optimal solutions to linear programming problems by graphical method, Simplex method.

2: Solve the Vogel's approximation method and finding solution by different methods.

3: Demonstrate the Replacement theory and accustom to solve different types of replacement problems.

4: Solve waiting line problems(Queuing theory)and gains introductory knowledge about CPM & PERT.

5: Explain the Perspectives of Retailing World of Retailing, Retail management

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources: Books

1. Operations Research – Theory and Applications – 5th Edition, J K Sharma, MACIN Publisher 2012
2. Principles of Operations Research – Theory and Practice. Philips, Ravindran and SolbergJohn Wiley &Sons (Asia) Pvt. Ltd,2000
3. Principles, Methodology and Applications of Operations Research, Prof. J. Govardhan JEM Consultants India 2012
4. .Operations Research, P.K.Gupta and D.S. Hira, S. Chand and Co 2002
5. Problems in Operations Research (Principles and Solutions) P.K.Gupta and D.S. Hira, ,S. Chand and Co 2010
6. Retail Management Levy and Weitz McGraw Hill
7. Retail Management Chetan Bajaj Oxford University press

Web links and Video Lectures (e-Resources):

APPAREL MARKETING AND MERCHANDISING			
Course Code	**21TX733**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Course objectives:

- To make students understand the basics of apparel Industry and Business concepts, understand the various marketing and merchandising responsibilities and strategies.
- To study about the analysis of garment and its standards, design and understanding about export marketing.
- To acquaint the students of the concepts of business, design merchandising, sourcing and export
  Documentation.

Teaching-Learning Process: (General Instructions)

These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
3. Encourage the students for group learning to improve their creativity and analytical skills.
4. Support and guide the students for self-study.
5. Encourage students to observe apparel marketing and merchandising in various showrooms, malls etc.
6. Actual marketing of apparels can be demonstrated to students by taking them to show rooms, retails etc.
7. Arrange visits to apparel manufacturing industries.
8. Encourage students to observe marketing and merchandising of various apparelsto understand market trends.

Module-1

Organization of the apparel business -Nature of Apparel, Organization of the Apparel Industry-Business Concepts Applied to the Apparel Industry-International Issues- Cooperation in Manufacturing and Distribution.

Marketing objectives and strategies-Functional organization of an apparel firm, responsibilities of marketing division strategic plan, marketing objectives & strategies, Retail and Wholesale Strategies of Merchandise Distribution-Labelling and Licensing.

Teaching-Learning Process

1. Teaching Learning Methodology: Chalk & Board, Power Point and Animation films
2. Participatory & Innovative Teaching Learning : Seminars, Group Discussion and Quiz

Module-2

Merchandising strategies & process- Concepts apparel production lines, dimensions of product change, nature & timing of merchandising responsibilities, business & marketing plans, line planning, line development line presentation,

Analysis of garment development- Role of garment analysis, process of garment analysis, professional perspectives on garment analysis.

Teaching-Learning Process

1. Teaching Learning Methodology: Chalk & Board, Power Point and Animation films
2. Participatory & Innovative Teaching Learning : Seminars, Group Discussion and Quiz

Module-3
Product standards and specifications: Sources of Product and Quality Standards-Standards for Quality, Fit, and Performance - Use of Specifications-Writing Specifications for Apparel Manufacturing. **Apparel design:** Product Development and the Design Function- Role of Product Change in the Design Process- Post adoption Style. Development- Apparel Design Technology.
Teaching-Learning Process 1. Teaching Learning Methodology: Chalk & Board, Power Point and Animation films 2. Participatory & Innovative Teaching Learning : Seminars, Group Discussion and Quiz
Module-4
Export marketing: Outlook for export marketing, International agreement & agencies for promoting exports. Export import policy. Export assistance. Current pattern of India's foreign & world trade, Export barriers-tariff & non-tariff,
Teaching-Learning Process 1. Teaching Learning Methodology: Chalk & Board, Power Point and Animation films 2. Participatory & Innovative Teaching Learning : Seminars, Group Discussion and Quiz
Module-5
Export marketing channels, physical distribution transportation, packaging & marine insurance for exports. Management of risk & export financing, Quality control& pre-shipment inspection, documents for exports. An Introduction to retail marketing. Consumer behaviour &retail operation. The retail marketing mix. Management of a retail brand. Application of IT in retail marketing.
Teaching-Learning Process 1. Teaching Learning Methodology: Chalk & Board, Power Point and Animation films 2. Participatory & Innovative Teaching Learning : Seminars, Group Discussion and Quiz
Course outcome: (Course Skill Set): At the end of the course the student will be able to: 1. Learn about organization of the apparel industry and business concepts of apparel Industry. 2. Gain knowledge about Marketing and Merchandising Strategies 3. Understand the procedure involved in the export of apparel and will be able to understand the basics garment analysis and Standards for Quality, Fit, and Performance. 4. Will be able to understand the apparel design and apply the concept of marketing and merchandizing in the apparel industry in India 5. Understand about the apparel export marketing, apply the concept of marketing and merchandizing in the apparel industry in India
Assessment Details (both CIE and SEE) The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together **Continuous Internal Evaluation:** Three Unit Tests each of **20 Marks (duration 01 hour**) 1. First test at the end of 5th week of the semester 2. Second test at the end of the 10th week of the semester **3.** Third test at the end of the 15th week of the semester Two assignments each of **10 Marks** 4. First assignment at the end of 4th week of the semester

5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources: Text books:

1. Apparel Manufacturing - Ruth E. Glock, Grace I. Kunz-, PHI Publication, UK
2. Export Marketing- B.S.Rathore&J.S.Rathore, Himalaya Publishing house,Bombay, 1997
3. "Fashion Merchandising", Elian stone, Jean A samples, McGraw Hill Book Company, NewYork, 1985, ISBN: 0-07- 061742-2
4. "Export Marketing" – A Practical Guide to Exporters", Shivaramu S.,Wheeler Publishing,Ohio, 1996, ISBN: 81- 7544-166-6
5. "Apparel Manufacturing Sewn Product Analysis" , Ruth E. Glock, Grace I. Kunz FourthEdition, Pearson Prentice Hall, NJ, 2005, ISBN: 81-7758-076-0

Reference books:

1. The Technology of Clothing manufacture-Herold Carr and Barbara Latham
2. Individuality-Mary Kefgan, PhyllissTouchies Specht
3. Apparel Manufacturing and Sewn Product Analysis-Ruth E Clock
4. Quality Control in Apparel Industry-By Pradip V. Mehta
5. Fabulous fit-By Judith Rashand
6. Marketing Management-Phillip Kotler
7. Retail marketing management – David Gilbert

Web links and Video Lectures (e-Resources):

- Apparel marketing and merchandising :https://textilelearner.net/?s=Apparel+marketing+and+merchandising
- Apparel Merchandiser & Merchandising: :https://www.slideshare.net/MehediHassanRifat/apparel-merchandiser-merchandising

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Collection of apparel marketing and merchandising data from literature and studying their market trends.
- Seminars, quizzes, group discussions, seminars and report writing on apparel marketing and merchandising concepts.
- Practical exposure on Marketing and Merchandising Strategies on apparels.

INDUSTRIAL ENGINEERING			
Course Code	21TX734	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

- Objective of this course is to understand the importance of Industrial engineers and industrial engineering department in Textile and Garment Industry. This course will enable the students to get familiarized with plant location, layout, work study and time study concepts.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. State the importance of Industrial engineering through related videos
2. Seminars & Quizzes may be arranged in respective topics to develop skills
3. Arrange Industrial visits to understand practically the duties of Industrial engineer.
4. Support and guide the students for Self study.

Module-1

Importance of Industrial Engineering department in Textile and Garment Industry. Position of Industrial Engineering department in industry. Management, Administration and organization. Professional and scientific Management. Difference between management and administration. Study of different types of organization.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-2

Plant location and Plant layout. Definition of plant location. Factors influencing the plant location. Types of Plant location and their advantages and limitations. Plant layout. Definition of Plant layout. Objects of Scientific layout. Principles of Layout. Types of layout and their detailed study

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-3

Work study and its importance definition of work-study. Success of organization through work-study Technique. Objects of work study. Problems of work study. Method study and its objects. Steps of method study and detailed study of each step. Determination of new method to complete each activity in industry.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-4

Time study. Definition of Time study and its objects. Detailed study of each steps of Time study. Determination of Normal time, Observed time and Standard time. Study of different types of allowances. Study of Decimal minute stop watch for recording all the activities.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-5

PLANNING AND FORECASTING planning and its concept in industry. Detailed study of TEAM work, SMART and POSDCORB and SWOT analysis. Production planning and Control (PPC). Importance of PPC and its detailed study in Industry. Study of Value of money, Inflation and Deflation currency, Supply and Demand factor and its impact on society

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1: Explain the importance of Industrial engineers and industrial engineering department in Textile and Garment Industry.
2: Demonstrate Plant location and Plant layout
3: Explain Work study and its importance & Method study and its objects
4: Explain Method study and its objects & Study of different types of allowances
5: Explain the Production planning and Control (PPC).

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:

Books

1 Production and Operations Management, R. Paneerselvam Prentice Hall of India 2002
2 Strategic operations Management Robert H. Lowson Vikas Publishing House 2003
3 Production and operations management Thomas E Morton Vikas Publishing House,First Indian reprint 2003
4 Computer Aided Production Management Mahapatra P B Prentice Hall of India 2001
5 Production Management Martand T Telsang S Chand and Company 2003

Web links and Video Lectures (e-Resources):

Professional Elective Course-III

ELEMENTARY MECHANICS OF TEXTILE STRUCTURES			
Course Code	21TX741	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:
The objective of this course is to make students to understand the basic structural properties of yarns and fabrics and to assess them for required end uses.

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Use the related videos of Textile structures so that student can understand more easily.
2. Ask the students to make graphical representation of various textile structures.
3. Inspire the students to have collaborative learning in the class.
4. Support and guide the students for Self study

Module-1

Elements of yarn geometry - and their application. Geometry of folded yarns. Yarn diameter and density. Theories of yarn strength

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-2

Characteristics of spun and continuous filament yarn .Detailed study of Concept of blend irregularity, and elongation balance

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-3

Determination of cover factor and its application. Geometry of plain weave fabrics and their applications. Crimp interchange in woven fabrics.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-4

Introduction to fabric deformation in tension, bending and shear. Simple geometry of knit structures.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-5

Simple mechanics of non-woven structures. Study of Properties of non-woven fabrics and their application

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)
At the end of the course the student will be able to :

1:Understand yarn Geometry and their applications
2:Familiarise with characteristics of both Filament and Blend yarns
3 : Understand the Geometry of Woven structures.
4 : Understand the Geometry of Knitted structures.
5: Familiarise with Geometry of Non woven structures.

Assessment Details (both CIE and SEE)
The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE

(Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources: Books

1. **Manual of Cotton Spinning**, Coulson. A.F.W. (Ed.), Vol. I to IV, Textiles Institute, Manchester, 1958.
2. **Series on Textile processing,** Zaloski. S. Tp - Institute of Textiles Technology USA Vol.I (Opening, Cleaning and Picking).
3. **Technology of short-staple spinning,** Klein. W., Vol.I, II, III and IV, Textile Institute Pub., Manchester 1989.
4. **Spun Yarn Technology,** Oxtoby, Butterworths, London, 1987.
5. **Contemporary Textile Engineering,** Happey. F. (Ed.) Academic Press Inc., 1981.
6. **Hand book of Cotton Spinning,** William Taggart., UniversalPubl corp. 1979.
7. **Essential Facts of Practical Cotton Spinning**, Pattabhiraman. T.K., Soumya Pub., Bombay 1979.
8. **Cotton Spinning Calculations**, Pattabhiraman. T.K., Soumya Pub., Bombay 1979.
9. **Cotton Opening & Carding,** Merril G.R., Pub: G.R. Merill, Lowell Mass, 1955.
10. **Blowroom and carding** NCUTE Pilot programme.

Web links and Video Lectures (e-Resources):

- **https://youtu.be/CyIJIe3x47k**
- **https://archive.nptel.ac.in/courses/116102051/**

ADVANCED FABRIC STRUCTURE AND DESIGN			
Course Code	21TX742	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3 : 0 : 0 : 1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

The objective of this course are

1. To make students to have a knowledge about advanced design features of various complicated and intricate design fabrics.
2. Students are to learn analysis of these fabrics for their various construction particulars, manufacturing data and design details.
3. Students are to understand the characteristic features of fabrics, design features and aesthetic qualities of different fabrics.
4. Students will understand the raw material requirements, machine and equipment for the production the fabric.
5. Students understand the end uses of different fabrics and their suitability.

Teaching-Learning Process (General Instructions)

The following are the simple strategies, which a teacher can use to accelerate the attainment of the various course outcomes :

1. Apart from conventional lecturer methods various types of innovative teaching techniques through videos, may be adopted so that the delivered lesson can progress the students in theoretical and applied practical analysing skills.
2. Seminars may be arranged for students to develop this subject skill.
3. To encourage the students for group learning so as to improve their creativity and analytical skills.
4. To support and guide the students for self-study.
5. Encourage students to observe working of various weaving machines in order to understand the construction and manufacturing details for making a fabric with help of design, draft, lifting plan and denting plan.

Module-1

Welts & pique fabrics, weft wadded pique, figured pique Fabrics. Extra warp and extra weft fabrics. Backed weaves and fabrics.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-2

QUALITY & MANAGEMENT PHILOSOPHIES

Deming Philosophy : Chain reaction, 14 points for management, triangle theory of variance, deadly diseases & sins, Deming's wheel.

Juran's Philosophy : 10 steps for quality improvement, quality trilogy, universal breakthrough sequence.

Crosby Philosophy : Crosby's 6 C's, Absolutes of quality, Crosby's 14 points for quality, Crosby triangle. Comparison of 3 major quality philosophies

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-3

MANAGING QUALITY- Traditional Vs Modern quality management, the quality planning, road map, the quality cycle. Cost of quality- Methods to reduce cost of quality, Sampling plans, O.C. curve.

QUALITY CONTROL - Objectives of quality control, Strategy & policy. Company wise quality control. Quality Assurance- Definition, concepts & objectives. Economic models for quality assurance. Statistical methodology in quality assurance. Process capability ratio, 6 sigma in quality assurance.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-4

FOCUSSING ON CUSTOMER -Importance of customer satisfaction, Kano's model of customer's satisfaction, customers driven quality cycle, understanding customer's needs & wants, customer's retention.

LEADERSHIP- Introduction, characteristics of quality leaders, role of TQM in leadership. Tools &Techniques of TQM, **Just in time system-**Concepts, objectives, overview, characteristics, benefits.

Benchmarking: Introduction, process of bench marking, benefits, advantages & limitations.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-5

SUPPLY CHAIN MANAGEMENT - Objectives, process tools, supply chain management for manufacturing organization & service organization.

World class manufacturing - becoming world class, relevance of TQM in world class manufacturing.

World class supplier, world class customer, present global business conditions, world class companies in 21st century.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1: Define and explain about basic concepts TQM.
2: Explain about Quality and management Philosophy.
3: Classify and discuss about managing quality and quality control
4: Summarize and discuss the role of TQM in leadership and tools and techniques of TQM.
5: Illustrate and discuss about Supply chain management.

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.

2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:

Text Books

1. **Total Quality Management,** K. Shridhara Bhat, Himalaya Publishing House, 2010
2. **Total Quality Management,** N.V.R. Naidu, K.M. Babu, New age international publishers

Reference Books

1. **Norms For Spinning,** Weaving and Processing, ATIRA Publication, Ahmadabad, 1990
2. **Handbooks manuals,** BIS, ASTM, ISO-9000

Web links and Video Lectures (e-Resources):

- https://asq.org/quality-resources/total-quality-management
- www.investopedia.com/terms/t/total-quality-management-tqm.asp
- https://www.youtube.com/watch?v=oMYqqAbsEXo
- https://www.youtube.com/watch?v=SMOQV2CyVQo
- https://www.youtube.com/watch?v=SMOQV2CyVQo&list=RDCMUC640y4UvDAlya_WOj5U4pfA&start_radio=1&rv=SMOQV2CyVQo&t=28
- https://www.youtube.com/watch?v=ksR4Xy6tFcM
- https://www.youtube.com/watch?v=YKwcxjUnots
- https://www.youtube.com/watch?v=DJPXQ7OU7qo

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- https://www.isixsigma.com/methodology/total-quality-management-tqm/applying-total-quality-management-academics/
- https://www.slideshare.net/justinsolin/total-quality-management-56112246

TOTAL QUALITY MANAGEMENT IN TEXTILES			
Course Code	21TX743	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3 : 0 : 0 : 1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

The objective of this course are

1. To make the students to understand and acquire the concepts of Total Quality Management tools
2. It helps the Students to apply the TQM concepts in Textile/Garment manufacturing industries
3. Students are exposed to TQM principles and concepts so that they apply these concepts in the actual work environment for maximum benefits.

Teaching-Learning Process (General Instructions)

The following are the simple strategies, which a teacher can use to accelerate the attainment of the various course outcomes :

[1] Apart from conventional lecturer methods various types of innovative teaching techniques through videos, may be adopted so that the delivered lesson can progress the students in theoretical and applied analysing skills.

[2] Seminars may be arranged for students to develop these subject skills.

[3] To encourage the students for group learning to improve their creativity and communication skills.

[4] To support and guide the students for self-study.

[5] Encourage students to visit and observe working of TQM concepts in various Textile and Garment Industries.

Module-1

Introduction to TQM. Quality movement in Japan, US & India. Definition of quality. Small q & Big Q, Quality characteristics - Views, Dimensions, Determinants. Quality & Profitability. **PRINCIPLES OF TOTAL QUALITY,** Evolution of total quality and control. **TQM –** Basic concepts & overview. Necessity of TQM. Elements of TQM, benefits of TQM, TQM in services, ISO 9000 & ISO 14000 in quality management system

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-2

QUALITY & MANAGEMENT PHILOSOPHIES

Deming Philosophy : Chain reaction, 14 points for management, triangle theory of variance, deadly diseases & sins, Deming's wheel.

Juran's Philosophy : 10 steps for quality improvement, quality trilogy, universal breakthrough sequence.

Crosby Philosophy : Crosby's 6 C's, Absolutes of quality, Crosby's 14 points for quality, Crosby triangle. Comparison of 3 major quality philosophies

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-3

MANAGING QUALITY- Traditional Vs Modern quality management, the quality planning, road map, the quality cycle. Cost of quality- Methods to reduce cost of quality, Sampling plans, O.C. curve.

QUALITY CONTROL - Objectives of quality control, Strategy & policy. Company wise quality control. Quality Assurance- Definition, concepts & objectives. Economic models for quality assurance. Statistical methodology in quality assurance. Process capability ratio, 6 sigma in quality assurance.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-4

FOCUSSING ON CUSTOMER -Importance of customer satisfaction, Kano's model of customer's satisfaction, customers driven quality cycle, understanding customer's needs & wants, customer's

retention.

LEADERSHIP- Introduction, characteristics of quality leaders, role of TQM in leadership. Tools &Techniques of TQM, **Just in time system**-Concepts, objectives, overview, characteristics, benefits.

Benchmarking: Introduction, process of bench marking, benefits, advantages & limitations.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Module-5

SUPPLY CHAIN MANAGEMENT - Objectives, process tools, supply chain management for manufacturing organization & service organization.

World class manufacturing - becoming world class, relevance of TQM in world class manufacturing.

World class supplier, world-class customer, present global business conditions, world class companies in 21st century.

Teaching-Learning Process: Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1: Define and explain about basic concepts TQM.
2: Explain about Quality and management Philosophy.
3: Classify and discuss about managing quality and quality control
4: Summarize and discuss the role of TQM in leadership and tools and techniques of TQM.
5: Illustrate and discuss about Supply chain management.

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.

2. There will be 2 questions from each module. Each of the two questions under a module (with a

maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:

Text Books

1. **Total Quality Management,** K. Shridhara Bhat, Himalaya Publishing House, 2010
2. **Total Quality Management,** N.V.R. Naidu, K.M. Babu, New age international publishers

Reference Books

1. **Norms For Spinning,** Weaving and Processing, ATIRA Publication, Ahmadabad, 1990
2. **Handbooks manuals,** BIS, ASTM, ISO-9000

Web links and Video Lectures (e-Resources):

- https://asq.org/quality-resources/total-quality-management
- www.investopedia.com/terms/t/total-quality-management-tqm.asp
- https://www.youtube.com/watch?v=oMYqqAbsEXo
- https://www.youtube.com/watch?v=SMOQV2CyVQo
- https://www.youtube.com/watch?v=SMOQV2CyVQo&list=RDCMUC640y4UvDAlya_WOj5U4pfA&start_radio=1&rv=SMOQV2CyVQo&t=28
- https://www.youtube.com/watch?v=ksR4Xy6tFcM
- https://www.youtube.com/watch?v=YKwcxjUnots
- https://www.youtube.com/watch?v=DJPXQ7OU7qo

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- https://www.isixsigma.com/methodology/total-quality-management-tqm/applying-total-quality-management-academics/
- https://www.slideshare.net/justinsolin/total-quality-management-56112246

SERICULTURE AND SILK TECHNOLOGY			
Course Code	**21TX744**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03

Course objectives:

- Status of sericulture and growth of silk industry in India & abroad.
- Principles of Rearing silk worms, environmental condition of rearing, grainages.
- Physical and commercial characteristic of cocoon reeling machine and technology advancements.
- Silk by products, wet processing, and recent developments in wet processing.

Teaching-Learning Process: (General Instructions)

These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Seminars and Quizzes may be arranged for students in respective subjects to develops kills.
3. Encourage the students for group learning to improve their creativity and analytical skills.
4. Support and guide the students for self-study.
5. Actual production of mulberry plants can be demonstrated to students by taking them to agricultural fields.
6. Arrange agriculture fields to visit moriculture and sericulture cottage industries.
7. Encourage students to observe growth of mulberry plants to understand moriculture and sericulture.
8. Students can be taken to research laboratories to demonstrate about modern tools and techniques used for the production of silk.

Module-1

Introduction to Sericulture and silk industry, Status of sericulture and silk industry in India and abroad .Mulberry cultivation practices, environmental conditions, types of mulberry, Silk worm rearing, and Environmental conditions for silk worm rearing, various methods. Chawki rearing, Late age silk worm rearing, recent developments in rearing. Seed production & grain age activities. Diseases & pests & their control.

Teaching-Learning Process

1. Teaching Learning Methodology: Chalk & Board, Power Point and Animation films
2. Participatory & Innovative Teaching Learning : Seminars, Group Discussion and Quiz

Module-2

Different types of cocoons, Physical and commercial characteristics, sorting and testing of cocoons. Stifling of cocoons, objects, various methods: open pan, three pan, Conveyor cooking etc. Merits & Demerits of silk reeling, systems of reeling, charka, Cottage basin, multi end filature automatic reeling machine, Re-reeling, recent developments in silk reeling.

Teaching-Learning Process

1. Teaching Learning Methodology: Chalk & Board, Power Point and Animation films
2. Participatory & Innovative Teaching Learning : Seminars, Group Discussion and Quiz

Module-3

Silk throwing, Objects, Winding, doubling, Rewinding and twisting, Manufacture of silk yarns for ordinary, Chiffon, Crape, Georgette fabrics. Recent developments in silk throwing machines. Silk

weaving preparatory for warp & weft yarns, handloom &power looms special features, modifications required to weave silk fabrics.

Teaching-Learning Process

1. Teaching Learning Methodology: Chalk & Board, Power Point and Animation films
2. Participatory & Innovative Teaching Learning : Seminars, Group Discussion and Quiz

Module-4

Introduction to spun silk industry, Different source of waste, Sequence of operations in spun silk production, end uses of spun silk yarns. Noil yarns. Testing & grading of silk yarns. Chemical processing of silk degumming of silk fabrics.

Teaching-Learning Process

1. Teaching Learning Methodology: Chalk & Board, Power Point and Animation films
2. Participatory & Innovative Teaching Learning : Seminars, Group Discussion and Quiz

Module-5

Dyeing of silk fabrics. Printing & finishing of silk fabrics. Recent developments in wet processing of silk fabrics, silk by-products, properties and application .Introduction to non-mulberry silks and their applications.

Teaching-Learning Process

1. Teaching Learning Methodology: Chalk & Board, Power Point and Animation films
2. Participatory & Innovative Teaching Learning : Seminars, Group Discussion and Quiz

Course outcome: (Course Skill Set):

At the end of the course the student will be able to:

1. Classify and explain the mulberry cultivation and silkworm rearing.
2. Explain the physical and commercial characteristics and reeling of silk
3. Discuss the silk throwing and manufacture of silk fabrics.
4. Explain the spun silk production and assess the Testing, grading, chemical processing of silk.
5. Discuss about dyeing of silk fabrics and silk by-products, their applications

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5^{th} week of the semester
2. Second test at the end of the 10^{th} week of the semester
3. Third test at the end of the 15^{th} week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4^{th} week of the semester
5. Second assignment at the end of 9^{th} week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13^{th} week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources:

Text books:

1. Hand Book of Practical Sericulture, S R Ullal and M N Narasimhanna, Central Silk Board, India, 1987
2. Manuals on Sericulture, Vol – I, &II, Various Authors, FAO Publication, 1976
3. Hand Book of Silk Technology, T N Sonwalkar, Taylor and Francis, 1993
4. Mulberry Silk Reeling Technology, D. Mahadevappa, V G Halliyal, D G, Shankar, Ravindra, Bhandiwad
   Oxford and IBH Publishing Company Pvt.Ltd, 2000

Reference books:

1.Silk Weaving Compiled byZhejiang SilkEngineeringInstitute, Science Pub Inc. 2002

Web links and Video Lectures (e-Resources):

- Central Silk Board: https://csb.gov.in/publications/books/
- Karnataka State Sericulture Research and Development Institute: https://kssrdi.karnataka.gov.in/english

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Collection of various silk properties from literature and studying their properties
- Collecting various silk cocoons, filaments and fabrics from silk industries/R&D centres and studying their appearance, feel etc.
- Seminars, quizzes, group discussions, seminars and report writing on various silk cultivation & productions.
- Finding out various parameters of cocoons and silk filaments in textile testing laboratory.

Open Elective Course-II

NANO TEXTILES			
Course Code	21TX751	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

- To teach the concept of Nano technology and its application in textiles.
- To educate the production of nano fibres by different process
- To impart knowledge on Nano composites and their properties

Teaching-Learning Process (General Instructions) : These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1.State the importance of Nano technology through related videos

2.Seminars & Quizzes may be arranged in respective topics to develop skills

3. Inspire the students by giving examples of nano textiles applications in various fields.

4. Support and guide the students for Self study.

Module-1

Nano fibres: Process: Electro spinning – properties – improvement – fibre morphology – fibre alignment. Bi-component cross sectional Nano fibre.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-2

Nanotubes and Nano Composites: Carbon nano tubes: synthesis – characterization techniques – nano tubes – Polymer fibres – structures –production process – properties – fibre morphology. Carbon nano tubes applications

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-3

Nanofiller Polypropylene Fibres: Polymer layered silicate nano composites: structure and properties – Nano composites Dyeing of Polypropylene – Modified propylene for improved dyeability. Assessment of dyed polypropylene

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-4

Nano Coating of Textiles: Surface modification techniques – anti-adhesive nano coating of fibre and textiles – water and oil repellent coating, self-cleaning. Functional textiles: protection – applications. Applications of nano coated textiles for filtration.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-5

Hybrid Polymer Nanolayers: Thin hybrid film – smart textiles – polymer to polymer hybrid layers – polymer to particles hybrid layers. Nanofabrication of thin polymer fibre – "Grafting from" and "Grafting to" techniques for synthesis of polymer films, synthesis of smart switchable coatings. Synthesis of hydrophobic materials.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set) : At the end of the course the student will be able to :

1:Describe the basics of Nano fibres

2:Introduces to production process of Nano composites and their properties

3: Discusses about Polymer layered silicate nano composites: structure and properties and their Dyeing mehods

4: Describe the Surface modification techniques using Nano coating

5:Introduces to Hybrid Polymer Nano layers and Synthesis of hydrophobic material

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources: Books

1 Nanofibres and Nanotechnology in TextilesP. J. Brown and K. Stevens Woodhead Publishing Limited, England 2007

2 Springer Handbook of Nanotechnology Bharath Bhushan Springe 2004

3 Synthesis of various forms of Carbon Nanotubes H. Zeng, L.Zhu, G. Hao and R. ShengAC Arc Discharge 1998

4 Carbon Nanofibres for Composites Applications E. Hammel, X. Tang, M.Trampert, T. Schmitt, K. Mauthner, Woodhead Publishing Limited, England 2004

Web links and Video Lectures (e-Resources):

PROCESSING OF POLYMERS AND POLYMER REINFORCED COMPOSITES Title of the subject			
Course Code	21TX752	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives:

This course aims at updating the knowledge of students in the following fields' polymer and polymer processing technology.

1. Introduction to polymers, methods of production
2. Fundamental aspects polymer composites and their processing
3. Studies on various high performance fibers

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
2. Encourage the students for group learning to improve their creativity and analytical skills.
3. Support and guide the students for self-study.
4. Arrange visits to nearby garment industries to learn garment processes.
5. Encourage students to observe working of various textile machineries to understand mechanisms
6. Actual production of composites may be demonstrated
7. Arrange industrial visits to manufactured fibre industries

Module-1

Introduction to polymers, the genesis of polymers, classification of polymers. Chemistry of polymerization and techniques of polymerization. General applications of polymers.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-2

Engineering materials and processing techniques. Thermosets and thermoplastic polymers, Plastics elastomers and fibres. Processing of polymers- Thermoforming, Calendaring, Die casting, Rotational casting, Film casting, compression moulding, injection moulding, Blow moulding.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-3

Introduction to composite materials, Basic concepts, Classification of composite materials, reinforcing phase, continuous phase, matrix, interface, bio composites. Composites from 3D fabrics, different types of fibres used for production of composites. Brief outline on high performance fibres used for the production of composites. Study of various natural fibres used for production of composites. Different types of matrix used for production of composites. Composites v/s metals.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-4

Processing of composites: Interphase in composites, lamina, laminate and representation on laminates, pre preg technology Hand layup, spray layup, Bulk moulding, filament winding, compression and injection moulding.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-5

Resin transfer moulding, pultrasion, vacuum bagging ,textile structures in advanced composites, powder coating, importance of surface modification of fibres, sheet moulding, challenges in primary processing of composites. Secondary pressing of composites – joining of composites, different methods of joining, Drilling of composites.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Illustrate and recall history and growth of polymers, and polymer production
2. Demonstrate production of polymers.
3. Classify and apply knowledge on production basics of composite tecnology
4. Demonstrate concepts processing of composites.
5. Summarize and compare various processing techniques of polymer composites and secondary process involved.

Assessment Details (both CIE and SEE)

The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

1. **Text Books: Text book of polymer Science**, Billmeyer.W., Wiley Int.Sc. New York 1984.
2. **Polymer Science,** Gowarikar V.R., Vishwanathan N.V., JayadevSridhara, Wiley Eastern Ltd., New Delhi,
3. **Plastic Materials and Processing** : A. Brent Strong, Prentice Hall, ISBN 0-13-021626-7
4. **Composite Materials:** Engineering and Science: F.L. Mathews and R.D. Rawlings, CRC press, 084930251X
5. **Handbook of Composites:** S.T. Peters, ISBN 978-1-4615-6389-1.
6. **Composite materials**:- Krishan K. Chawla, Springer 2005

7. **High Performance Fibres:-** J.W.S. Hearle, Woodhead UK 2005
8. **Composites Engineering Hand Book** - Ed. Mallik P.K., Marcell Dekker, N.Y., 1997.

Web links and Video Lectures (e-Resources):

1. NPTEL course on Textile fibres
2. NPTEL course on Manufactured Fibre Technology
3. NPTEL course on High Performance and Speciality Fibres
4. NPTEL course on processing of polymers and polymer composites

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Quizzes, group discussions ,seminars and report writing on various aspects of textile fibres.

2. Practical exposure to various natural and manufactured fibres and demonstrating environmental effect of synthetic fibres.

HISTORY OF COSTUMES AND TRADITIONAL TEXTILES			
Course Code.	**21TX753**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	**3:0:0:1.**	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits 4	03	Exam Hours	03

Course objectives:

- Toimpartknowledgeonhistoryoftextilesthroughtheprevious centurieswithreferencetofa shionclothing
- Tounderstandandlearnsymbolismofmotifsandcoloursofdifferenttraditionaltextiles of India

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
2. Encourage the students for group learning to improve their creativity and analytical skills.
3. Support and guide the students for self-study.
4. Arrange visits to nearby garment industries to learn garment processes.
5. Encourage the students to learn pattern preparation, sewing machine operations, and accessories and garment finishing operations.

Module-1

Introduction to World textiles and costumes - History, types, motifs and symbols, pre-historic textiles and costumes - social evidence, costume components for men, women and children, hair and headdress-Egyptian, Greek, Roman, Japanese.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-2

Ancient Indian textiles and costumes - History and social life, costumes, jewelry, textiles and dyes - Indus Valley, Vedic, Mauryan, Sunga Period, Satavahana, Kushan, Gupta and Mughal period

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-3

Development of design - Motif, design, pattern - combination of different motifs in a pattern, pattern arrangements. Bases - Ogee leaf base, diagonal base, square base, diamond base, counterchanges and borders. Repeats – Drop repeat (full, ¼, ½, ¾ drop), brick repeat, mirror repeat (vertical and horizontal) Design manipulation.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-4

FrenchRevolution,Frenchcostumes,motifandsymbolsfromRenaissanceto20thcentury.Textiles and costumes of Colonial, Victorian, Edwardian Era, WWI and WWII, factors influencing costume change-Style, religion, location, climatic period and World affairs, youth fashion, ted, mod, punk, hippie.

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Module-5

An overview of textiles - Textile design, symbolic motifs of various cultures from ancient to modern day. Sarees- Banaras Brocades, Baluchari, Jamdani, Paithani, Kanjeevaram, Chanderi, Bandhani - Bandhani of Gujarat, Bandhej and Lehariya of Rajasthan, Patola of Gujarat, Ikat textiles of Andhra Pradesh – Pochampalli, Batik, Kalamkari from Andhra Pradesh, Warli and Madhubani painting. Kashmiri Shawls-Kulluand Kinnaur Shawls, Wraps of North-East, carpets, durries and rugs.

Study of costumes of India North (Jammu and Kashmir, Punjab, Rajasthan), East (West Bengal, Assam, Manipur), West (Maharashtra, Gujarat, Goa) and South (Karnataka, Kerala, Tamil Nadu).

Teaching-Learning Process : Chalk and talk, power point presentation, videos

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

1. Fashion & garment industries, fashion trends, fashion forecasting, consumer expectations of textiles.
2. Students are able to understand the production process, quality control, quality control studies, merchandising process, export & import policies.
3. Students who want to become entrepreneurs this course gives the detailed input to startup new garment industries

Assessment Details (both CIE and SEE)

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6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module. Marks scored out of 100 shall be reduced proportionally to 50 marks

Suggested Learning Resources: Books.Text Books: References

1. FrancoiseTetart-Vittu,"TheCompleteCostumeHistory",TaschenGmBH,2018.
2. GertrudLehnert,"AHistoryofFashioninthe20thCentury",KonemannPublications,2000.
3. JamilaBrijBhusan,"TheCostumesandTextilesofIndia",Taraporevala,Bombay,1958.
4. MartandSingh,"HandCraftedIndianTextiles",LustrePress,2005.
5. ParulBatnagar,"DecorativeDesignHistoryinIndianTextilesandCostumes",AbhishekPublications , 2011.
6. ParulBhatnagar,"TraditionalIndianCostumes&Textiles",AbhishekPublication,2009.
7. PhyllisTortora,KeithEubank,"SurveyofHistoricalCostumes,AHistoryofWesternDress",Blooms buryPublishing IndiaPrivateLimited,5thedition,2009.
8. Prakash, Raman K, Pradeesh K, "Warli Traditional Folk Art from India", Shree Book Centre Publication, 2016.

REFERENCES::

1. **Pattern Cutting for Women's Outwear-** Gerry Cooklin, 1994, Blackwell Scientific Publications,Oxford England.
2. **The NIFT Book of Grading and sizing-** Vol I and II, Published by NIFT, New Delhi
3. **Fashion Source Book**- by Kathryn Mikelvey, 1996, Blackwell Scientific Publication, Oxford England .**Fusing Technology**- Cooklin G, 1990, The Textile Institute, Manchester

Web links and Video Lectures (e-Resources):

- NPTEL video on Science of clothing comfort.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Students

1. Quizzes, group discussions, seminars and report writing on various aspects of apparel production.
2. Practical exposure to various types of seams, stitches, development of various patterns and attachments of trims to garments.

Course outcomes of 21TXP75: Project Work
At the end of the course students will be able to

Course/COs	Course outcomes
1	Explain the methodology and carrying out various methods involved
2	Summarize and compile the collection of data and presentation of data
3	Discuss the analyze the data and feedback techniques to arrive at appropriate results
4	Use data and bring optimum solutions
5	Present data in suitable format and to draw appropriate conclusions and predict scope for future improvement.

Course outcomes of 21TX81: Technical Seminar
At the end of the course students will be able to

Course/COs	Course outcomes
1	Identify and search literature from various sources related to a particular area.
2	Analyze and review of literature
3	Prepare report in standard format
4	Present and communicate the knowledge learnt.

Course outcomes of 21INT82-Internship Training
At the end of the course students will be able to

Course/COs	Course outcomes
1	Explain the organization management and planning in Garment or any Textile Industry.
2	Classify and discuss the process and analysis of garments or any textile product development.
3	Explain and asses the Standards for Quality, and Performance of garment or any textile products.
4	Summarize and prepare a report of the training.