HIMACHAL PRADESH TECHNICAL UNIVERSITY
HAMIRPUR

Syllabus & Examination Scheme

for

B. Tech.

Textile Engineering

3rd to 4th Sem

As per National Education Policy (NEP-2020)

(w.e.f. the Academic Year 2024-2025)

Semester-III

SCHEMEOFTEACHINGANDEXAMINATION B.TECH TEXTILE ENGINEERING Semester–III										
S. N.	Categ.	Course Code	Subject	Teaching Hours Per Week			Credits	Examination		
				L	T	P/D		I.A Marks	ESE Marks	Total Marks
1	HS	IKS-311	Indian Knowledge System	2	0	0	2	40	60	100
2	PC	TEPC-311	Textile Fibre -I	3	0	0	3	40	60	100
3	PC	TEPC-312	Properties of Fibres	3	0	0	3	40	60	100
4	PC	TEPC-313	Yarn Manufacture-I	3	0	0	3	40	60	100
5	PC	TEPC-314	Fabric Manufacture-I	3	0	0	3	40	60	100
6	PC	TEPC-315	Theory of Textile Machines	3	1	0	4	40	60	100
Labs:										
1	PC	TEPC-311P	Textile Fibre Laboratory	0	0	2	1	30	20	50
2	PC	TEPC-313P	Yarn Manufacture-I Laboratory	0	0	2	1	30	20	50
3	PC	TEPC-314P	Fabric Manufacture-I Laboratory	0	0	2	1	30	20	50
4	PC	TEPC-315P	Theory of Textile Machines Laboratory	0	0	2	1	30	20	50
			Total	**17**	**1**	**8**	**22**			800

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Semester – IV

S. N.	Category	Course Code	Subject	Teaching Hours Per Week			Credits	Examination		
				L	T	P/D		I.A Marks	ESE Marks	Total Marks
Theory										
1	FC	MAFC-311	Probability Theory and Statistics	3	1	0	4	40	60	100
2	PC	TEPC-411	Textile Fibre-II	3	0	0	3	40	60	100
3	PC	TEPC-412	Yarn Manufacture-II	3	0	0	3	40	60	100
4	PC	TEPC-413	Textile Chemical Processing-I	3	0	0	3	40	60	100
5	PC	TEPC-414	Fabric Manufacture-II	3	0	0	3	40	60	100
6	PC	*CSPC-414	Artificial Intelligence in Engineering	3	0	0	3	40	60	100
7	HS	HS-311	Engineering Economics	2	0	0	2	40	60	100
Laboratory:										
1	PC	TEPC-412P	Yarn Manufacture-II Laboratory	0	0	2	1	30	20	50
2	PC	TEPC-413P	Textile Chemical Processing-I Laboratory	0	0	2	1	30	20	50
3	PC	TEPC-414P	Fabric Manufacture-II Laboratory	0	0	2	1	30	20	50
			Total	**20**	**1**	**6**	**24**	**370**	**480**	**850**
Exit Option to 2- Year UG Diploma										
INT	**TE-416P**	**Internship-I (Exit)****		**8 Weeks/ 2 Months**			**6**	**30**	**20**	**50**

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Note:

***Common Subject**

****Exit Option (as per NEP)**: These **6 credits** shall be counted only for those taking Exit Option for 2-year diploma. .

- Direct entry students (not applicable for lateral entry students) may exercise exit option after 2nd Year for which he/she will be awarded UG diploma provided they secure an additional 6 credits through summer internships/ apprenticeship for two months/8 weeks after 4th Semester.
- The student concerned has to apply for UG diploma exit option at the time of filling up of end semester examination of 4th Semester (provided he has no back log up to 3rd semester). The evaluation of such candidates shall be done by the concerned department of Institution after successful completion of internship by the candidate.
- The course Internship-I will be completed by students during summer vacations after 4th semester under the supervision of faculty of department. The internship should, preferably, be focused on site EXPERMENTIAL LEARNING and CONTRIBUTION TO COMMUNITY for the benefit of local industry, government/private organization, entrepreneurs, craft and skilled people.
- The evaluation and viva voce of such candidates (who opted for UG Diploma) shall be done at the earliest possible, preferably within one month of running next semester, *i.e.*, 5th sem (and not with end semester exams of 5th semester).
- The student will be recommended for 2-Years'Diploma if has cleared all the four semesters without any back log in accordance with fulfillment of above requirements

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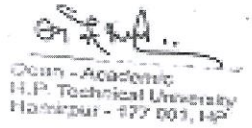
SCHEME OF TEACHING AND EXAMINATION B.TECH TEXTILE ENGINEERING										
Semester – III										
S. N.	**Categ.**	**Course Code**	**Subject**	**Teaching Hours Per Week**			**Credits**	**Examination**		
				L	**T**	**P/D**		**I.A Marks**	**ESE Marks**	**Total Marks**
1	HS	IKS-311	Indian Knowledge System	2	0	0	2	40	60	100
2	PC	TEPC-311	Textile Fibre-I	3	0	0	3	40	60	100
3	PC	TEPC-312	Properties of Fibres	3	0	0	3	40	60	100
4	PC	TEPC-313	Yarn Manufacture-I	3	0	0	3	40	60	100
5	PC	TEPC-314	Fabric Manufacture-I	3	0	0	3	40	60	100
6	PC	TEPC-315	Theory of Textile Machines	3	1	0	4	40	60	100
Labs:										
1	PC	TEPC-311P	Textile Fibre Laboratory	0	0	2	1	30	20	50
2	PC	TEPC-313P	Yarn Manufacture-I Laboratory	0	0	2	1	30	20	50
3	PC	TEPC-314P	Fabric Manufacture-I Laboratory	0	0	2	1	30	20	50
4	PC	TEPC-315P	Theory of Textile Machines Laboratory	0	0	2	1	30	20	50
			Total	**17**	**1**	**8**	**22**			800



SEMESTER-III

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Indian Knowledge System (IKS-311)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
2	0	0	2	MaximumMarks:40	MaximumMarks:60	100	3 Hours
				MinimumMarks:16	MinimumMarks:24	40	

Instructions to the question paper setter:

Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e., one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus.

Course Learning Objectives:

- To equip the students with the knowledge and understanding related to Indian knowledge systems,origin, evolution and the approaches used in ancient and modern times.
- To promote the youths to do research in the various fields of Bhāratīya knowledge system.

Unit-I: Bhāratīya Civilization and Development of Knowledge System.
Genesis of the Bharatbhumi and Civilization ,Discovery of the Saraswatī River, The Saraswatī-Sindhu civilization, Traditional knowledge system, The ancient education system, Brief introduction of the Takṣaśilā University, The Nālandā University, Knowledge export from Bharata
Unit-II: Art, Literature and Scholars
Natraja- A masterpiece of Bhartiya Art, Introduction to Vedas and Vedic Literature, Life and works of Agastya,Vālmīki, Patañjali, Vedvyāsa, Loapmudra,Maitreyi,Gārgī, Caraka, Suśruta, Kaṇāda, Kauṭīlya, Pāṇini, Āryabhaṭa, Varahmihira,Bhāskarācārya
Unit-III: Engineering Science and Technology
Engineering, science and technology in the Vedic Age, Post-Vedic period,History of Mathematics in Bharata, Concepts of Zero,History and Culture of Astronomy in India,Kerala School of Astronomy and Mathematics.
Unit-IV: Cultural Heritage and Indian Traditional Practices
Temple architecture in ancient India, Fairs and festivals, Yoga ,Āyurveda, Integrated apporach to healthcare, Agriculture in Ancient India, Approaches and strategies to the protection and conservation of environment.

Course Outcomes (COs):

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

- The students will be able to understand and appreciate the rich heritage that resides in our traditions.

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- The students will be able to improve mindfulness and more maturity leading to effective process of learning.

Textbooks:

- Bhag Chand Chauhan, IKS: The Knowledge of Bharata, Garuda Prakashan, 2023.
- Pradeep Kohle et. Al. Pride of India- A Glimpse of India's Scientific Heritage edited by SanskritBharati, 2006.
- Suresh Soni, India's Glorious Scientific Tradition, Ocean Books Pvt. Ltd., 2010.
- Sibaji Raha, et al, History of Science in India Volume-1, Part-I, Part-II, Volume VIII, NationalAcademy of Sciences, India and The Ramkrishna Mission Institute of Culture, Kolkata, 2014.

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TEXTILE FIBRE-I (TEPC-311)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	0	0	3	MaximumMarks:40	MaximumMarks:60	100	3 Hours
				MinimumMarks:16	MinimumMarks:24	40	

INSTRUCTIONS TO THE QUESTION PAPER SETTER:

Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus

COURSE OBJECTIVES: The objective of this course is to familiarise the students with the different fibre forming polymers, their structure and properties. Another objective of this course is to introduce the natural fibres which are used for textile applications

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction**: Definition of Textiles, Fibre, Staple fibre, Filament, Yarn, Thread, Fabric and Clothing. Essential and desirable properties of textile fibres. Requirement of fibre forming polymers. Classification of textile fibres. **Polymers:** Degree of Polymerization. Types of polymer, Orientation and crystallinity in fibres. Molecular architecture, amorphous and crystalline phases, glass transition, plasticization, crystallization, melting, factors affecting T_g and T_m.	8
II	**Cotton** – Varieties: Genetically modified Cotton, Organic Cotton & Coloured Cotton, Cultivation and harvesting, Chemical composition, Chemical structure, Morphological structure, Physical properties, Chemical properties and uses. **Bast Fibres:** Jute: Cultivation, Retting, Fibre Extraction and Properties. Ramie: Chemical composition, properties and processing of Ramie fibre. Hemp: Physical and chemical properties, Structure, Primary processing of Hemp stalk and Retting. Sisal: Chemical composition, Properties, Fibre structure, Production and early processing. Mudar fibre: Properties and composition. Varieties and uses –Kenaf, Banana and coir	9

	fibre.	
III	**Protein Fibres:** Wool – Types, Fibre extraction, Chemical Composition, Chemical structure, Morphological structure, Physical properties, Chemical properties and uses. Silk – Types, Production of Raw silk, Wild silk, Spun silk, Chemical composition, Chemical structure, Physical properties, Chemical properties and uses. Spider Silk: Types and Properties. **Regenerated Protein Fibres:** Principle of manufacture of Casein fibre, Vicara fibre, and Ardil fibre. General properties and applications.	**9**
IV	**Regenerated Cellulosic Fibres:** Principle of manufacture, Viscose rayon production, Purification of viscose fibre, Physical properties, Chemical properties & Uses. Modification of viscose rayon. Other regenerated cellulosic fibres – Tencel, Modal and Bamboo. Unconventional natural fibres. **Identification of Fibres:** Feeling Test. Burning test. Microscopic test. Staining Test. Chemical test and Density measurement.	**8**

COURSE OUTCOMES:-

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

CO1 Classify textile fibres and explain the concept of orientation and crystallinity in fibre

CO2 State the process of cultivation, harvesting and fibre extraction of natural cellulosic fibres and to analyze various factors contributing to properties of these fibres.

CO3 Explain the extraction process of natural and regenerated protein fibres and to compare their properties.

CO4 Discuss the process of formation of regenerated cellulose fibre and to demonstrate different fibre identification methods.

TEXT BOOKS:

1. Mishra S P, —***A Text Book of Fibre Science and Technology***,‖ New Age. International (P) Ltd., Pub., New Delhi, (2000).

2. Sreenivasamurthy H V —***Introduction to Textile Fibres***‖, The Textile Association India, Mumbai, (1998).

3. Gohl E.P.G & Valensky —***Textile Science***‖ CBS Publishers and Distributors, New Delhi, 2nd Ed Reprint- (2005).

REFERENCE BOOKS:

1. Bernard P Corbman, —***Textiles: Fibre to Fabric,***‖ McGraw Hill Book Co., Singapore, (1983). ISBN:0070131376

2. Marjory L Joseph, —***Essentials of Textiles",*** CBS College Publishing, New York, (1984), ISBN:0030627389

3. NPTEL course on Textile Fibres by S. Mukhopadhyay, IIT Delhi.

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PROPERTIES OF FIBRE (TEPC-312)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	0	0	3	Maximum Marks:40	Maximum Marks:60	100	3 Hours
				Minimum Marks:16	Minimum Marks:24	40	

INSTRUCTIONS TO THE QUESTION PAPER SETTER:

Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus

COURSE OBJECTIVES:

To teach the fundamentals of fibre structure and physical characterization methods and to provide knowledge of fibre properties such as moisture, mechanical, optical, frictional, electrical and thermal properties in terms of structure of the fibres.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fiber structure:** Basics of polymers, Homo and copolymers, amorphous and crystalline phases, thermal transitions, glass transition temperature, melting, crystallization, Fibre structure models, fiber structure models, fringed-micelle, fringed-fibril, and folded chain models. **Structure investigation.:** Investigation of physical structure of fibres, X-ray diffraction, Differential scanning calorimetry (DSC), Thermo-Gravimetric Analysis (TGA), Fourier Transform Infrared Spectroscopy (FTIR), Sonic modulus, Scanning electron microscopy (SEM), Optical microscopy with hot stage, density gradient columns	9
II	**Moisture absorption:** Moisture regain and content, relation between relative humidity and regain, moisture absorption and desorption in fibres, heat of sorption, measurement, quantitative theories of moisture absorption, hysteresis, rate of absorption of moisture, retention of liquid water, swelling **Fibre friction:** Technological importance. Static and Kinetic Friction, Nature of Friction, Fibre on Fibre Friction and Fibre on other material Friction.	8

	Measurement of friction. Factors affecting Coefficient of friction, Effect of load and area of contact, Lubrication.	
III	**Mechanical Properties:** Load-elongation and stress-strain curves, elastic recovery, dynamic tests, Factors influencing results of tensile experiment, Weak link effect theory. Elastic recovery. Effect of test conditions on recovery, Cyclic testing. Fibre fracture and fatigue. **Viscoelastic Properties:** Viscoelastic models, Maxwell model, Kelvin Model, creep and stress relaxation, mechanical conditioning, Bending and torsional properties of fibre. Structural effect on extension behaviour.	**9**
IV	**Electrical Properties:** Basic concept of Electrical conductivity, Electrical conductivity of polymer fibres, effect of different factors on the electrical resistance of fibres. Static electricity: Introduction and significance. Measurement of static electricity. Explanation of static phenomena. Anti-Static treatment. Dielectric properties: Definition and effect of different parameters on dielectric properties **Optical properties:**Polarization and Light, Refractive index and birefringence. Birefringence and orientation of fiber. Reflection and lustre, Absorption, and dichroism	**8**

COURSE OUTCOMES:-

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

CO1 Analyze fiber structure and properties using advanced techniques

CO2 Investigate moisture absorption and its effects on fibers.

CO3 Evaluate mechanical, viscoelastic, electrical, and optical fiber properties

CO4 Apply knowledge to predict and interpret fiber behaviors.

TEXT BOOKS

1. Fundamental of fibre Science, Zhang X, DEStech Publications, Inc 2014.
2. Physical properties of Textile Fibres by W. E. Morton & J. W. S. Hearle, Woodhead Publishing, 2008
3. Gupta V B and Kothari V K, —Manufactured Fibre Technology‖, 1st Ed., Chapman and Hall, London (1997)
4. Hearle J W S, —Polymers and their properties", Vol. I, John Wiley and Sons, NY (1982)

REFERENCE BOOKS

1. Introduction to Polymers - Robert J. Young and P A Lovell., 2011
2. Handbook of Fibre Chemistry by M. Lewin, CRC Press, 2006.
3. Structure Formation in Polymeric Fibre by D. R. Salem, Hanser Publishers, 2000.
4. Polymer Viscoelasticity: Stress and Strain in Practice by E. Riande, R. Diaz-Calleja, M. Prolongo and R. Masegosa, Marcel Dekker, 1999.

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YARN MANUFACTURE – I (TEPC-313)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	0	0	3	MaximumMarks:40	MaximumMarks:60	100	3 Hours
				MinimumMarks:16	MinimumMarks:24	40	

INSTRUCTIONS TO THE QUESTION PAPER SETTER:

Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus

COURSE OBJECTIVES: To teach the design, constructional features and working principles of spinning preparation machines – ginning machinery, blowroom, card, drawframe and to educate on the processing of different types of fibres and their blends according to the specifications and needs of the customers.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction**: Introduction to the terms 'Textiles', 'Fibres', 'Filaments', 'Yarns' and 'Fabrics'; Understanding various properties of fibres and assessing the essential and desirable properties of fibres required for staple yarn preparation; Basic operations involved in yarn production – a brief conception. Process flowchart for carded and combed yarn manufacturing. Yarn numbering systems and their conversion; A brief idea about Yarn classifications. **Ginning:** Impurities in cotton fibres and their removal during pre-baling operation, objective of ginning, study of ginning machineries, Pre and post ginning, baling of fibers, latest developments.	9
II	**Blow room:** Basics of Opening, cleaning, mixing and blending and their sequential implementation in yarn preparatory stage; Objectives of blowroom; Basic operations in blowrooms; Sequence of opening and cleaning machineries in conventional and modern blowroom, Various types of opening elements in blowroom, fibre opening in blowroom, Principles of cleaning at blowroom, influence of process parameters, grid bar adjustment, Processing of natural and	8

	synthetic fibres in blowroom. **Blow room Performance:** Process Performance of blowroom machines for such as cleaning efficiency, Degree of Opening etc.; Production calculation, and fiber waste in blowroom.	
III	**Carding:** Objectives and functions of carding machine; Mechanism of feeding into a card; Principles of actions in different zones of carding and concept of card clothing, wire geometry at different regions of card, rotation of flats, stationary flats; Web formation in card, tension draft. Autoleveller in card, Transfer efficiency of card- a brief idea, Mechanism of hooks formation in carding. Modern developments in carding machines. **Carding Performance:** Process performance of carding viz. cleaning efficiency, wastes, nep formation, sliver unevenness etc. Actual and mechanical draft, Draft and production calculations of card	**9**
IV	**Drawframe:** Principles of equalizing (doubling) and drafting processes; A idea of drafting theory; Different types drafting arrangements; Zone-wise study of a draw frame machines viz. creel section, drafting zone, dust removal region, material condensing and delivery sections. Mass variations of fibrous assembly and their monitoring and control; Basic principle of auto-levelers; Classifications of Auto-leveller. Modern developments in drawframe. **Drawframe Performance:** Process performance of Draw frame viz. U%, Imperfection etc. Draft and Production calculations of draw frame machines.	**8**

COURSE OUTCOMES:

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

CO1 Analyze fiber properties and yarn production processes

CO2 Evaluate ginning, blow room, carding, and draw frame operations.

CO3 Apply principles of cleaning, mixing, and drafting in yarn preparation.

CO4 Assess process performance and efficiency metrics.

CO5 Implement production calculations for optimized yarn manufacturing

TEXTBOOKS

1. The Technology of Short Staple Spinning' by W. Klein. The Textile Institute Publication, Manual of Cotton Spinning, Short Staple Spinning Series;
2. A Practical Guide to Opening & Carding, W. Klein. The Textile Institute Publication, Manual of Cotton Spinning, Short Staple Spinning Series;
3. A Practical Guide to Combing & Drawing by W. Klein, The Textile Institute Publication, Manual of Cotton Spinning, Short Staple Spinning Series;
4. The characteristics of Raw Cotton' by P. Lord. The Textile Institute Publication, Manual of Cotton Spinning, vol. II, Part-I;
5. Opening & Cleaning' by C. Shirley, The Textile Institute Publication, Manual of Cotton

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Spinning, vol. II, Part-II;
6. The Principle of Roller Drafting &The Irregularity of Drafted Materials' by G. A. R. Foster,
7. Fundamentals of spun yarn technology' by Carl A. Lawrence;
8. Cotton Ginning' – Textile Progress, The Textile Institute Publication;
9. Spun Yarn Technology' (Vol-1 & Vol-2) by A Venkatasubramani;
10. Blow room and Carding' – Training Programme conducted by NCUTE, IIT, Delhi.
11. Essential Calculations of Practical Cotton Spinning' by T.K. Pattabhiraman

REFERENCE BOOKS

1. Salhotra K R, "Spinning of Man Made Fibres and Blends on Cotton Spinning Systeml, The Textile Association, Mumbai (1989).
2. Khare A R, —Elements of Blowroom, Carding and Drawframe", Sai book Centre, Mumbai (1999).

FABRIC MANUFACTURE-I (TEPC-314)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	0	0	3	MaximumMarks:40	MaximumMarks:60	100	3 Hours
				MinimumMarks:16	MinimumMarks:24	40	

INSTRUCTIONS TO THE QUESTION PAPER SETTER:

Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus

COURSE OBJECTIVES: To educate about the basic principle of weaving and to teach the design, constructional features and working principles of machine and methods used for weaving preparatory process and the primary motions of weaving.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	Introduction to various fabric manufacturing process flow chart, methods, weaving, knitting, nonwoven and braiding, Warp, weft, crimp, fabric cover, porosity, GSM and related concepts with some basic calculations. Doubling: Objective and types, TFO: Objectives, machine parameters, properties of TFO yarn. **Winding:** Objectives of winding, types of packages, types of winding machines: drum and precision, terms related to winding: wind, wind per double traverse, angle of wind, expressions of winding speed, angle of wind and traverse ratio. Winding machine zones: Unwinding, Tensioning and clearing, winding, problems in winding, Patterning: Reasons and remedies. Yarn path with different traverse ratio, gain, Conditions for uniform building of cheese and cones, Auto winders Autoconer: Objective, machine parameters, Yarn fault classifying systems: Classimat faults, Pirn winding: principles, build of the pirn; Calculations related to winding.	9
II	**Warping:** objectives of warping, warping creels, efficiency of warping; Beam	8

	warping, machines, passage of warp, yarn tension in warping, leasing and beaming, control systems in warping; Sectional warping, objectives, passage of warp, angle of cone and traverse of warp band; derivation for volume of yarn to be stored on beam, actors effecting warp quality on beam Calculations related to beam and sectional warping. **Sizing**: Objectives, sizing-weaving curve, Sizing machine: creel, size box configurations, squeeze rollers, factors influencing the size pick-up, viscosity of size paste and its measurement, Drying systems. Sizing ingredients, size preparation, control points. Modern trends: single-end sizing, prewetting, hot melt, solvent and cold sizing; Quality of sized yarns; Performance assessment and calculations.	
III	**Drawing In**: Importance, manually and automatic drawing process, design with its drawing and lifting plan. Calculation of heald and reed count. Weaving: History of weaving with manual and automatic loom, and modern loom revolutions. Different motions of looms: Primary, secondary and auxiliary motions. **Shedding**: Objective, Different types of shedding: Tappet, dobby, jacquard with advantage and disadvantages. Tappet shedding: its limitations, positive and negative shedding, types of shed, early and late shedding, distinct and indistinct shed, shed timing, Reversing mechanisms, importance of bending factor.	**9**
IV	**Picking:** Types of conventional picking: over picking and under picking with its mechanism, advantages and disadvantages, different picking accessories and their functions, Calculation of shuttle velocity and derivation for energy of picking, picking force. Nominal and actual displacement, Loom timing, shuttle velocity and loom speed, loom width and rate of weft insertion, expression for power required for picking. **Beat up:** Expressions of sley displacement, velocity and acceleration Sley eccentricity, effects of sley eccentricity; Beat up force, weaving resistance, bumping conditions, temples.	**8**

COURSE OUTCOMES:

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

CO1. Identify factors influencing yarn quality for weaving.

CO2. Understand the significance of preparatory processes in fabric manufacturing.

CO3. Relate machine components in winding, warping, and sizing to fabric properties.

CO4. Illustrate the importance of primary motion in fabric production.

CO5. Design operational sequences for woven fabric production considering fabric quality factors and production.

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TEXTBOOKS

1. Talukdar M K, Srirammulu P K and Ajgaokar D B, —*Weaving – Machine, Mechanism and Management*‖, Mahajan Publisher Private Ltd., Ahmedabad, India (1998).
2. Mark R, Robinson A T C, —*Principles of Weaving*, The Textile Institute, Manchester (1986).
3. Weaving: Conversion of Yarn to Fabric by P. R. Lord and M. H. Mohamed, Woodhead Publishing (1982).
4. Principles of Woven Fabric Manufacturing by A. Majumdar, CRC Press (2016).

REFERENCE BOOKS

1. Booth J E, —*Textile Mathematics", Part III*, Textile Institute, Manchester (1977).
2. Dr. Sabit Adanur, —*Hand book of weaving*‖ Technomic Publishing Company Inc Lancaster, Basel, UK (2001)
3. *Winding,* BITRA Monograph Series, Bombay Textile Research Association, Bombay (1981).
4. *Warping and Sizing*, BTRA Monograph Series, Bombay Textile Research Association, Bombay (1981).
5. Principles of Fabric Formation by P. K. Banerjee, CRC Press (2015).
6. Textile Sizing by B. C. Goswami, R. Anandjiwala and Hall, Woodhead Publisher

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THEORY OF TEXTILE MACHINES (TEPC-315)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	1	0	4	MaximumMarks:40	MaximumMarks:60	100	3 Hours
				MinimumMarks:16	MinimumMarks:24	40	

INSTRUCTIONS TO THE QUESTION PAPER SETTER:

Question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus

COURSE OBJECTIVES: Theobjective of this course is to introduce the students to the basic mechanisms and motion transmission systems used in machines so that they can follow and analyze various components of machines used in textile industry.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Basic concepts**: Kinematics of machine, machine and structure, kinematics link and their different type, types of kinematics pair, degree of freedom, kinematics chain, types of joints in kinematic chain, mechanism and inversion of four bar chain, single slider and double slider crank mechanism. Analysis of four-bar sley motions in shuttle loom.	8
II	**Belt, rope and chain drive**: Types of belt drives, velocity ratio, law of belting, concept of slip and creep, length of belt, ratio of driving tensions for flat belt and v-belt, power transmitted, effect of centrifugal tension on power transmission, condition for maximum power transmission, initial tension in the belt, relative advantage and disadvantage of chain and belt drives. Applications of belt, chain and rope drives in textile machines.	8
III	**Gears**: Classification of gears, terminology used in gear, law of gearing, forms of teeth, construction, properties and comparison of an involute and cycloidal teeth, length of path of contact, arc of contact, number of pairs of teeth in contact, interference, minimum number of teeth on the pinion and wheel to avoid	9

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	interference, minimum number of teeth on the pinion for involute rack to avoid interference, undercutting, terminology of helical and worm gears. **Gear trains:** Definition, types: simple, compound, reverted and epicyclic gear trains, velocity ratio of epicyclic and compound epicyclic gear trains. Selection and applications of gears in textile machines, planetary gear trains in speedframe and comber.	
IV	**Cams and follower**: Types of cams and followers, cam terminology, types of motion of the follower, radial and offset cam designing for uniform velocity, SHM, and uniform acceleration and retardation motion of the follower, Design of cams for ring rail movement in ring spinning, belt shifting in speed frame and shedding in shuttle loom.	**9**

COURSE OUTCOMES:

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

CO1 Understand the basic principles of different mechanism applicable in textile machines.

CO2 Proficient in the use of mathematical methods to design linkage with belt, chain and rope.

CO3 Analyse gear and gear train for textile applications.

CO4 Apply cam terminologies for design of cam profiles

TEXT BOOKS:

1. Khurmi R.S and Gupta —***Theory of Machine***‖ S. Chand Publisher,New Delhi.
2. Bansal R K, —***A text book of Theory of Machines***‖, Laxmi Publication Pvt. Ltd, New Delhi.
3. Rattan S S, —***Theory of Machines***‖, Tata Mc Graw Hill, New Delhi, 2001.

REFERENCE BOOKS:

1. Ghosh A and Mallik A K, —***Theory of mechanism and machines***‖, Affiliated East West Press Pvt. Ltd, New Delhi, 198
2. Bevan T, —***The Theory of Machines***‖, CBS Publishers and Distributors, New Delhi, 2002.
3., R. S. Rengasamy- **Mechanics of Spinning Machines,** NCUTE, New Delhi, 2002

TEXTILE FIBRE LABORATORY (TEPC-311P)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks:20	50	3 Hours
				Minimum Marks:12	Minimum Marks:8	20	

COURSE OBJECTIVES

- To demonstrate various fibre and blend identification methods.
- To analyse physical and chemical structure of fibre.
- To instruct students in the standard test procedures for various tests.

At least 10 experiments are to be performed by each student

LIST OF EXPERIMENTS

Physical and Chemical identification of following Textile fibre(s)

1. Identification of Cotton
2. Identification of Wool
3. Identification of Silk
4. Identification of Bast fibres
5. Identification of Polyester
6. Identification of Nylon
7. Identification of Acrylic
8. Identification of Polypropylene

Identification of fibres in blend and % fibre content in blend:

9. Analysis of P/C blended fabric
10. Analysis of P/V blended fabric
11. Analysis of P/W blended fabric
12. Estimation of fibre/filament fineness using projection microscope.
13. Determine the thermal behaviour of fibre by using DSC and TGA.
14. Structural analysis of fibre using XRD and SEM.
15. Identification of chemical structure of fibre by FTIR spectroscopy.

COURSE OUTCOMES:

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

CO1 Acquire requisite laboratory skills and become familiar with the use of various fibre identification methods.

CO2 Evaluate the results using various types of fibers and yarns and utilize feedback from evaluations to modify project work, ensuring a quality result.

CO3 Analyze the physical and chemical structure of fibre.

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YARN MANUFACTURE-1 LABORATORY (TEPC-313P)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks:20	50	3 Hours
				Minimum Marks:12	Minimum Marks:8	20	

COURSE OBJECTIVES

- To help students understand spinning techniques and yarn formation principles.
- To explore yarn path mechanisms in various machines used in yarn manufacture.
- To gain practical skills in yarn formation, quality control, and testing methods.

At least ten experiments are to be performed by each student.

LIST OF EXPERIMENTS

1. Introduction to the knowhow of spinning process, sequence, machineries (carded/ combed) used in yarn manufacturing (short and long staple system) including explanation of objects of each machine and their feed as well as delivery materials.
2. Preparation of a flowchart of conventional and modern Blow room line along with machine positioning.
3. Study of following in Shirley trash analyser machine.
   - Chief organs.
   - Gearing arrangements.
   - Teeth inclination and teeth per inch
4. Determination of trash content and analysis of waste by using trash analyzer machine. Calculate the cleaning efficiency.
5. Study of different machines in Blow room operation viz. Bale opener, course and fine cleaning machines, Mixer, De-dusting machines etc.
6. Study and sketch the working mechanism of a card zone wise (viz. Feeding, stripping, carding, transfer, web collection and delivery, waste collection) with respect to flow of material and their dimensions.
7. Study or gearing system of carding machine and calculation of rotational speeds and surface speeds of various components of card.
8. Determination of drafts at various regions of card and draft constant of a carding machine.
9. Different settings and maintenance of a carding machines.
10. Identification and analysis of different types of neps in card web.
11. Study and sketch the working mechanism with respect to flow of material along with dimension zone-wise of a draw frame machine.
12. Study or gearing system and determination of draft constant of draw frame. Determination of individual and total draft, tension draft and calculation of productions of drawframe machines.
13. Study of orientation of fibres in card and drawframe sliver using Lindsley technique.

14. Maintenance and overhauling of draw frame machine.
15. Study of Auto-levellers used on Card and Draw frame machines.

COURSE OUTCOMES:

CO1 Understand spinning machinery and yarn manufacturing processes.
CO2 Analyze Blow room operations and Shirley trash analyzer functions.
CO3 Evaluate carding and drawframe machines for fiber orientation and drafting.

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FABRIC MANUFACTURE-I LABORATORY (TEPC-314P)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks:20	50	3 Hours
				Minimum Marks:12	Minimum Marks:8	20	

COURSE OBJECTIVES

- To show the working principle of various preparatory machine-like winding, warping, sizing, drawing in.
- To demonstrate the need of primary motions in a loom.
- Plan a sequence of machines required to manufacture a fabric considering EPI, PPI, count, cover.

At least 10 experiments are to be performed by each student

LIST OF EXPERIMENTS

1. Analysis of fabric sample to determine the EPI, PPI, weave, fabric sett and crimp.
2. Study of working principle of TFO machine and silent features of machine with yarn characteristics.
3. Study of the motion transmission system in winding machine.
4. Study all the different zones of the winding machine.
5. Calculation of winding speed on grooved drum winding system and study of anti-patterning system incorporated to it.
6. Study of precision winding machine and mechanism of package building.
7. Study of the motion transmission system in Pirn winding machine
8. Study of working of Autoconer automatic winding machine with its machine elements.
9. Study of the sectional warping machine and planning the width of a section according to pattern of the given striped fabric.
10. To study the passage of yarn on a sizing machine and the features of various parts/ mechanism of the sizing machine.
11. To select the proper reed and heald for a weaver's beam keeping in mind the beam, loom size and fabric construction.
12. Analysis of various fabric design with its drafting and lifting plan.
13. Study of shedding mechanism of shuttle loom and cam positioning with respect to loom cycle.
14. Study of picking mechanism of shuttle loom with picker movement in relation with crank shaft rotation and calculation of average velocity of shuttle.

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15. Study of sley movement, construction and calculation of sley eccentricity.

COURSE OUTCOMES:

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

CO1 Develop requisite laboratory skills and become familiar to the machine and its parts.

CO2 Understand and demonstrate the working of preparatory process of weaving and primary motions in various types of loom.

CO3 Work with machine for troubleshoot interactions between the mechanism and machine parts.

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THEORY OF TEXTILE MACHINES LABORATORY (TEPC-315P)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks:20	50	3 Hours
				Minimum Marks:12	Minimum Marks:8	20	

COURSE OBJECTIVES

- To identify basic mechanisms and motion transmission systems used in textile machines.
- To analyse various components of machines used in textile industry.
- To practice designing of belts, gears & gear trains and cam & followers for textile machines.

At least 10 experiments are to be performed by each student

LIST OF EXPERIMENTS

1. To study various types of kinematic links, pairs, and kinematic chains.
2. To analyze four-bar sley motions in shuttle loom.
3. To study various kinds of belts drives.
4. To study various types of chain and rope drives.
5. To find the length of the belt required and the angle of contact between the belt and given pulley for open and crossed belt drives on mentioned textile machine.
6. To study and derive an expression for the ratio of driving tensions for given flat belt drive.
7. To study different types of gears used in textile machines.
8. To study and derive an expression for the minimum number of teeth required on a given pinion to avoid interference when it gears with a rack on mentioned textile machine.
9. Derive an expression for the minimum number of teeth required on the pinion in order to avoid interference in involute gear teeth when it meshes with wheel on mentioned textile machine.
10. To study different types of gear trains used in textile machines.
11. To study planetary gear trains in speedframe and comber.
12. To study various types of cam and follower arrangements used in textile industry.
13. To plot follower displacement Vs cam rotation graph for various cam follower arrangements.
14. Design an offset and radial cam for a given textile machine, with a given minimum cam radius, rotating clockwise at a uniform speed.
15. A cam rotating clockwise with a uniform speed is to give the roller follower of 20 mm diameter with the following motion: i) Follower to move outwards through a distance of 30 mm during 120° of cam rotation ii) Follower to dwell for 60° of cam rotation; iii) Follower to return to its initial position during 90° of cam rotation; and iv) Follower to dwell for the remaining

90° of cam rotation. The minimum radius of the cam is 45 mm and the line of stroke of the follower is offset 15 mm from the axis of the cam and the displacement of the follower is to take place with simple harmonic motion on both the outward and return strokes. Draw the cam profile.

COURSE OUTCOMES:

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

CO1 Acquire requisite laboratory skills and become familiar with basic mechanisms and motion transmission systems used in textile machines

CO2 Analyse various components of machines used in textile industry.

CO3 Design belts, gears & gear trains and cam & followers for textile machines.

SEMESTER-IV

MAFC-311 Probability Theory and Statistics							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Exam	Total	
3	1	0	4	Maximum Marks: 40	Maximum Marks: 60	100	3 Hours
				Minimum Marks: 16	Minimum Marks: 24	40	

Instructions for question paper setter:

The question paper for the end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each (each subdivided into at least two equal sub-parts) and section E has short answer type questions consisting of six parts of 02 marks each or twelve parts of 01 mark each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and Section E will be compulsory. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Objective:

- To understand the basic probability concepts.
- To have an in-depth knowledge of standard distribution which can describe real life phenomena.
- To unerstand and characterize phenomena which evolve with respect to time in probabilisitc manner.
- To analyse the response of random imputs to linear time invariant systems.

Course Contents:

Unit-I:
Probability Theory: Counting principles, Probability axioms, Sample space and events, Conditional probability & Baye's Theorem, Random variable, Discrete and continuous probability distribution, Expectation, Variance, Standard deviation, Joint probability distribution, Mass function, Distribution function, Marginal distribution function, Covariance. **Probability Distributions:** Discrete Probability Distributions: Uniform, Bernoulli, Binomial distribution and Poisson distribution. Continuous Probability Distributions: Normal and exponential distribution.
Unit-II:
Sampling and Testing of Hypothesis: Basic sampling models, Sampling distribution of mean and standard deviation, Testing of hypothesis, Level of significance, Confidence intervals for known and unknown means, Simple sampling of attributes, Tests of significance for large samples, Comparison of large samples, Central limit theorem, Test of significance for two large samples, Student's t-test, Chi-square test, Goodness of fit, F-distribution.

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Unit-III:
Solution of System of Linear, Transcendental Equations & Interpolation: Bisection method, Regula-Falsi method, Newton Raphson's method, Gauss elimination method, LU factorization method. Introduction to interpolation, Lagrange's interpolation, Newton's divided difference interpolation, Difference operators and relations.
Unit-IV:
Numerical Differentiation & Integration: Numerical differentiation using forward difference, backward difference and central difference formula. Integration by trapezoidal and Simpson's rules $1/3^{rd}$and $3/8^{th}$rule. **Numerical Solution of Ordinary Differential Equations:** Picard's method, Taylor series method, Euler's method, Modified Euler's method, Runge's and Runge-Kutta method.

Course Outcomes (COs): After the completion of the course, the student will be able to:

1. Develop understanding of basics of probability theory.
2. Identify different distribution functions and their relevance.
3. Apply the concepts of probability theory to different problems.
4. Understand different numerical integration techniques and numerically solve differential equations.

Text Books:

- R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics (2003), 2nd ed.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
- S.C. Gupta & V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
- K.E. Atkinson, An Introduction to Numerical Analysis (2nd edition), Wiley-India, 1989.
- S. S. Sastry, Introductory Methods of Numerical Analysis (5th edition), PHI Learning Pvt. Ltd.

Reference Books:

- Seymour Lipschutz, and John J. Schiller, Introduction to Probability and Statistics, Schaum's Outlines by McGraw Hill Education.
- E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, New York.
- H.K. Dass and Rajnish Verma, Engineering Mathematics, S. Chand Publications.

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TEXTILE FIBRE-II (TEPC - 411)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	0	0	3	Maximum Marks:40	Maximum Marks:60	100	3 Hours
				Minimum Marks:16	Minimum Marks:24	40	

INSTRUCTIONS TO THE QUESTION PAPER SETTER:

The question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus.

COURSE OBJECTIVES:

To educate on the difference between manmade and natural fibres and to describe different methods of manmade fibre manufacturing and explain how the process parameters can affect fibre properties and characteristics.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Introduction** to man-made fibres: Definition of man-made fibres. Brief history of manmade fibres. Relative merits and demerits of manmade fibres and natural fibres. Synthesis of raw materials from petrochemicals: Elementary idea of synthesis of raw materials viz. DMT, TPA, MEG, Caprolactam, Acrylonitrile, propylene. Raw materials for rayons. **Polymer Production**: PET through TPA and DMT route, Nylon 66 and Nylon 6 - Acrylic - Polypropylene - Elastomeric - Polyvinyl and Aramid fibres.	9
II	**Fundamentals of the fibre spinning process**: Physical fundamentals of the fibre spinning process - spinnability of liquids, rheology of spinning, mechanics of spinning, formation of fibre structure. **Melt Spinning Equipments**: Melting device, Grid and extruder, Static mixer, Pre-filtration, Manifold, Spin pack, Spinneret, Quenching chamber, Spin finish application, Take-up winding. Staple fibre line production details, high speed spinning - Polyester, Polyamide and Polypropylene.	9

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III	**Wet and Dry Spinning**: Preparation of dope, extrusion and fibre formation. Comparison of wet and dry spinning processes. Dry-jet-wet spinning, Gel spinning. Viscose rayon and variants. **Drawing and Heat Setting**: Neck drawing, drawing systems, influence of drawing on structure and properties of fibres. Types of heat setting, influencing parameters on heat setting, influence of heat setting on fibre behaviour.	9
IV	**High performance fibres:** Polymerization, spinning of high-performance fibres and their applications. Modified Synthetic Fibres: Differentially dyeable fibres, Antistatic fibres, Flame retardant fibres, Micro fibres Bicomponent fibres- Cationic dyeable polyester, Polyblend fibres, Tencel. **Quality Control:** Methods for Molecular weight measurements, Thermal characteristic measurements. Testing of filament yarns and staple fibres- denier, tenacity, elongation modulus. - draw force, shrinkage force.	9

COURSE OUTCOMES:

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

- **CO1.** Develop insight about the evolution of manmade fibres
- **CO2.** Differentiate between different fibre types viz. natural and manmade fibres
- **CO3.** Develop insight about the synthesis of monomers and polymers used for different manmade fibres
- **CO4.** Clearly interpret the fundamentals of fibre spinning
- **CO5.** Assess the quality related aspects of manmade fibres
- **CO6.** Appraise the functional developments in manmade fibres

TEXTBOOKS:

1. Vaidya A A, —Production of Synthetic fibres, Prentice-Hall of India Pvt. Limited., New Delhi(1988).
2. Gupta V R and Kothari V K, —Manufactured fibre Technology, Chapman & Hall Publication, (1997).

REFERENCE BOOKS:

1. Mc lntyre J. E,—Synthetic Fibres‖, Univ of Leeds, UK,(2000)
2. Klein W, —Man Made Fibres and their processing ‖, Vol. 6, The Textile Institute, (1996)

YARN MANUFACTURE – II (TEPC-412)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	0	0	3	Maximum Marks:40	Maximum Marks:60	100	3 Hours
				Minimum Marks:16	Minimum Marks:24	40	

INSTRUCTIONS TO THE QUESTION PAPER SETTER:

The question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus.

COURSE OBJECTIVES:

To teach the design, constructional details and working principles of spinning machines (comber, speed frame, ring frames, alternative spinning systems) and to educate the inter-relationship of the process of conversion of fibres to yarns and the related machinery features.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Combing:** Preparation of fibre assembly for combing from slivers to comber lap, sliver lap, ribbon lap and unilap former, Noils in comber. Sequence of combing operations in a Combing cycle. Zone-wise description of components of Comber machine and their driving arrangement. Fibre-fractionation and its theory in combing. Noils theory in comber. Role of cylinder comb and top comb, Modern developments and Automation in comber **Combing Performance:** Calculation related to production, draft in comber and its preparatory machines. Quality aspects in combing, Numerical problems, norms, performance assessment.	9
II	**Roving Frame:** Objectives, roller drafting systems with aprons, role of spacers; Purpose and principle of flyer twisting, types and design, Winding of rovings, bobbin and spindle drive, geometry of roving-build bobbins, flyer-lead and bobbin-lead methods, Principle and design aspects of builder motion in roving frame, package faults and their control. **Roving Frame Performance:** Calculations pertaining to speed, production, draft and twist, coils/inch etc. Numerical problems, Quality aspects in speed frame.	8
III	**Ring Frame:** Objectives and mode of operation of ring frame, role of drafting	9

	system, yarn guiding devices, forces acting between ring and traveller, yarn tension variation, balloon tension at maximum diameter, tasks of traveller, limiting speed, classification, form of traveller, traveller mass and material, different ring-traveller combinations, fibre lubrication, running on new-ring. **Ring Frame Performance:** Quality aspects in ring spinning. Calculation related to production etc	
IV	**Yarn Production Dynamics:** Study of package building. Spinning geometry. Analysis of forces on yarn and traveller. End breaks during spinning. New developments and automation in ring frames. spinning triangle, overhang, twist and tension variation during cop build, expression of yarn tension; Yarn twist structures, twist directions and twist calculations. **Exploring Ring Spinning Innovations:** Advantages and Disadvantages of Ring spinning, Modifications in Ring spinning machines. Principles of, Compact, Siro, and Solo Spinning	**8**

COURSE OUTCOMES:

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

CO 1. Analyze combing and roving frame operations, assessing performance metrics and quality control measures.

CO 2. Evaluate ring spinning dynamics and innovations, including package building and tension analysis.

CO 3. Understand principles of roving frame mechanisms and flyer twisting, addressing package faults.

CO 4. Assess performance in roving and ring spinning, calculating speed, draft, and twist for optimization.

CO 5. Explore advancements in ring spinning machines, considering modifications and advantages.

TEXT BOOKS:

1. The Technology of Short Staple Spinning' by W. Klein. The Textile Institute Publication, Manual of Cotton Spinning, Short Staple Spinning Series (volume-1)
2. A Practical Guide to Combing & Drawing by W. Klein, The Textile Institute Publication, Manual of Cotton Spinning, Short Staple Spinning Series (volume-3)
3. A Practical Guide to Ring Spinning by W. Klein, The Textile Institute Publication, Manual of Cotton Spinning, Short Staple Spinning Series (volume-4)
4. Spun Yarn Technology' by Eric Oxtoby, Butterworth, London, 1987
5. Fundamentals of spun yarn technology'- Edited by Carl A. Lawrence, CRC Press, 2000

REFERENCE BOOKS:

1. Khare A R —Elements of Ring Frame and Doubling‖, Sai book Centre, Mumbai (2000).
2. Salhotra K R, —Spinning of Man Mades and Blends on Cotton System‖, The Textile Association of India, Mumbai (1989).
3. Chattopadhyay R and Rengasamay R, —Spinning: Drawing, Combing and Roving‖, NCUTE-Pilot Programme (1999).

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TEXTILE CHEMICAL PROCESSING -1 (TEPC-413)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	0	0	3	MaximumMarks:40	MaximumMarks:60	100	3 Hours
				MinimumMarks:16	MinimumMarks:24	40	

INSTRUCTIONS TO THE QUESTION PAPER SETTER:

The question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus.

COURSE OBJECTIVES:

To impart overall knowledge about the concepts of textile wet processing, pretreatment before wet processing for textiles and to acquire the knowledge various processing machinery of textile fibre/material.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Preparation before chemical processes Singeing:** Objectives, suitability of material. Singeing methods: plate, roller and gas singeing, merits and demerits, precautions, advancement, bio-singeing. **Desizing:** Objectives and methods of desizing: hydrolytic & oxidative processes, viz. rot, acid, enzyme, chlorine. Chlorite and bromite methods, influence of controlling parameters, merits and demerits of each method; mechanism of removal of starch in all these processes, evaluation of desizing efficiency.	8
II	**Scouring:** Objective, impurities in cotton and their chemical nature and possible methods of removal, importance of alkali scouring, surfactants, enzymatic scouring. Factors affecting scouring, methods of scouring, different scouring equipment e.g., High pressure kier, steamer, their construction, working principle, capacity, solvent scouring, scouring of colored cotton, method of evaluation of scouring efficiency **Bleaching:** Objective, classification of bleaching methods, different bleaching agents, their relative merits and demerits, hypochlorite, chlorite, peroxide bleaching, their mechanisms, bleaching parameters, methods of bleaching, role of chemicals used in bleaching, method of evaluation of bleaching efficiency. **Optical brightening agents: Introduction**, Chemical constitution of optical	9

	brighteners, Mechanism of fluorescent whitening, Factors influencing the functions of optical whiteners Application of optical brighteners.	
III	**Mercerization:** Objectives, mechanism related to various physical and chemical changes in cotton during mercerization. Process parameters and operation, causticization. Barium activity number, its determination& interpretation. Wet and hot mercerization. Ammonia treatment of cotton. Performance of different mercerization processes Treatment with liquid ammonia: Objective, methods, relative merits and demerits, evaluation. **Heat setting:** Objectives, types, mechanism of setting in each type. Heat setting conditions, controls and efficiency. Heat setting of polyester, nylon, acetate and their blends, machines involved in heat setting, Evaluation of heat setting efficiency.	8
IV	**Combined pre-treatment processes of textiles:** Introduction Combined scouring and desizing Combined scouring and bleaching Combined desizing, scouting and bleaching. **Pre-treatment of textiles under plasma conditions:** Introduction, The concept of plasma: Corona discharge, Glow-discharge, Generation of plasma and its action, Machine performance for producing plasma, The interaction of plasma with substrate, Surface modification of fabrics under plasma treatment **Application of biotechnology in the pre-treatment processes of textiles:** Introduction, Enzymes for textile application, Treatment of cotton with enzymes, Treatment of protein fibres with enzyme	9

COURSE OUTCOMES:

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

CO1. Understand and apply textile pre-treatment processes, including singeing, desizing, scouring, bleaching, and mercerization.

CO2. Analyze efficiency and effectiveness of pre-treatment methods, considering parameters and evaluation techniques.

CO3. Synthesize knowledge to propose innovative solutions for sustainable textile production.

CO4. Apply advanced technologies like plasma treatment and biotechnology in pre-treatment processes.

CO5. Evaluate environmental and ethical considerations, advocating for sustainable practices in textile production.

TEXT BOOKS:

1. Shenai V.A, "Technology of Bleaching and Mercerisation ‖, Sevak Publications, Mumbai (1991)
2. Peters R. H, —Textile Chemistry‖, Vol - II, Elsevier Publishing Company, London (1967).
3. Karmakar S R, Chemical Technology in Pre-Treatment Processes of Textiles, Elsevier, Publishing Company, London (1999).

REFERENCE BOOKS:

1. Mittal R M and Trivedi S S, —Chemical Processing of polyester / cellulosic Blends, Ahmedabad Textile Industries Research Association, Ahmedabad, India.

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FABRIC MANUFACTURE-II (TEPC-414)							
Teaching Scheme			Credits	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
3	0	0	3	MaximumMarks:40	MaximumMarks:60	100	3 Hours
				MinimumMarks:16	MinimumMarks:24	40	

INSTRUCTIONS TO THE QUESTION PAPER SETTER:

The question paper for the end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus.

COURSE OBJECTIVES:

- To educate about the secondary motion and auxiliary motions required to continue the weaving process producing productive fault free fabric and to teach the design, constructional features and working principles of modified replenished and box motion loom.
- To impart overall knowledge about the concept of dobby and jacquard looms.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Let-off System**: Objective and types, types of tension variation, Warp and cloth control, different types of let-off systems, control of tension variation. **Take-up:** Objective, Types of take-up and their mechanisms, calculation of periodic faults, anti-crack motion, dividend calculation, and control of pick density, calculation related to it.	9
II	**Warp Stop**: Objective, Types of warp stop motions and their functioning, mechanism, advantage and disadvantage. Weft Stop: Objective, Types of weft stop motions and their functioning, mechanism, advantage and disadvantage. **Warp protector**: Objective, Types of warp protector motions and their functioning, mechanism, advantage and disadvantage. Temple: objective, importance and types	8
III	**Weft Replenishment System**: Pirn replenishment mechanism: Cimmco and Ruti C, its limitations, different types of feelers used for it. Shuttle changing mechanism, bobbin loader mechanism and automatic loom winder. **Box changing motion**: Objective, types, its advantage and disadvantage,	9

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	Working mechanism of multiple box motions: weft mixing, cow burn, sliding gear box, pick at will	
IV	**Dobby:** Scope of dobby, different types of dobby: Keighley, climax, cam, paper, rotary, positive, cross border and their mechanism pegging system as per design of weave. **Jacquard:** Scope of jacquard, working of different types of jacquards: single lift single cylinder, double lift single cylinder, double lift double cylinder and electronic jacquard. Harness ties and design ties, card punching machine.	8

COURSE OUTCOMES:

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

- **CO1.** Define the basic need of secondary motions for the continuous manufacturing of fabric in any loom.
- **CO2.** Understand the significance of auxiliary motions in ensuring fault-free fabric production.
- **CO3.** Utilize advanced technologies in shuttle looms, such as Weft Replenishment System and Box changing motion, for fabric manufacturing.
- **CO4.** Appreciate the versatility of tappet and jacquard looms in weaving intricate fabric designs.
- **CO5.** Create a streamlined sequence of processes and loom utilization for efficient and productive fabric manufacturing.

TEXT BOOKS:

1. Talukdar M K, Srirammulu P K and Ajgaokar D B, —Weaving – Machine, Mechanism and Management‖, Mahajan Publisher Private Ltd., Ahmedabad, India (1998).
2. Mark R, Robinson A T C, —Principles of Weaving, The Textile Institute, Manchester (1986).
3. Weaving: Conversion of Yarn to Fabric by P. R. Lord and M. H. Mohamed, Woodhead Publishing (1982).
4. Principles of Woven Fabric Manufacturing by A. Majumdar, CRC Press (2016).

REFERENCE BOOKS:

1. Dr. Sabit Adanur, —Hand book of weaving Technomic Publishing Company Inc Lancaster, Basel, UK (2001)
2. Principles of Fabric Formation by P. K. Banerjee, CRC Press (2015).
3. T. F. Bell, "Jacquard Weaving and Designing" (1895)
4. P. K. Sriramalu, D. B. Ajgaonkar and M. K. Talukdar, Weaving Machines Mechanisms, Management Mahajan publishers, Ahmedabad, 2000.

Artificial Intelligence in Engineering (CSPC-414)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P	C	Internal Assessment	End Semester Exam	Total	
3	0	0	3	Maximum Marks:40	Maximum Marks:60	100	3 Hours
				Minimum Marks:16	Minimum Marks:24	40	

Instructions for question paper setter:

The question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidates will attempt five questions in all, i.e. one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and Section-E will cover the whole syllabus.

Course Contents:

Unit-I:
Fundamentals of Artificial Intelligence (AI): Introduction to AI, History of AI, General applications of AI, Need of AI in Engineering, Problem solving, Process of problem solving, breadth first search, depth first search, heuristics search techniques, best first search, Introduction to intelligent systems, Various approaches to AI: Cybernetics and brain simulation, Symbolic, Sub-symbolic, Statistical. **Ethical and Social Implications of AI:** Ethical considerations in AI development and deployment, Impact of AI on jobs and society, Regulatory and policy issues.
Unit-II:
Fundamentals of Machine Learning (ML): Introduction to Machine Learning, datasets, Forms of Learning: Supervised and Unsupervised Learning, reinforcement learning, processes involved in Machine Learning, Applications of ML in Engineering. **Data Preprocessing, cleaning and normalization Approaches in Machine Learning (ML):** Data preprocessing, Data cleaning, Feature selection and extraction, Data normalization and scaling.
Unit-III:
Artificial Neural Networks: Introduction to Artificial Neural Networks (ANNs): Definition and history of ANNs, Types of ANNs architecture, Basic architecture of ANNs, Activation functions, Singled- Layered and Multi-Layered Perceptron, Backpropagation algorithms, Applications of ANNs in Engineering.
Unit-IV:
Fuzzy Logic and Genetic Algorithm: Introduction to Fuzzy Logic: Basic concepts, history, and fuzzy set theory. Processes in a fuzzy logic system, Applications of Fuzzy Logic in Engineering. Genetic Algorithm (GA): Basics of GA, Main operations of GA, Flowchart of GA, Working principle of GA in step by step, Applications in Engineering.

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Text/Reference Books:

1. Russell and Norvig, —Artificial Intelligence- A Modern Approach‖, Pearson Prentice Hall.
2. D W Patterson, —Artificial Intelligence and Expert Systems‖, Prentice Hall of India.
3. B. Vegnanarayana —Artificial neural networks‖, Prentice Halll of India P Ltd
4. Elaine Rich, Kevin Knight, —Shivashankar B. Nair, Artificial Intelligence‖, Tata McGraw Hill.
5. Nils J Nilsson, —Artificial Intelligence A New Synthesis‖, Morgan Kaufmann

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Demonstrate fundamental understanding of Artificial Intelligence (AI) and its foundation
2. Apply basic principles of AI in solutions that require problem solving, inference, perception,knowledge representation, and learning
3. Demonstrate proficiency in applying scientific method to models of machine learning
4. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societalimplications

HS-311 Engineering Economics							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P	C	Internal Assessment	End Semester Examination	Total	
2	0	0	2	Maximum Marks: 40	Maximum Marks: 60	100	3 Hrs
				Minimum Marks: 16	Minimum Marks: 24	40	

Instructions to the question paper setter:

The question paper of end semester examination will be of 60 marks. The question paper will consist of five sections A, B, C, D and E. Sections A, B, C and D will have 2 questions of 12 marks each and section E has short answer type questions consisting of six parts of 02 marks each. The candidate will attempt five questions in all, i.e., one question each from sections A, B, C, D and the compulsory question from section E. In the question paper, the questions available in sections A, B, C and D will be covered from Unit-I, Unit-II, Unit-III and Unit-IV respectively and section-E will cover whole syllabus.

Course Learning Objectives:

- Understand the basic definitions, nature, scope, and significance of economics.
- Learn about the elasticity of demand, its types, methods of measurement, and its importance in economicanalysis.
- Examine price determination under different market structures, including perfect competition, monopoly,monopolistic competition, and oligopoly.
- Explore the meaning, types, theories, causes, effects, and control measures of inflation.

Unit-I
Introduction: Definition, Nature, Scope, Importance and significance of Economics, Distinction between Microeconomics and Macroeconomics. Concept of Utility and Its Types. **Demand and** **Supply:** Meaning, Demand Function, Law of Demand. Elasticity of Demand, Types, Measurement and importance. Demand Forecasting and itstechniques. Concept of Supply, Law of supply.
Unit-II
Production Function: Concept and types, Returns to Factor and Returns to Scale, Law of Variable Proportions. **Cost and Revenue:** Concept of Cost, Short run and Long-run Cost Curves, Relationships among various costs,Break-even Analysis. Revenue: Concept and its types.

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Unit-III
Market Structure: Price Determination under Different Market Structure i.e. Perfect Competition, Monopoly, Monopolistic Competition Oligopoly. **Reserve Bank of India:** Nature, Organisation Structure, Objectives, Function of RBI. **Monetary Policy and Fiscal Policy:** Meaning, Objectives and Its tools and Techniques of Monetary and Fiscal Policy.
Unit-IV
National Income: Definition of National Income and its Aggregates, Methods of Calculating National Income. **Inflation:** Meaning, Types, Theories, Causes, Effects and Control. **Business Cycle** – Meaning-Phases of businesscycle.

Course Learning Outcomes (CLOs):

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

- Identify the determinants of supply and demand; demonstrate the impact of shifts in both market supply anddemand curves on equilibrium price and output.
- Determine the roles that prices and markets play in organizing and directing economic activity
- Calculate and graph the short-run and long-run costs of production, supply and demand elasticities.
- Describe governmental efforts to address market failure such as monopoly power, externalities, and publicgoods.
- Examine and interpret a nation's economic performance indicators such as economic growth,unemployment and inflation from a macroeconomic perspective.
- Articulate the mechanics and institutions of international trade and their impact on the macro economy.

Textbooks:

1. Steven A. Greenlaw, David Shapiro, **"Principles of Economics"**,2nd Edition, Rice UniversityOpenStax, 2020.ISBN-13: 978-1947172371.
2. Managerial Economics, 8/e, D N Dwivedi, Vikas Publishing.

Reference Books:

1. N. Gregory Mankiw, **"Principles of Economics"**,8th Edition, Cengage Learning, 2016.ISBN-13:978-0357038314.
2. Niall Kishtainy, **"The Economics Book: Big Ideas Simply Explained"**,1st Edition, DK Publishers,2012.ISBN-13:978-0756698270.
3. Yves Hilpisch, **"Python for Finance: Mastering Data-Driven Finance"**, 2nd Edition, O'Reilly Media,2018 ISBN-13:978-1492024330.

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YARN MANUFACTURE-II LABORATORY (TEPC-412P)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks:20	50	3 Hours
				Minimum Marks:12	Minimum Marks:8	20	

COURSE OBJECTIVES

- To help students understand studies on combing efficiency and yarn quality parameters.
- To investigate drafting and twisting mechanisms in speed and ring frames.
- To gain practical skills in maintenance procedures and operational parameters in spinning machines.

At least 10 experiments are to be performed by each student.

LIST OF EXPERIMENTS

1. Study and sketch the working mechanism of a comber machine zone wise (viz. Feeding, combing, detaching, post-combing, drafting and delivery, noil collection) with respect to flow of material, machine components.
2. Study the combing cycle with respect to index wheel of a comber machine.
3. Determination of Mechanical Draft and draft constant of a comber machine from necessary gearing arrangements.
4. To study the effect of type of feed and detachment setting on noil percentage and fractionating efficiency.
5. Study and sketch the working mechanism of a speed frame machine zone wise (viz. creel, drafting, twisting and winding) with respect to flow of material, machine components and their dimensions, features etc.
6. Prepare a gearing diagram of driving elements of a speed frame machine to calculate the speed of the components viz. spindle rpm, bobbin rpm etc. and hence find out the production of the machine
7. Calculations of individual draft, total draft and different draft constant values of a speed frame machine from necessary gearing arrangements.
8. Calculations of twist and twist constant of a speed frame machine.
9. Study the working of building mechanism of a speed frame machine.
10. Study and sketch the working mechanism of a Ring frame zone wise (viz. creel, drafting, twisting and winding) with respect to flow of material and machine components along with their dimensions, features etc.
11. Determination of break draft, total draft and their respective constants of a Ring frame machine.
12. Calculation of Mechanical twist and twist constant of a Ring frame machine. Hence find out the production in spindle-hr of the machine.

13. Study the driving arrangement of different elements and building mechanism of a ring frame machine.
14. Estimation of spinning tension as a function of traveller weight, yarn count and balloon height.
15. Study the chief organs, mechanism and calculations of compact spinning.

COURSE OUTCOMES:

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

CO1 Analyze combing efficiency and yarn quality.
CO2 Understand drafting, twisting, and winding mechanisms in spinning frames.
CO3 Execute maintenance and adjust operational parameters in spinning machines.

TEXTILE CHEMICAL PROCESSING- 1 LABORATORY (TEPC-413P)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks: 20	50	3 Hours
				Minimum Marks: 12	Minimum Marks: 8	20	

COURSE OBJECTIVES

The student will be acquainted with the basics and in depth knowledge of preparatory part of textile chemical Processing.

At least 10 experiments are to be performed by each student

LIST OF EXPERIMENTS

1. Desizing of cotton material.
2. Scouring of cotton goods
3. Scouring of polyester goods
4. Scouring of P/C blended goods
5. Scouring of wool fibre
6. Scouring of woven cotton fabric using Jigger
7. Bleaching of cotton with H2O2
8. Bleaching of cotton with NaClO2
9. Bleaching of cotton with NaOCl
10. Bleaching of Polyester
11. Bleaching of P/C blend
12. Bleaching of jute yarns / fabric
13. Bleaching of knitted cotton fabric using Winch
14. Degumming of silk
15. Mercerisation of cotton material

COURSE OUTCOMES:

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

CO1. Apply desizing techniques to cotton materials, demonstrating comprehension of removal mechanisms and evaluation methods.

CO2. Analyze scouring processes for different textile materials, including cotton, polyester, blends, and wool, considering factors like equipment and efficiency.

CO3. Evaluate bleaching methods for various textiles, such as cotton, polyester, blends, silk, and jute, demonstrating understanding of agents, mechanisms, and application techniques

FABRIC MANUFACTURE-II LABORATORY (TEPC-414P)							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Examination	Total	
0	0	2	1	Maximum Marks: 30	Maximum Marks:20	50	3 Hours
				Minimum Marks:12	Minimum Marks:8	20	

COURSE OBJECTIVES:

- To demonstrate the need, principle and working of secondary, auxiliary motions, replenishment motion and drop box motion for production of productive fault free fabric in a loom.
- To learn about producing large, designed fabric using dobby and jacquard looms.

At least 10 experiments are to be performed by each student

LIST OF EXPERIMENTS

1. Study of selvedge formation in shuttle loom.
2. Study of temple motions in a loom.
3. Study of take up motion and calculation of loom take up constant.
4. Study of let-off system in a loom.
5. Study of warp stop motion in a loom.
6. Study of weft stops mechanism.
7. Study of Warp protection motion in a loom.
8. Identification of fabric faults by fabric inspection machine.
9. Study of pirn changing mechanism in a loom.
10. Study of loom winder mechanism in a loom.
11. Study of shuttle changing mechanism in a loom.
12. Study of multiple box motion in a loom.
13. Study of Dobby loom
14. Study of Jacquard loom.
15. Preparation of various designs by using Jacquard Punching Machine.

COURSE OUTCOMES:

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

CO1. Develop requisite laboratory skills and become familiar to the machine and its parts.

CO2. Understand and demonstrate the working of secondary motions, auxiliary motions, modified mechanisms in weft replenishment, box change, different shedding mechanisms in tappet and jacquard loom.

CO3. Work with machine for troubleshoot interactions between the mechanism and machine parts.

Exit Option for UG Diploma in Textile Engineering

TE-416P Internship-I							
Teaching Scheme			Credit	Marks Distribution			Duration of End Semester Examination
L	T	P		Internal Assessment	End Semester Exam	Total	
0	0	0	6	Maximum Marks: 30	Maximum Marks: 20	50	3 Hours

Eligibility for Exercising Exit Option and Pursuing Internship-I:

Those students without any backlogs who wish to leave the studies after completion/end of 2nd year, can exercise exit option for UG Diploma in Engineering during registration for 4th semester (only for regular students (admitted in first year) and not applicable for lateral entry students). They will be required to obtain additional 6 credits summer internship (Internship-I (Exit)) of 8-weeks/2-months duration during summer term/summer vacations after 4th semester. The evaluation of such candidates shall be done within the first-two months of the running next semester i.e. 5th sem. The internship shall be completed by student during summer vacations after 4th semester, in local industry, government/private organization, entrepreneurs, craft and skilled persons for on-site experiential learning.

List of activities/projects to be completed by student:

1. The appropriate ***area of internship shall be identified by student in consultation with the faculty mentor and industrial supervisor*** (if any) during the course of 4th semester, ***by learning all concepts being taught in previous semesters and demonstrating hard work and genuine desire to learn.***
2. The student shall clearly state in his brief report to faculty supervisor regarding (a)What he/she intends to learn, acquire and clarify through this internship? (b) Use of try to use concrete, measurable terms in listing his/her learning objectives under each of the following categories:
   a) ***Knowledge and Understanding***
   b) ***Skills***
3. The student will clearly state and describe in his brief reports regarding
   a) ***Learning Activities***: How will internship activities enable him/her to acquire the knowledge/understanding, and skills listed to be acquired by students (above)?
   b) ***On the job***: How internship activities will enable him/her to meet his/her learning objectives. Student should include *projects, research, report writing, conversations, etc., which student will do while working, relating them to what he/she intends to learn.*
   c) ***Teaching/Mentoring Activities:*** How his/her technical knowledge can be applied at the site of the internship to create value through mentoring/help people learn new things.
   d) ***Off the job:*** List of appropriate study material for reading, writing, method to keep contact with faculty supervisor, peer group discussion, field trips, observations, etc., he/she will make and carry out which will help him/her to meet his/her learning objectives.
   e) ***Evidences:*** *Student will describe* in detail what other evidence he/she will provide to attached faculty mentor to document what was learnt (e.g. journal, analytic paper, project, descriptive paper, oral presentation, etc.) Deadline dates should be included.
   f) ***Evaluation:*** The faculty or internship supervisor will provide a written evaluation, preferably in a tabular format, and by defining rubrics used for evaluation of internship.
   g) ***The Internship Job Description***: Student will describe about role and responsibilities while on his/her internship. (in as much detail as possible), about list of assigned /expected duties, project to be completed, deadlines, etc., and description of contribution expected by the organization/site of internship.

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4. The internship will be defended by student during 5th semester in front of appropriate committee (including faculty/ internship supervisor) as per schedule notified by academic department. The concerned department will review the Internship-I rigorously to discourage low quality internship work and to avoid exit options as an escape route, rather than a genuine learning curve.

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