M.D. UNIVERSITY, ROHTAK

SCHEME
OF
STUDIES AND EXAMINATION

B.TECH
(FASHION AND APPAREL ENGINEERING)
SEMESTER 7TH AND 8TH

SCHEME EFFECTIVE FROM 2021-22

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION effective from 2020-21

Bachelor of Technology (Fashion and Apparel Engineering)

Seventh Semester

Sr No.	Course Code	Course Title	Hours per week			Total contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Class work	Theory	Practical	Total	
1	PEC-FAE-401-403G	Elective-III	3	0	0	3	3	25	75		100	3
2	PEC-FAE-404-406G	Elective-IV	3	0	0	3	3	25	75		100	3
3	OEC-FAE-401-403G	Open Elective-V	3	0	0	3	3	25	75		100	3
4	PROJ-FAE-401G	Industrial Internship (Evaluation)	0	0	0	0	5	100	-	100	200	Viva
5	PROJ-FAE-402G	Seminar	0	0	4	4	2	200	-	-	200	-
6	PROJ-FAE-403G	Project Work (Mid Term Evaluation)	0	0	4	4	2	100	-	-	100	Viva
Total							18				800	

Sr No.	Category	Course Code	Course Title
	PEC-III		
1.	Professional Elective Course-III	PEC-FAE-401G	Robotics and Artificial Intelligence in Apparel Industry
2.		PEC-FAE-402G	Printing and Finishing of Textile and Apparel
3.		PEC-FAE-403G	Digital Motif Designing and Development
PEC-IV			
1.	Professional Elective Course-IV	PEC-FAE-404G	Textile and Apparel Costing
2.		PEC-FAE-405G	Clothing Comfort Science
3.		PEC-FAE-406G	Research Methodology and Quality control
OEC-V			
1.	Open Elective Course-V	OEC-FAE-401G	Fashion Selection
2.		OEC-FAE-402G	Supply Chain Management
3.		OEC-TT/TC/FAE-403G	Fashion Retailing and Promotion

M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION effective from 2020-21

Bachelor of Technology (Fashion and Apparel Engineering)

Eighth Semester

Sr No.	Course Code	Course Title	Hours per week			Total Contact hrs/week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Class work	Theory	Practical	Total	
1	PEC-FAE-407-409G	Elective-V	3	0	0	3	3	25	75		100	3
2	PEC-FAE-410-412G	Elective-VI	3	0	0	3	3	25	75		100	3
3	OEC-FAE-404-406G	Open Elective-VI	3	0	0	3	3	25	75		100	3
5	PROJ-FAE-404G	Project Work (Final Evaluation)	0	0	12	12	6	100		100	200	Viva
							15				500	

Sr No.	Category	Course Code	Course Title
PEC-V			
1.	Professional Elective Course -V	PEC-FAE-407G	Sustainable Fashion
2.		PEC-FAE-408G	Leather Apparel & Accessory Design
3.		PEC-FAE-409G	Digital Apparel & Portfolio Presentation
PEC-VI			
1.	Professional Elective Course -VI	PEC-FAE-410G	Advance Apparel Construction Techniques
2.		PEC-FAE-411G	Home Textiles
3.		PEC-FAE-412G	Quilt Design and Development
PEC-VI			
1.	Open Elective Course-VI	OEC-TT/TC/FAE-404G	High Performance Fibre
2.		OEC-TC/FAE-405G	Sportswear Textiles & Accessories
3.		OEC-FAE-406G	High Tech Garments

DETAILED SYLLABUS

SEMESTER 7th

PEC-FAE-401G Robotics and Artificial Intelligence in Apparel Industry

Course code	**PEC-FAE-401G**				
Category	Professional Elective Course (PEC-III)				
Course title	Robotics and Artificial Intelligence in Apparel Industry				
Scheme and Credits	L	T	P	Credits	Semester-7th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: AP- I and II, GPME, Automation in Garment Industry

Course objectives-

- To introduce the basics of automation and robots in general.
- To learn the potential application areas of robots in textile and apparel production sectors.
- To learn and explore the concepts of Artificial Intelligence in the apparel segment.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

Automation and robotics, Historical development of robots, robotic terminology, basic structure of robots, Robots anatomy, classification of robots, factors affecting the robot use and performance.

UNIT - II

Basic robot configurations and their relative merits and demerits; controller components, driving systems, wrist and gripper subassemblies, concepts of basic control systems, types of controllers- Proportional, Integral, Differential and PID controllers.

UNIT - III

Various teaching methods of robots, task programming, programming languages of robots, teach pendants, various sensors and their classification, Use of sensors in robots, Machine vision system, sensing, digitizing, image processing and analysis of vision systems, Intelligent sensors. Applications of robots in Textile and apparel business industries.

UNIT - IV

Artificial Intelligence: Concept, features, process details, Applications of AI in apparel sector: apparel design, production, retail and supply chain management.

Suggested Reading List-

Title	**Author**
Artificial Intelligence for fashion Industry in the Big Data Era	Sebastien Thomasssey-Xianyi Zeng
Automation in Garment Manufacturing	Nayak & Padhey
Garment Manufacturing Technology	Nayak & Padhey
Industrial Automation and Robotics	Mikell P. Groover

Course outcomes

At the end of the course, students will be able to:

- Implement basic principles of robots and AI technology
- To understand control systems used in textile industry.
- Develop the skills required for adaptation of automation at different levels

PEC-FAE-402G Printing and Finishing of Textile and Apparel

Course code	**PEC-FAE-402G**				
Category	Professional Elective Course (PEC-III)				
Course title	Printing and Finishing of Textile and Apparel				
Scheme and Credits	L	T	P	Credits	Semester-7th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Yarn and Fabric Coloration techniques, PWP & Dyeing, Auxiliaries, Techniques of dyeing

Course Objective:

- To understand fundamentals, methods, and styles of printing.
- To learn applications of printing to different fibres
- To familiarize mechanical and chemical finishes.
- To gain knowledge about the application of textile and garment industries.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

Introduction of printing, Evolution in textile printing, Different methods of printing such as block, roller and screen printing, Construction and working mechanism, drawback and advantage of each method, Transfer Printing: Types, mechanism of transfer in each type and machineries, Printing Styles: Direct, discharge and resist styles of printing on textiles.

UNIT - II

Brief concept of printing of cellulosic with direct, reactive and vat dyes; proteineous with acid dyes and synthetic textiles with disperse dye, Printing with Pigments: Fundamental concept, Advantage and disadvantages of pigment printing, Printing after treatments: Importance of steaming, curing, ageing of prints. Mechanism of each process. Special effects like – Batik, Tie and dye, crimp style, etc.

UNIT - III

Introduction to textile finishing. Aim and scope. Classification of finishes. Concept of permanent and temporary finishes. Various finishes in industrial practices such as raising and shearing, drying. Calendaring - its types, construction and function of various calendaring m/cs, Brief concept of finishing of wool: Crabbing, decatising, milling, shrink finishing etc. Bio-polishing and enzymatic treatments

UNIT - IV

General chemical finishes like softening, stiffening, delustering of rayon, polyester. organdy finish. Silky finish of polyester. Weighting of silk. Introduction and preliminary concepts of specialty finishes, Introduction and preliminary concepts of specialty finishes such as Soil and oil repellent finish, anti-static finish, antimicrobial finish, enzymatic finishes, Evaluation of finishes.

Suggested Reading List:

Title	**Author**
Textile Chemistry	RH Peters
Fundamental and practices in colouration of textiles	J N Chakraborty
Textile Scouring and Bleaching	Trotman E R
Technology of Bleaching & Mercerising	Shenai VA
Technology of Printing	Shenai VA
Dyeing and Chemical Technology of Textile Fibres	Trotman E R
Chemical Processing of Silk	ML Gulrajni
Textile processing	N N Mahapatra
Textile Printing	R B Chavan
Textile Printing	Leslie W C Mile
An Introduction to Textile Finishing	JT Marsh
Textile Finishing	Shenai VA

Course Outcomes:

At the end of the course, students will be able to:

- Make use of Textile printing and different printing techniques.
- Learn application of different printing pastes on textiles.
- Develop the skills of Textile finishing and different finishing techniques.
- Learn the application of different functional and specialty finishes.

PEC-FAE-403G Digital Motif Designing and Development

Course code	**PEC-FAE-403G**				
Category	Professional Elective Course (PEC-III)				
Course title	Digital Motif Designing and Development				
Scheme and Credits	L	T	P	Credits	Semester-7th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Computer Aided Textile Designing, Colour and Design Concepts, Visual designing in Apparels

Course Objective:

- To understand fundamentals of motifs and symmetry in designing
- To understand arrangement of figures for print patterns
- To familiarize computers in fabric design and development
- To gain knowledge of digital options in print and texture mapping

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

Introduction to types of motifs, Classification of design by symmetry, relevance of symmetry in designing, symmetry operations and groups, figures and designs, classification of finite designs ,structure of translational design, function generation, classification of mono-translational design, classification of ditranslational design

UNIT – II

Construction of designs from incomplete repeat, classification of borders patterns, all over patterns and types, borders in traditional Indian textiles, Colour –contrast and applications in motif-designing

UNIT - III

Introduction to use of computers in fabric design and development, Features and applications of commercial textile printing software

UNIT - IV

Digital development in commercial vector software print development. Graphic options for Texture mapping, Geometrical floral motif, cross-stitch effect, engineered prints, block repeat with offset filters, Half drop repeats, all over patterns, Gingham patterns, creating stripe and plaid patterns, diamond patterns, complex colour blends. Filters for different effects depicting common textile effects like silk screen, leather etc

Course Outcomes: At the end of the course, students will be able to:

- Make use of motifs, symmetry in designing.
- Apply drop devices, arrangement of figures in designing fabrics
- Develop the skills of textile designing software in designing fabric print pattern
- Apply knowledge of vector graphic software for virtual prototype development

Suggested Reading List:

Title	Author
Digital Printing of Textiles	H Ujiie
Fashion Designer′s Handbook for Adobe Illustrator	Marianne Centner and Frances Vereker
Fashion presentation	Anne Kiper
Inside Fashion design	Sharon L. Tate, Mona S.Edward
The Fashion Sketchpad	Tamar Daniel
Adobe Photoshop for Fashion Design	Susan Lazear

PEC-FAE-404G Textile and Apparel Costing

Course code	PEC-FAE-404G				
Category	Professional Elective Course (PEC-IV)				
Course title	Textile and Apparel Costing				
Scheme and Credits	L	T	P	Credits	Semester-7th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Apparel Merchandising, Textile Coloration techniques, Industrial Engineering in Apparel Industries

Course Objective:

- To impart knowledge of Costing and different terms used in apparel industry.
- Enable the student to understand how to control cost using standard cost concept
- Enable the student to identify the various sources of waste and their control
- Enable the student to prepare cost sheet for various textile products

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

General Cost Concept: Classification of cost (Fixed, Variable, Semi-variable and Total Cost), Cost elements (direct, indirect), planning and storage of materials, pricing and control of materials, computation and control of labour cost, Remuneration and incentives to labour. Over head costs: Classification and accumulation, allocating service department costs, distribution and absorption**,** marketing and administration, depreciation and miscellaneous.

UNIT – II

Methods of costing: Single or output costing, job order cost system, introduction to other methods of costing. Cost control techniques: standard costing, variance analysis (Materials and

labour, overheads, sales and marketing). Cost control and cost reduction, Research and development cost: cost of product design, R & D budget, accounting treatment

UNIT - III

Costing in textile industry: Cost structure, raw material cost, labour cost and other expenses. Yarn realization, determination of cost per kg of yarn, per meter of fabric. Cost of dyeing/printing per meter fabric. Value loss, selling price decision of fabric. Costing in apparel industry: Raw material cost, labour cost and other expenses. Cost analysis of different garments with example.

UNIT - IV

Dollar Planning and control: Introduction, Responsibilities for a dollar plan, Requirements of a dollar plan, Approach to a dollar plan, Elements of the dollar plan (planned sales, Planned Stock – Stock turnover, Stock/Sales ratio. GMROI. The relationship between stock turnover and stock/sales ratio). Integrated dollar planning and control in retailing.

Suggested Reading List:

Title	**Author**
Advanced cost accounting	B.M.L. Nigam, G.L. Sharma
Fashion Buying & Merchandising	Sidney Packard
Cost and Management Accounting	M N Arora
Costing of apparel	Michael Jeffry
Production Management in Apparel Industry	Rajesh Bheda

Course Outcomes:

At the end of the course, students will be able to:

- Analyze the different costing techniques, cost control measures and different types of costing techniques.
- To prepare cost-sheet for textile products
- To Control the overhead cost occurring in any industrial set-up
- To analyze the costing involved in set-up for new textile product at primary level

PEC-FAE-405G Clothing Comfort Science

Course code	**PEC-FAE-405G**				
Category	Professional Elective Course (PEC-IV)				
Course title	Clothing Comfort Science				
Scheme and Credits	L	T	P	Credits	Semester-7th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Textile Raw Materials, Fabric Formation, Textile Testing

Course Objectives:

• To enable the students to understand specific characteristics of human clothing.

• To gain knowledge about the fabric handle and aesthetic properties of fabric required for human clothing.

• To understand the comfort characteristics of fabric for clothing purposes.

• To understand the safety aspects of garments.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

Introduction to group of apparels, Properties for selection for fabric for clothing for different age groups, occasions, functions etc. Fabric properties and performance for apparel use. Significance of dimensional Stability of Fabrics; Hygral expansion, Relaxation shrinkage, Swelling shrinkage, Felting shrinkage. Mechanism of fabric shrinkage - Relationship between Hygral Expansion, Relaxation shrinkage and extensibility. Methods of measuring dimensional stability to dry cleaning and dry heat.

UNIT-II

Definition of comfort - Human clothing system - Physical, Physiological, and psychological aspects of comfort – Tactile and pressure sensation aspects. Psychology and comfort: basic concepts, Psychological research techniques, General aspects and measurement of aesthetic properties, changes in aesthetic behaviour. Sensory perceptions with respect to neurophysiologic basis related to thermal, moisture and mechanical stimulai. Pattern engineering in relations with garment size and fit.

UNIT-III

Concept of Thermal transmission :Thermo regulatory mechanism of human body, Dry heat transfer and Rapid heat transfer, heat transfer theories. Function of Textiles in enhancing thermal comfort. Comparison of thermal comfort properties for different textile structures Fabric properties for serviceability of fabrics, Concept of tailorability of woven and knitted garments.

UNIT-IV

Aesthetic properties of garments, fabric parameters affecting fabric texture, concept of Fabric Hand, subjective hand judgment, objective evaluation of fabric hand and its application. Concept of Functional Properties of garments, Elasticity: elastic recovery, residual strain; Thermal insulation; Water repellence, water resistance and waterproof; Wicking: vertical and horizontal transportation of liquid; Water absorbency; UV protection; Soil release.

Suggested Reading List:

Title	Author
The Science of Clothing Comfort	Y Li
Physical Testing of Textiles	B P Saville
Clothing: Comfort & Functions	Lyman Fourt & Norman R S Hollies
Science in Clothing Comfort	A Das, R Alagirusamy

Course Outcomes

After successful completion of this course, the students will be able to

• Understand the fabric selection process for apparels.

• Understand the role of clothing for human comfort.

• Recognize the Principles of heat transfer to and away human body.

PEC-FAE-406G Research Methodology and Quality Control

Course code	PEC-FAE-406G				
Category	Professional Elective Course (PEC-IV)				
Course title	Research Methodology and Quality Control				
Scheme and Credits	L	T	P	Credits	Semester-7th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Prerequisites: Applied Statistics and Operation Research, Textile Testing, Industrial Engineering in Apparel Industries

Course Objectives:

- To introduce students with various aspects of quality and their management.
- To learn the concept and basic process of research methodology
- To understand different aspects of statistical quality control
- To understand the design of experiment for optimization of any problem

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

Research: Definition of research, Applications of research and types, Steps involved in Research process, Deductive and inductive reasoning; Validity-conclusion, internal, construct and external. Literature review- Need, Procedure- Search for existing literature, Review the literature selected, Development of theoretical and conceptual framework, Writing up the review while taking suitable examples from apparel industry

UNIT - II

Significance of the study of correlation, Karl Pearson's coefficient of correlation, Rank correlation coefficient, Method of least squares, Regression Lines, Least square parabola, Partial correlation coefficients (Three variables only), Multiple correlation and Regression.

UNIT - III

Meaning of Statistical Quality Control, Control charts, namely, X,R,C and p charts. Benefits and limitations of SQC, acceptance sampling, selection of sampling plan (Single and Double sampling Plan). Construction of an OC curve

UNIT - IV

Principles of experimental design, selecting a statistical design, analysis of variance (one way and two way clarifications) , Latin Squares design, Factorial design, Numerical based on 2^2 and 2^3 experimental design via Suitable examples from apparel industry

Suggested Reading List:

Title	**Author**
Design and analysis	Das & Giri
Fundamentals of statistics	Gupta & Kapoor
An Introduction to Quality Control for the apparel	Pradip V Mehta
Managing Quality in the Apparel Industry	Satish Bhardwaj & P V Mehta
Fundamentals of statistics (Vol-II)	Goon, Gupta & Das Gupta
Business Statistics	Gupta & Gupta

Course Outcomes: Upon successful completion of the course, the students will be able **:**

- To understand different aspects of statistical quality control .
- To implement regression analysis and design of experiments in their assignments in industry
- To implement optimisation of industrial processes for quality control.
- To understand Quality assurance systems adopted by industries

OEC-FAE-401G Fashion Selection

Course code	OEC-FAE-401G				
Category	Open Elective Course (OEC-V)				
Course title	Fashion Selection				
Scheme and Credits	L	T	P	Credits	Semester-7th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Textile Coloration techniques, AP-I, AP-II

Course Objective:

- To impart knowledge of Children'**s** wear selling seasons, fibres, trimmings required for Kids wear.
- To gain knowledge of Women's wear, Tops, coats, different types of sleeves.
- To impart knowledge of Skirts, Dresses and their style variations.
- To understand Men's wear, historical developments, designing of Men's wear.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

Children's Wear: Size categories for children's wear – infants, toddlers, young children and older girls. Selling seasons – Fall/Back to school, Holiday, Cruise/spring and Summer. Common fibres, fabrics, prints and trimmings. Sources of inspiration for children's wear. Designing of some garments.

UNIT - II

Women's Wear: Tops and Coats – different bodices, use of darts, ease gores and yokes to design tops, different types of sleeves and placket finishes, knit styling. Designing of some women's wear garments

UNIT – III

Skirts – Basic skirt shapes and their variations, skirt lengths and waistband treatment. Dresses – Different dress categories like junior dresses, contemporary dresses, Missy dresses.

UNIT - IV

Men's wear – Historical development of menswear, menswear manufacturing plant, menswear designer. Sources of inspiration, constructional details in menswear. Designing of menswear.

Suggested Reading List:

Title	**Author**
Inside Fashion Design	Sharon Lee Tate
Inside Fashion Business	Kitty G Dickerson

Course Outcomes:

At the end of the course, students will be able to:

- Analyze the different types of Kidswear, womenswear and menswear.
- Design Kidswear, womenswear and menswear as per market requirements
- Develop various types of styles of Kidswear, womenswear and menswear
- Utilise sources of inspiration, different types of fibres for the developments of Kidswear, womenswear and menswear

OEC-FAE-402G Supply Chain Management

Course code	OEC-FAE-402G				
Category	Open Elective Course (OEC-V)				
Course title	Supply Chain Management				
Scheme and Credits	L	T	P	Credits	Semester-7th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Retailing, Channels of distribution, Basic concept of management, Apparel Merchandising

Course Objectives:

- To familiarize with supply chain and its concepts.
- To gain knowledge about the decision phases and role of drivers in Supply Chain.
- To familiarize with different techniques of supplier assessment.
- To understand the difference between forward and reverse supply chain and its application.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

Introduction of Supply Chain, Supply Chain Concepts: flow of materials, flow of Information, Supply Chain Drivers.

UNIT - II

Objective of supply chain, decision phases in a supply chain, process view of supply chain- cycle view and push/pull view, importance of supply chain flows.

UNIT - III

Safety Inventory, cyclic inventory, role of sourcing in a supply chain – supplier scoring and assessment, supplier selection, design collaboration, procurement process, sourcing planning and analysis, procurement process, making sourcing decisions in practice.

UNIT - IV

Reverse supply chain (RSC), difference with forward supply chain, cost considerations involved, industries participation, factors leading to application of concept of RSC in specific industries and its restricted application, benefits, cost effectiveness of RSC compared to forward supply chain. Overview on critical path management, the role of IT in supply chain.

Suggested Reading List:

Title	**Author**
Logistics & supply Chain Management	Martin Christopher
Supply Chain Management : Strategy, Planning and Operation	Sunil Chopra and Peter Meindl,
Partnership Sourcing: An Integrated Supply Chain Management Approach	Douglas Macbeth and Ferguson N.

Course Outcome:

After this course the students will be able to:

- Understand various processes and drivers in a Supply Chain.
- Apply the role of decision phases in a Supply Chain.
- Understand and evaluate the supplier assessment practices.
- Analyze the difference between forward and reverse supply chain and to apply it in areas of fashion and textile.

OEC-TT/TC/FAE-403G Fashion Retailing and Promotion

Course code	OEC-TT/TC/FAE-403G				
Category	Open Elective Course (OEC-V)				
Course Title	Fashion Retailing and Promotion				
Scheme and Credits	L	T	P	Credits	Semester-7th
	3	0	0	3	
Branch	TT, TC, FAE				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Textile Raw Materials, Yarn formation, Fabric formation, Coloration techniques, Accessory designing

Course Objectives:

To impart knowledge of fashion retail formats and services being offered by them.

• To understand the role of Wholesalers and to differentiate with that of a retailer.

• To introduce various aspects of retail marketing mix and its elements.

• To familiarize the students with the changing dimensions of fashion Retailing.

• To introduce the basics of retail in an apparel supply chain.

• To learn the retail decisions with emphasis on site selection and retail pricing.

• To learn the fashion promotion, advertising and communication to the other retailers and consumers.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

Retailing Environment: Introduction to Retailing, Types of Retailers/retailing. Multi-channel retailing. Retail strategy: Retiling decisions- Decisions related to target market, pricing, store positioning, retail site selection etc. Store Organization, Retail communication, Retail audit.

UNIT – II

Wholesalers-difference between retailers and wholesalers, types of wholesalers, major functions and services provided by wholesalers, product line of wholesalers. Retail store management: Store layout, Store design, Visual merchandising, Retail services. Retail Arithmetic- product price setting, price change, Numerics of different types of mark ups, mark downs, price settlement at retail level.Retail Inventory planning, Inventory control and management.

UNIT - III

Fashion communication: Fashion shows, Portfolio presentation, Moodboards, Storyboards. Fashion advertising, Fashion photography. Planning and Direction of Fashion advertising and different kinds of Advertising, Scheduling and planning (Public Media, Newspaper, Magazine, radio, Television, Direct mailing etc.), Advertising department in a retail store, Advertising agencies, Publicity, Special events.

UNIT - IV

Changing dimensions of fashion retailing - growth of private labels: retailers into manufacturing, concentration of retail power, globalization of retailing. Fashion communication: Fashion shows, Portfolio presentation, Moodboards, Storyboards. Fashion advertising, Fashion photography. Planning and Direction of Fashion advertising and different kinds of Advertising, Scheduling and planning (Public Media, Newspaper, Magazine, radio, Television, Direct mailing etc.), Advertising department in a retail store, Advertising agencies, Publicity, Special events.

Suggested Reading List:

Title	**Author**
Inside Fashion Design	Sharon Lee Tate
Inside the Fashion Business	Kitty G Dickerson
Marketing Management, 13th Ed, Prentice Hall Higher Education, 2008	Philip Kotler, Kevin Keller
Marketing Management, 13th Ed, Prentice Hall Higher Education, 2008	Philip Kotler, Gary Armstrong
Fashion Marketing, Blackwell Publishers, 2008	Mike Easey

Course Outcomes:

At the end of the course, students will be able to:

- Analyze the fashion retail, various formats and levels of services offered by retailers.

- Develop the skills of differentiate fashion retailers and Wholesalers and their operations.
- Analyze the retail Marketing process and modes of Fashion sales Promotion.
- Implement the changes in dimensions of Fashion Retail and Globalization.

PROJ–FAE–401G Industrial Internship (Evaluation)

Course code	**PROJ–FAE–401G**				
Category	Project/Internship				
Course title	Industrial Internship (Evaluation)				
Scheme and Credits	L	T	P	Credits	Semester–7th
	0	0	0	5	
Branch	Fashion and Apparel Engineering				
Class work	100 Marks				
Exam	100 Marks				
Total	200 Marks				
Duration of Exam	Viva				

Course Objective:

1. To give exposure to the industrial environment and its work culture.
2. To explore the machineries and processes involved in the industries.
3. To provide hands-on training on machines and instruments.
4. To develop understanding of techniques like Design and Development, Production Planning, Quality Assurance, Maintenance practices, Environment and Pollution Control, Management Information System.

Content

At the end of 6th semester, each student, individual or in association with some other students has to undergo Practical Training of 6 weeks in an Industry/Mill/ Professional Organization with the approval of the Director, TIT&S and submit a typed report along with a certificate from the organization to the Head of the Department.

Following points to be considered by the students for studies during industrial evaluation:

General Studies:

Process Flow Chart,

Design and Development

Visit to various departments and study of machineries,

Important adjustments and settings,

Speed of Important Parts,

Modern Developments in machines/process,

Process parameters and effect on quality of product,

Actual Production and Efficiency,

Production Planning and Control,

Maintenance Practices, maintenance tools and gauges, maintenance schedule,

Process Control and Quality Control activities,

Roles and responsibilities of various categories of workers/technical Staffs',

Labour allocation.

Special Studies:

Management information systems,

Waste study,

Costing,

Production planning and control,

Target achievement,

Information regarding humidification plant,

Utility,

Electrical supply,

Store, purchase,

Marketing,

Sales,

Samples,

Lay-out of Plant.

Project:

Objectives,

Procedures,

Observations,

Analysis and Conclusion of the projects carried-out.

Course Outcomes:

At the end of the course student will be able:

1. To understand the environment and work culture of the industries.
2. To understand the machineries and processes followed in industries.
3. To use hand on training skills.

4. To reproduce the techniques like production planning, quality assurance. Students will be able to maintenance practices, environment and pollution control, management information system.

PROJ–FAE–402G Seminar

Course code	**PROJ–FAE–402G**				
Category	Project/Internship				
Course title	Seminar				
Scheme and Credits	L	T	P	Credits	Semester–7th
	0	0	4	2	
Branch	Fashion and Apparel Engineering				
Class work	200 Marks				
Exam	-				
Total	200 Marks				
Duration of Exam	-				

Course Objective:

1. To develop presentation skills of the students via delivery of academic content.
2. To aware the students with latest technology and developments in the field of fashion and apparel engineering.
3. To boost the communication skills in the students.

Content

Each student will have to deliver a talk on the topic in the weekly period allotted to this subject, either pertaining to his project work or any topic related to recent development in technology/process/machinery in fashion and apparel engineering field. A Board of Examiners would judge the performance of the student in the class via presentation and students will also submit a report with the relevant content used for preparing presentation.

Course Outcomes:

At the end of the course student will be able:

1. To prepare presentations and reports for the meetings etc.
2. To give presentations/talks with in the relevant domain.
3. Explore recent developments taking place in the field of textile and apparel industries.

PROJ–FAE-403G Project Work (Mid Term Evaluation)

Course code	**PROJ–FAE–403G**				
Category	Project/Internship				
Course title	Project Work (Mid Term Evaluation)				
Scheme and Credits	L	T	P	Credits	Semester–7th
	0	0	4	2	
Branch	Fashion and Apparel Engineering				
Class work	100 Marks				
Exam	-				
Total	100 Marks				
Duration of Exam	Viva				

Course Objective:

1. To identify the problem or idea and summarize the literature for the topic of the identified problem
2. To describe the process for undertaking the research.
3. To explain various tools and methods employed for testing and evaluation to draw relevant conclusions.
4. To exhibit effective team work and communication skills.

Course Content:

Each student individually, or an association with some other students will carry out project of an experimental and/or theoretical nature in one of the main branches of fashion and apparel engineering.

Guidelines for Project Work Submission (Mid Term):

Students should provide a typed report form in systematic manner, duly approved and signed by his/her Supervisor/Guide (to be nominated by the Head of Department/Institution).

The report is to normally include:

1. **Literature Review/Survey**

   Literature related to topic selected should be searched from Reputed Research Journals, Books, e-content etc.

2. **Preliminary Approach to the problem relating to the assigned topic/Plan of work**

   Proposed plan of work in consultation with guide should be prepared. Plan of work consists of Raw Material details and Methodology to be adopted.

3. **Preliminary Analysis/ Modelling/ Simulation/ Experiment/Testing/Design/ Feasibility**

Evaluation:

Spiral bound copy of Introduction, Literature review and plan of work as per the standard format should be submitted in front of project evaluation committee. If any recommendations are suggested by committee, those should be implemented and resubmitted.

Term work marks are allotted by continuous monitoring of the progress in the work and submission of spiral bound copy.

Course Outcomes:

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

1. Identify the problem /idea and collect the literature for the concerned topic.
2. Design suitable experimental plan.
3. Understand and use various tools of testing and analysis for the data in order to draw relevant conclusions.
4. Communicate and work effectively as a member of team.

DETAILED SYLLABUS

SEMESTER 8th

PEC-FAE-407G Sustainable Fashion

Course code	PEC-FAE-407G				
Category	Professional Elective Course (PEC-V)				
Course title	Sustainable Fashion				
Scheme and Credits	L	T	P	Credits	Semester-8th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre-requisites:- Textile Coloration Techniques**,** Indian Textile heritage, Printing and Finishing of Textile and Apparel

Course Objectives:

- To understand concept of eco-friendly chemical processing using enzymes in textile chemical processing for sustainability.
- To discuss the concept of digital printing with its salient features.
- To understand the sustainable developments related to textile dyeing.
- To explain the concept of sustainable strategies for traditional craft .

UNIT-I

Sustainability and green processing technologies. Technologies using novel raw materials like organic, natural and bio composites. Eco-friendly Processing: Enzyme with their definition, sources, types, mechanism of application. Various types of enzyme used in textile processing, advantage and disadvantage of enzymes, different process of textile processing with enzyme application.

UNIT-II

Sustainable Wastewater treatment: Effluent load and effluent treatment plant, Alternative ways of reduction wastewater load in processing. Eco labeling schemes. Standard certification and testing followed in apparel industry

UNIT-III

Requirements of sustainability in fashion, Introduction to product development, Design thinking for sustainability , distinguishing features of textile products in view of sustainability , Introduction to sustainable material sourcing, Zero waste fashion design, Basis of Recycling of clothing, challenges and economic impact.

UNIT-IV

Commercial business models for sustainable fashion, Social responsibility and innovation in garment industry, Digital contrive of traditional craft for sustainable development

Reading List

Title	**Author**
Handbook of Sustainable Textile Production	Marion I. Tobler-Rohr
Biotechnology in Textile processing	G. M. Guebitz, A. Cavaco-Paulo, R. Kozlowski
Functional Materials for Sustainable Energy Applications	John A. Kilner, Stephen J. Skinner, Peter P. Edward
Sustainable Fashion and Textiles: Design Journeys	Kate Fletcher
Sustainable Fashion: Past, Present and Future	Jennifer Farley Gordon, Colleen Hill

Course Outcomes:

At the end of the course, the students will be able to:

- Substitute existing pre-treatment processes with new techniques for sustainability.
- Adapt to latest coloration technique as sustainable approach.
- Invent the alternative application for sustainable fashion
- Application of enzymatic technology for processing

PEC-FAE-408G Leather Apparel & Accessory Design

Course code	PEC-FAE-408G				
Category	Professional Elective Course (PEC-V)				
Course title	Leather Apparel & Accessory Design				
Scheme and Credits	L	T	P	Credits	Semester-8th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Prerequisites: Apparel Production, Fashion Accessories, Material Studies, Textile & Garment Design by Surface Ornamentation.

Course Objective: The course objective is to impart knowledge about:

- Fashion leather terminologies
- Leather processing
- Application of Leather in apparels and accessory design
- Design, development and styles of leather apparels and accessories.

UNIT-I

Leather sources, classification based on distinct layers, fashion leather terminology. Major leather apparel & accessory manufacturing brands. Leather apparel and accessory industry in India – challenges, global scenario and market profitability. Forecasting & trend analysis of leather apparels and accessories. Brief idea about processing of leather – preservation process - curing, tanning, tanning agents. Rendering properties of durability & serviceability by different operations - Dry and wet operations, finishing of leather. Properties of processed leather, care of leather.

UNIT-II

Leather Apparel design & development – theme and design selection, creation of mood board & story board, selection of leather type– patent, suede, imitated based on style, type of garment. Pattern making - drafting, computerized methods of pattern making, spreading, cutting method

– die cutting, die press, types of dies- forged, strip steel, needle and sewing thread specifications.Finishing of garments. Styles of leather garments –double rider jacket, bomber jacket, flight jacket etc

UNT-III

An overview of leather accessory categories – footwear, handbags hats, gloves & belts.

Leather Footwear design & development - Anatomy of shoe, brief shoe designing – as last, development last, designer last, pattern making, die-manufacturing, cutting, fitting, assemblage of remaining components, bottoming &finishing. Footwear making tools. Footwear specification sheet. Caring of leather footwear. Styles of men's and women footwear – oxford, moccasin, wingtip, ballerinas, stilettoes. Major leather footwear brands. Visual merchandising of footwear in retail outlets.

UNIT-IV

Leather handbags – components of handbags, manual & computerized designing, bag making tools, construction – pattern making, cutting, assembling, finishing & embellishment. Bag specification sheet. Styles of leather handbags – clutch, envelope, saddle, slingbag etc. Major leather handbag brands.Leather Hats, gloves and belts – components, construction methods, style and care.

Reading List

Know your Fashion Accessories	Celia Stall Meadows
Fashion Apparels & Accessories	Ellen Diamond & Jay Diamond
Leather fashion Design	Franscesca Sterlacci
Design Ideas and accessories	Ritu Bhargav
Accessory Design	Aneta Genova

Course Outcome: At the course completion, the students should be able to understand:

- Fashion leather terminologies
- Leather processing
- Application of Leather in apparels and accessory design
- Design, development and styles of leather apparels and accessories.

PEC-FAE-409G Digital Apparel & Portfolio Presentation

Course code	**PEC-FAE-409G**				
Category	Professional Elective Course (PEC-V)				
Course title	Digital Apparel & Portfolio Presentation				
Scheme and Credits	L	T	P	Credits	Semester-8th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Computer aided textile designing, Colour & design concepts, Visual merchandising, Digital fabric design & development

Course Objectives:-

- To impart knowledge about textile digital printing technology
- To understand graphic tools for digital fabric print generation
- To understand engineered patterns for apparels and other textile articles
- To learn and explore the concepts of presentation techniques like flat sketches, mood board, story boards

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

Brief idea about evolution of textile digital printing system, Types of digital printing machines: desirable requirements, existing relative features and limitations, Pre-treatments requirements of different textile materials like cotton, wool, silk before printing: Involved recipes and parameters, fixation and after treatments

UNIT - II

Technique of Sublimation printing process for polyester. Latest trends in digital printing system in industry, Digital image design specifications, Colour gamout and rendering, Introduction to computer colour matching, Just in time printing, Digital printing and customisation

UNIT - III

Generation of graphic silhouettes, mixed media techniques, collage, water colour, working with oils and wood textures etc. Engineered print marker development for different ranges of garments like T-shirts, suits, sarees, stoles, jackets, accessories like scarves, bags, ties etc. Home–textiles like bed-sheets, curtains, cushion covers, table runners etc.

UNIT - IV

Requirements and types of portfolio, components of portfolio, Digital portfolio, Creative Visual boards in presentation, visual marketing tools, presentation analysis, types of presentation formats, design inspiration, board elements, assembly and layouts .

Suggested Reading List:

Title	**Author**
Digital Printing of Textiles	H Ujiie
Fashion Designer′s Handbook for Adobe Illustrator	Marianne Centner and Frances Vereker
Fashion presentation	Anne Kiper
Inside Fashion design	Sharon L. Tate, Mona S.Edward
The Fashion Sketchpad	Tamar Daniel
Adobe Photoshop for Fashion Design	Susan Lazear

Course Outcomes:

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

- Develop Practical skills related to digital textile printing
- Design graphics for print and silhouette development
- Make presentation techniques as moodboards, storyboards and flat sketches.
- Produce engineered patterns for apparels

PEC-FAE-410G Advance Apparel Construction Techniques

Course code	**PEC-FAE-410G**				
Category	Professional Elective Course (PEC-VI)				
Course title	Advance Apparel Construction Techniques				
Scheme and Credits	L	T	P	Credits	Semester-8th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: AP- I and II, GPME, Automation in Garment Industry, PM&AC labs –I &II

Course Objectives:

- To impart knowledge of advanced apparel construction techniques
- To understand production scheduling, patterning and cutting procedures.
- To learn the pattern making and construction techniques of shirts, pants, trousers , jackets, coats, etc.
- To learn and explore the concepts of presentation techniques like flat sketches, mood board, story boards

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT – I

Production Scheduling- Concept, significance, aspects of Production Scheduling in Cutting and Sewing departments, Productivity- Concept, definitions and types, Qualitative and Quantitative analysis of production planning & scheduling, Cut room planning (Calculations related to EOQ/ CRP).

UNIT – II

Drafting, Pattern making and Construction of Kidswear as dresses, jumpers, tops, pants and jumpsuits, body suits and swimwear. Drafting, Pattern making and construction techniques of Formal & Casual Shirts (Males & Females), Pants/trouser styles, Jackets/Coats, Types of Swimwear, Sportswear/Actionwear, Capes/ hoods, Tops, Full length dresses. Development of Men's Ready-to-wear clothing, Design and production procedures of Men's tailored clothing.

UNIT - III

Digital Design Presentation techniques– Flat sketches, Mood board, Storyboard, Fashion Portfolio. Fashion Forecasting for Apparel Industry- trend analysis, style & silhouette forecasting. Learning Dedicated software for digital design presentation.

UNIT – IV

Know how of Apparel Designing process, Computerized Pattern making and Grading techniques using Apparel Designing software- Learning basic tools of manual Pattern making and Grading, Use of different drawing and measuring tools in Design software, Construction of Basic bodice blocks for Kids and Adults as front bodice, back bodice, basic sleeve, basic skirt, basic pockets, plain cuffs, Adaptation of the basic blocks into the final garments, Application of grading to basic blocks and patterns, Digitisation of manual patterns into editable and adaptable forms, Marker planning for constructed garments and details, Learning the basics of 3D simulation and Virtual draping using VR software.

Suggested Reading List:

Title	**Author**
Inside the Fashion Business	K G Dickerson
Fashion from Concept to Consumer	G S Frings
Pattern-making for Fashion Design	H J Armstrong
Introduction to Fashion Design	Patrick J Ireland
Fashion Forecasting	Mckelvey & Munslow
Portfolio presentation for Fashion Designers	Linda Tain

Course Outcomes:

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

- Make presentation techniques as moodboards, storyboards and flat sketches.
- Develop Practical skills related to garment designing using apparel designing software.

- Produce patterns and adaptations of advanced garments.
- Execute the 3D virtual technology to apparels.

PEC-FAE-411G Home Textiles

Course code	PEC-FAE-411G				
Category	Professional Elective Course (PEC-VI)				
Course title	Home Textiles				
Scheme and Credits	L	T	P	Credits	Semester-8th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Textile Raw material, Yarn Formation, Fabric formation, Fabric structure

Course Objectives:

- To impart knowledge on various home fashion product range, their properties, designing aspect and applications.
- To understand the basic principles acoustical insulation to interior spaces
- To familiarize with various methods to manage sound.
- To understand/stat the difference between Interior decorators and Interior designers.
- To familiarize the students with Recent developments in furnishing, floor covering and other home textile product.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

Introduction to Home Fashion, interior Product Classifications; Widely used interior fabrics, Decorative fabrics; home fabrics, Soft floor coverings, Residential and commercial interior, Interior decorators and Interior designers. Interior design and Home decoration ,Factors affecting interior design. Traditional and modern overview.

UNIT - II

Upholstery fabrics; their properties, standard performance specifications for woven upholstery fabrics, upholstery fabrics in use- application terms, upholstery fabric on furniture**.** Furnishings **;** Developments in Textile Furnishing – Type of Furnishings Materials – Woven and non-woven – Factors affecting Selection of Home Furnishings. Flame resistance of upholstered fabrics, filling and padding of upholstered furniture, care and maintenance.

UNIT - III

Floor Coverings :- Recent Developments in manufacturing of floor coverings -Hard Floor Coverings, Resilient Floor Coverings, Soft Floor Coverings, Rugs, Cushion and Pads – Care of floor coverings. Carpets; manufacturing methods, Woven Vs tufted carpet, types of carpet pile, carpet construction terms, fibres, yarns, dyeing, printing, and finishing for carpets, carpet underlay, carpet flammability, Traffic classification, carpet soiling, carpet maintenance, methods of cleaning, factor evaluating carpet quality.

UNIT - IV

Curtains and Draperies;- Advances in Home decoration -Draperies – Choice of Fabrics – Curtains – Types of Developments in Finishing of Draperies – Developments in tucks and Pleats and uses of Drapery Rods, Hooks, Tape Rings and Pins**.** Window fabrics and window blinds, how fibre properties, yarn and fabric construction, dyes and prints affect window fabrics, fabric finishing for window fabrics, Wall and Ceiling coverings, manufactured products, Bedding products; sheets, pillowcases, blankets, bedspread, quilts and comforters, mattresses. Introduction to acoustics, objectives of acoustics,Advanced technology in acoustics. Acoustics and environment - Introduction, material and its types, methods, applications and its benefits and advantages.

Suggested Reading List:

Title	**Author**
Understanding Textiles	Billie J. Collier, Martin Bide & Phyllis G. Tortora,
Fashion Design; Fashion Concepts: Vol –I	Navneet Kaur,
Fabric structure and design,	N.Gokarneshan,
Fashion Apparel & Accessories and Home Furnishing	Diamond Ellen and Diamond Jay,
Designing Interior Environment	Alexander.N.G

Interior Decoration in India Donserkery.K.G.,

Course Outcomes

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

- Produce Interior Products.
- Create interior designs.
- Identify Carpet pile and their constructions.
- Analyze all the window fabrics and bedding products.
- Evaluate the production method of different types of home textile products

PEC-FAE-412G Quilt Design and Development

Course code	PEC-FAE-412G				
Category	Professional Elective Course (PEC-VI)				
Course title	Quilt Design and Development				
Scheme and Credits	L	T	P	Credits	Semester-8th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: AP- I and II, Colour & Design, Textile Coloration Techniques

Course objectives-

- To introduce the basics of quilt development.
- To learn the potential categories of quilt patterns in home-textile sector
- To learn and explore the sewing and assembling requirements of quilts
- To understand the various styles of painted and printed quilts.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set up by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT - I

Quilt Definition, functions and types, Basic of quilt making procedure, fabrics, colour combinations , sewing requirements : hand stitches, requirements for sewing machine, patterns, wadding and backing, hand quilting, quilting stitches, ways to quilt, cording, Trapunto, utility quilting, machine quilting, sashing, borders and binding methods

UNIT - II

Wholecloth and strippy quilts: Basic, Amish bar, split bar, Flying geese, Chinese coin, different template , borders, corners and motifs used for quilting .Piece quilts: Basic, hand piecing and machine piecing, triangle squares, foundation piecing, Common strip patterns: rail fence, brick,

log-cabin : log cabin courthouse and pineapple, Roman stripes , Seminole, Nine-patch, Irish-chain, Squares /triangles, mosaics, stars, curves and representational

UNIT - III

Appliqué quilts: Basic and types, Hand appliqué by stitching, cording etc., Fused appliques, reverse appliqué, inlay, shadow , appliqué squares, hawaiin appliqués etc. Emblished quilts: embroidery, embellishments, fusing fabrics, sashiko etc. Folded quilts: basic, cathedral window, folded log cabin, Japanese folded, tuck etc.

UNIT - IV

Painted quilts: Colouring before and after quilting, basic printing techniques as discharge, block, stencil, hand painting. Use of computers in quilt designing, latest trends in quilt design and development, quality control and care labeling of quilts

Suggested Reading List:

Title	**Author**
Ultimate quilting Bible	Marie Claytone
The Painted Quilt: Paint and Print Techniques for Colour on Quilts	Linda & Laura Kemshall
Understanding Textiles	Billie J. Collier and Phyllis G. Tortora,
Fabric structure and design,	N.Gokarneshan,
Fashion Apparel & Accessories and Home Furnishing	Ellen Diamond and Jay Diamond
Home Furnishing	V. Ramesh Babu, S Sundaresan

Course Outcomes:

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

- Select the raw material requirements for quilt developement
- Design different styles of quilts
- Develop markers and patterns for styles of quilts
- Analyze the sewing and other quality requirements of quilts

OEC-TT/TC/FAE-404G High Performance Fibres

Course code	OEC-TT/TC/FAE-404G				
Category	Open Elective Course (OEC-VI)				
Course Title	High Performance Fibres				
Scheme and Credits	L	T	P	Credits	Semester–8th
	3	0	0	3	
Branch	Textile Technology, Textile Chemistry, Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Pre–requisites: Man-made fibre production, Drawing and Heat setting

Course Objectives:

The course is designed to impart the following:

• Polymers for high performance fibres

• Various fibre spinning systems

• Manufacturing of inorganic fibre

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT-I

Introduction to high performance fibres: fully aromatic polyamide or aramid fibres; Liquid crystals. Kevlar: manufacture, structure, properties and applications. Dry-jet wet spinning, Polyarylate fibres viz. Vectran - manufacture, properties and applications.

UNIT-II

Ordered polymeric fibres; Aromatic heterocyclic rigid rod polymeric fibres like PBO – their production, structure properties and applications.Flexible chain high performance fibres:

Ultra high molecular weight polyethylene; gel spinning and melt spinning / drawing. Routes for fibre manufacture. Manufacturing, structure, properties and applications these fibres.

UNIT-III

Carbon fibres: Different precursors for carbon fibres like viscose rayon, PAN and pitch; Pre-oxidation, carbonization and graphitization. Chemical and physical changes in structure during these processes: Structure, properties and applications of carbon fibre.

Brief introduction to the manufacturing methods, properties and applications of nano fibres.

UNIT-IV

Manufacturing of glass fibre, types of glass fibres; Manufacturing of PEEK fibre, Ceramic fibre; Manufacturing process of optical fibres, classification of optical fibres, applications of optical fibre

Suggested Reading List:

Title	**Author**
High Performance Fibres	P Bajaj & A K Sengupta
High Technology Fibres (Part A, B, C, D)	M. Lewin & J. Preston
High Performance Fibres	J. W. S. Hearle

Course Outcomes:

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

- know the type of polymers for manufacturing high performance fibres.
- know variants of fibre spinning systems.
- get familiarised with manufacturing techniques of inorganic fibres.

OEC-TC/ FAE-405G Sportswear Textiles & Accessories

Course code	OEC-TC/FAE-405G				
Category	Open Elective Course (OEC-VI)				
Course Title	Sportswear Textiles & Accessories				
Scheme and Credits	L	T	P	Credits	Semester–8th
	3	0	0	3	
Branch	Textile Chemistry/ Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Prerequisites: Textile Raw Materials, Yarn formation, Fabric Manufacture, Material Studies, Fashion Accessories.

Course Objective: Imparting knowledge about:

- Selection criteria and raw materials for sportswear design
- Properties and comfort aspects of sportswear
- Functional aspects of elastic & cold weather Sportswear
- Testing & evaluation of sportswear**.**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

UNIT I

Introduction, classification of sportswear. Sporting culture. Influence of sports on fashion Definition of sports and leisure wear. Influence of sportswear on everyday sports and leisure wear fashion. Requirements and properties of sportswear in accordance with specific sports. Key trends in sportswear design

UNIT II

Material requirements for the design of performance sportswear – design development process: the application of technical textiles in performance sportswear, Emerging trends. Innovations in

fibres and textile materials for sportswear. Designing for speed and comfort, Balance of fashion and functionality, smart textile applications in sports.

UNIT III

Elastic textiles- sportswear accessories – wrist bands, head bands, socks, stockings etc. Fulfilment of requirements i.e. freedom of movement, enhanced performance, recovery and well being, Sportswear and sports footwear industry - functional design of sport footwear, functional fit of sport footwear, functional components and materials in sport footwear

UNIT IV

Cold weather sportswear , Water vapor transfer, Condensation problem in water proof breathable fabrics for sportswear, Sports clothing for protection from injury. Protection effect of protective clothing and equipment on human performance , Sportswear & comfort – physiological comfort of sportswear, aspects of wear comfort, measurement of Physiological comfort. Testing & evaluation of sportswear.

Reading List

Textiles in sport	R. Shishoo
SportsTech Revolutionary Fabrics, Fashion & Design	Thames & Hudson
Science in Clothing Comfort	Apurba Das & R. Alagirusamy
Improving comfort in clothing	Guowen Song
Smart clothes & wearable technology	J.McCann & D. Bryson
Smart Clothing technology & applications	Gilsoo Cho

Course Outcome: At the course completion, students will learn about :

- Selection criteria and raw materials for sportswear design
- Properties and comfort aspects of sportswear
- Functional aspects of elastic & cold weather Sportswear
- Testing & evaluation of sportswear.

OEC-FAE-406G High Tech Garments

Course code	OEC-FAE-406G				
Category	Open Elective Course (OEC-VI)				
Course Title	High Tech Garments				
Scheme and Credits	L	T	P	Credits	Semester–8th
	3	0	0	3	
Branch	Fashion and Apparel Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Prerequisites: Apparel Production, Material Studies, Textile Raw Materials, High Performance Fibres.

Course Objective: The course objective is to impart knowledge about:

- Classification & raw materials for High Tech Garments
- Requirements and components of high tech garments
- Properties & Requirements of Protective Clothing & Medical Textiles
- High Visibility Apparels & Space suits

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 06 parts of 2.5 marks from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Unit I

High Tech Garments – Definition and different types. Brief idea about raw materials used for high tech garments.

Unit II

Protective clothing: General requirement of protective clothing. Chemical protective clothing, Areas of use, CPC items for air-born, liquid hazard. Different chemicals used, parts of CPC .Thermal Protective Clothing - Combustion mechanism, fire Governing parameters, Requirements, designing of TPC, Construction, various parameters affecting flame retardency.

Pesticide Protective Clothing -Rquirements of protective clothing, different areas, different parts of PPC. Ballistic Protective clothing – Requirements, principle of mechanism, different fibers and fabrics, soft and hard armor, Factors influencing performance.

Unit III

Antimicrobial clothing – Requirement, microbiology of skin clothing interface, approach to produce antimicrobial fabrics.Medical Responsive Garments – Definition, requirements, fibres, classification, working of artificial tandem and alignments, kidney, heart, surgical product, cardiovascular graft,
sterilization, wound care.

Unit IV

High visibility apparels – Introduction, requirements, material, different classifications, design features. Space suits- requirements, materials and parts of space suit.

Reading List

Protective Clothing System & Materials Mastura Raheel

Smart fibres, fabrics and Clothing Xiaoming Tao

Course Outcome: At the course completion, the students will have knowledge about:

- Classification & raw materials for High Tech Garments
- Requirements and components of high tech garments
- Properties & Requirements of Protective Clothing & Medical Textiles
- High Visibility Apparels & Space suits

PROJ–FAE-404G Project Work

Course code	**PROJ–TC–403G**				
Category	Project/Internship				
Course title	Project Work (Final Evaluation)				
Scheme and Credits	L	T	P	Credits	Semester–8th
	0	0	12	6	
Branch	Fashion and apparel engineering				
Class work	100 Marks				
Exam	100 Marks				
Total	200 Marks				
Duration of Exam	Viva				

Course Objective:

1. To identify the problem or idea and summarize the literature for the topic of the identified problem
2. To describe the process for undertaking the research.
3. To explain various tools and methods employed for testing and evaluation to draw relevant conclusions.
4. To exhibit effective team work and communication skills.

Course Content:

Each student individually, or an association with some other students will carry out project of an experimental and/or theoretical nature in one of the main branches of fashion and apparel engineering and present his findings in a systematic manner in the report form duly approved and signed by his Supervisor/Guide (to be nominated by the Head of Department/Institution).

Guidelines for Project Work Submission (Final):

Experimentation work:

Students should start their experimental work as per the approved plan of work in consultation with Guide.

Report Writing:

After completion of work, students should prepare the report as per the standard format and guidelines in consultation with guide. This report will include the Literature Review, Project

Plan, Methodology, Experimental Work Performed, Results & Discussions, Conclusions and References.

Submission of Final Report:

Each candidate or group would submit 3 typed copies of project report to the Head of the Department/Institution at least 15 days before the commencement of Second Semester Examination. One copy of the project report will be returned to the candidate after viva-voce examination. The original report and copy of the same will be retained by the concerned Department/Institution and the supervisor respectively

Internal Evaluation:

Term work marks will be allotted by continuous monitoring of the progress in the work and submission of final report.

End Evaluation:

Students have to submit their work in front of internal and external examiners. Examiners assess the project work and allocate the marks according to viva and submitted report.

Course Outcomes:

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

1. Identify the problem /idea and collect the literature for the concerned topic.
2. Design suitable experimental plan.
3. Understand and use various tools of testing and analysis for the data in order to draw relevant conclusions.
4. Communicate and work effectively as a member of team.

SEMESTER WISE DISTRIBUTION OF CREDITS

SEMESTER	BSC (25)	ESC (24)	HSMC (12)	PCC (48)	PEC (18)	OEL (18)	INDUSTRIAL INTERNSHIP (EVALUATION) / SEMINAR /PROJ (15)	TOTAL (160)
1st	9.5	8	3	-	-	-	-	**20.5**
2nd	9.5	8	1	-	-	-	-	**18.5**
3rd	3	-	-	19	-	-	-	**22**
4th	-	4	3	15	-	-	-	**22**
5th	-	-	-	13	3	6	-	**22**
6th	-	-	3	10	3	6	-	**22**
7th	-	-	-	-	6	3	9	**18**
8th	-	-	-	-	6	3	6	**15**
TOTAL	**22**	**20**	**10**	**57**	**18**	**18**	**15**	**160**