## Scheme of Examination

<table>
<thead>
<tr>
<th>Part</th>
<th>Study Components</th>
<th>Course Title</th>
<th>Hours per week</th>
<th>Examinations</th>
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### Semester IV

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<tr>
<th>Course</th>
<th>Core Paper XI - Industrial Engineering - II</th>
<th>Core Paper XII – Production Planning, Control and Inventory Management</th>
<th>Core Paper XIII - Operational Costing</th>
<th>Core Paper XIV - Practical VI - Plant Layout Practical</th>
<th>Allied Paper IV - Human Resource Management</th>
<th>Skill based Subject II – Mini Project (Industrial Engineering)</th>
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#### Semester V

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#### Semester VI

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<tr>
<th>Course</th>
<th>Core Paper XX – Lean six sigma</th>
<th>Elective Paper II</th>
<th>Elective Paper III</th>
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#### IV

- **Skill based Subject III – Behavioral Intervention Skills**: 3 3 30 45 75 3

#### Semester V

- **Elective Paper II**: 5 3 25 75 100 4
- **Elective Paper III**: 5 3 25 75 100 4

#### IV

- **Skill based Subject IV – Production Management - Project Work & Viva Voce**: 15 3 35 140 175 7

#### V

- **Extension Activities @**: - - 50 - 50 2

Total: 3500 140

@ No University Examinations. Only Continuous Internal Assessment (CIA)

# No Continuous Internal Assessment (CIA). Only University Examinations.

### List of Elective papers (Colleges can choose any one of the paper as electives)

<table>
<thead>
<tr>
<th>Elective – I</th>
<th>A</th>
<th>Technology advancements in apparel production</th>
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<tr>
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<td>B</td>
<td>ERP in Apparel Industry</td>
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<td>TQM in Apparel Industry</td>
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<td>B</td>
<td>Leadership &amp; Emotional Intelligence</td>
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<td>C</td>
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<th>A</th>
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<td></td>
<td>B</td>
<td>Factory Compliance</td>
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<td></td>
<td>C</td>
<td>Value Stream Mapping</td>
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</table>
Semester – I - Core Paper I - Basic Textiles

Objectives
- To study about types of textile fibre
- To study about the methods of producing yarn from fibres
- To know about the fibre and yarn quality parameters

Unit I - Natural Fiber

Unit II - Regenerated fiber

Unit III - Synthetic Fiber

Unit IV - Yarn Formation

Unit V - Latest trends in textile fibers and yarns

References:
3. Hand book of textile fibres by J.Gordon & Cook
4. The technology of short-shape staple spinning – W. Klein
5. Spun yarn technology – Oxtoby

Outcome:
After completion of this course students will be able to
- Understand various fibres and their properties
- Know yarn manufacturing process
- Know yarn quality parameters

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Semester – I  - Core Paper II – Apparel Manufacturing Technology

Unit I

Unit II

Unit III

Unit IV
Detailed study on various stitching, sewing and assembly defects - causes & remedies: skip stitch, unbalanced, puckering, gathering, needle defects, thread problems – quality of threads and its impact on sewing quality – sew ability and its influencing factors – needle cutting index.

Unit V

References:
1. Apparel Manufacturing – Hand Book – Jacob Solinger
2. Technology Of Clothing Manufacture – Herold Carr & B.Latham
3. Knitted Clothing Technology – T.Bracken Berry
4. Technology of Stitches & Seams – Coats Viyella Limited
5. Apparel Manufacturing Management System – Roche Daniel
6. Knitting and Apparel Manufacture – Sureshkumar, SSMITT Stores

Semester – I  - Core Paper I – Yarn & Fabric Analysis Practical

Objectives
• To learn about testing of yarn quality parameters
• To learn about testing fabric physical properties

1. Determination of count of yarn using wrap reel & weighing scale.
2. Determination of lea strength & CSP using lea strength tester.
5. Fabric Analysis for determining Weight, CPI, WPI, SL, CL & Yarn Count.
6. Analysis of Blend composition of given fabrics.
7. Determination of Fabric Pilling Using ICI Pill Box
8. Determination of Fabric Bursting Strength.
9. Determination of color fastness of given sample to washing by using launderometer.
10. Determination of color fastness of given sample to rubbing by using crock meter
11. Determination of dimensional stability % of a given fabric / garment to washing.
12. Determination of fabric spirality & bowing

Outcome:
After completion of this course students will be able to do various tests to assess the quality of yarns and fabrics, and its importance

Semester – I  - Allied Paper I – Fabric Manufacturing Technology

OBJECTIVES: To make the students to understand
- Fundamentals of knitting and Weaving process
- Basic differences between the processes & the types of machines used
- Applications of woven & knitted fabrics

Unit – I

Unit-II
Passage of material through a plain power loom – Basic mechanisms of a weaving – Primary, secondary & auxiliary motions – Fabric defects, causes & remedies. Brief study about shuttle less looms. Study Basic weaves (Plain weave, Twill & Satin) and its derivatives

Unit-III

Unit-IV
Terms and definitions in knitting. Principal weft knit stitches - Knit, tuck and miss stitch formation and properties - Representation of weft knit stitches – Study of Basic weft knit structures - Needle gating — Characteristics of basic weft knit structures. Brief study about derivatives of weft knit structures.

Unit V

References:
1. D.B. Ajgaonkar, Knitting Technology
2. David .J.Spencer, Knitting Technology
3. Dr.Samuel Raz , Flat Knitting

OUTCOMES: Upon completion of this course, the student shall be able to understand the
- Principle of weaving & knitting processes
- Basic structures of weaving & Knitting
- Concept of flat knitting & warp knitting

Semester –II - Core Paper IV – Garment Machines & Equipments

UNIT: I

UNIT: II

UNIT: III
Concept of Sewing, seaming& stitching.- Seam and stitch – Classification. Sewing machine – Parts and functions, identification and classification, bed types, classification of stitching mechanism, presser feet, feed mechanism, rotary feed, platform feed, other types prime feed and auxiliary feed. Special attachments in sewing machines

UNIT: IV
Sewing machinery& Equipments- Tables& auxiliary equipment – Types, basic sewing machine-general sewing, –SNLS, DNLS, over lock, blind stitching, buttonholes, bar tacking, button sewing, label sewing, special sewing machine, Embroidery sewing machines, mechanized work place, work aids and its types. Latest developments in sewing machines. Sewing machine maintenance.

UNIT: V

References:
Semester –II  - Core Paper – Computer Application Basics - Practical

Objectives

- To learn about application of MS word and to do exercise
- To learn about MS excel and creation of charts using excel
- To learn about the use of Corel draw and HTML

MS Office

1. Prepare an interview call letter and send using mail merge in MS Word.
2. Design the given advertisement using in MS word. Apply various fonts and pictures.
3. Create an organizational chart in MS word.
4. Create line, bar and pie charts for the given data using MS Excel.
5. Prepare students mark statement with the following fields Roll No, Name, Sub1, Sub2, Sub3, Sub4, Sub5. Calculate Total, Average, Result and Grade. Apply Conditional formatting.
6. Prepare employee salary list with fields Employee No, Employee Name, Experience, Basic Pay, HRA,DA,LIC,PF. Calculate Gross Salary & Net Salary based on the following conditions

<table>
<thead>
<tr>
<th>Experience</th>
<th>HRA</th>
<th>DA</th>
<th>LIC</th>
<th>PF</th>
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<tbody>
<tr>
<td>5 Years &amp; Above</td>
<td>30%</td>
<td>15%</td>
<td>3%</td>
<td>700</td>
</tr>
<tr>
<td>Less than 5 Years</td>
<td>15%</td>
<td>5%</td>
<td>3%</td>
<td>700</td>
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</tbody>
</table>

7. Create a fortnight report using pivot table in Excel
8. Prepare a employee table and apply financial functions.
9. Prepare a power point presentation about a product. Apply animation and slide timing.
10. Create Reports using MS Access.
11. Create Queries and Labels in MS Access
12. Create an E- Mail ID and use various mail features

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Semester –II  - Core Paper – Garment Construction I - Practical

Objectives

- To practice and learn sewing various shapes
- To learn about drafting of patterns for various components
- To learn about sewing of various components

1. Threading practice for SNLS machine Over Lock machine, Flat Lock machine
2. Sample preparations for SNLS machine Over Lock machine, Flat Lock machine.
3. Preparation of samples for seam (any 5)-plain, Top Stitched, Flat fell, piped seam.
4. Preparation of samples for seam finishes (any 3) - overcast, Hem, Edge stitched, bound.
5. Preparation of samples for fullness-darts, tucks (any 3)-pin, cross, group tucking with scalloped effect, Pleats (any 3)-knife, box, kick, gathering by machine, elastic. Ruffles-single, double.
6. Preparation of samples for facing and binding-bias facing, shaped facing, binding.
7. Preparation of samples for plackets -continuous, bound, faced and zipper plackets, Tailored Placket, button and buttonhole, press, button, hook and eye.
8. Preparation of samples for sleeves-plain sleeve, puff sleeve , raglon and kimono sleeve
10. Preparation of samples for collar - peter pan collar , shirt collar
11. Preparation of samples for pocket-patch Pocket
12. Safety practices while working on sewing machine. Care and maintenance on sewing machine.

Outcome:
After completion of this course students will be able to make various garment components using different types of sewing machine

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Semester –II - Allied Paper II – Textile Chemical Processing

Objectives
- To study about preparatory processes for coloration
- To learn about color concept of dyeing , Printing & Finishing
- To study about machines used in processing industry

Unit 1: Introduction to wet processing & Preparatory processes:
Water: water hardness – types - softening process. Preparatory process sequence for woven & knitted fabrics and its objectives(Singeing, Desizing, scouring, Bleaching & Mercerization)– Role of Textile auxiliaries used in processing industry

Unit 2: Dyeing process

Unit 3: Printing process

Unit 4: Finishing

Unit 5: Latest techniques, Eco process & Quality control

Reference
1. Principles of Textile Finishing - Asim Kumar Roy Choudhury – woodhead publishing
2. Chemical finishing of textiles -W. D. Schindler and P. J. Hauser - woodhead publishing
3. Handbook of textile and industrial dyeing Volume 1: Principles, processes and types of dyes - M. Clark - woodhead publishing
4. Handbook of textile and industrial dyeing Volume 2: Applications of dyes - M. Clark - woodhead publishing
5. Digital printing of textiles - Edited by H. Ujiie - woodhead publishing
7. Technology of printing – S.Prayag
8. Dyeing and Screenprinting on Textile by Joanna Kinnersly-Taylor
9. Print, Pattern and Colour by Ruth Issett
10. From Print to Stitch: Tips and Techniques for Hand-printing and Stitching on Fabric by Janet Edmonds

Outcome:
- Understand objectives of preparatory processes for coloration
- Know the types of dyes and its application for textiles
- Learn the various types of fabric and garment printing & finishing

Semester – III - Core Paper VII – Garment Accessories & Trims

Unit I: Introduction & Accessories for children apparels

Introduction to garment accessories - Selecting garment accessories - Types of garment accessories: Basic accessories - Decorative accessories - Finishing accessories –Accessories for children's wear - Design development for different accessories - Safety issues for different accessories in children's garment - Small parts: choking hazards - Decorative trims and embellishments

Unit II Sewing and embroidery threads:

Sewing threads – Textile fibers used for making sewing threads – Thread Construction – Ticket Number – Quality parameters applicable to sewing threads and testing – Thread packages - Embroidery threads – Quality requirements – Fibers used for embroidery threads - Quality evaluation of embroidery threads

Unit III: Closures


Unit IV: Supporting & Decorative Trims


Unit V : Packing Accessories

Tags and its types – Quality requirements – Poly bags and its types - Quality norms pertaining to poly bags – Hangers and its types – Cartons and its types –Testing required for apparel export Cartons –
Factors to be considered for export cartons - Wrappers and Tissues – Pouches for inner wear – Latest innovation in packing accessories

References:
1. Apparel Manufacturing: Sewn Product Analysis - Glock & Kunz – Pearson publishing
2. Sewing for the Apparel Industry - Claire Shaeffer - Pearson publishing
3. Technology Of Clothing Manufacture – Carr & Latham
5. Introduction To Clothing Manufacture – Gerry Cooklin

Semester –III - Core Paper VIII –Industrial Engineering – I

Unit – I Individual process standardization – Overview
Introduction to Industrial Engineering – Need of IE – Different time measurement techniques – Individual process standardization procedure – Its impact in factory costing and performance improvement

Unit - II Method Study

Unit – III Time Study procedure
Introduction to work measurement – Time study procedure – GSD (General Sewing Data) – How to take observe timing – Performance rating – Performance rating using cards and walking – Normal Time – Allowances and its different types – Deriving Standard Time (Standard Allowed Minute/ Standard Minute Value)

Unit – IV Production calculations

Unit – V Operator training methodology

REFERENCES:
1. Industrial Engineering in Apparel Production : V.Ramesh Babu Woodhead Publishing India in Textiles
7. AOTS PEGASUS Technical Manual

Semester –III - Core Paper IX - Garment Construction II - Practical

Objectives
- To practice and learn the construction of various styles of garment.

Using different kind of manufacturing machineries construct the following with details mentioned with it:

I. Men’s Style.

1. Basic T shirt with front patch pocket
2. Formal shirt full sleeve
3. Men’s kurta with stand collar & side kurta pocket
4. Hooded T shirt with front pocket
5. Vest RN, RNS
6. Briefs, Trunks
7. Baggy pant with pouch pocket/ Formal trouser with side and welt pocket
8. Track pant

II. Women’s Style.

1. High neck T shirt with full sleeve
2. Simple salwar + modification
3. Simple kameez with side slit + modification/Legging
4. Sari blouse
5. Skirt
6. Full gown/Maxi + modification
7. Night pajama set

III. Kid’s Style.

1. Sleeveless jabla
2. Overall with full sleeve
3. Bloomer with elastic hem
4. Chemise
5. frock variations + modification in sleeves
6. Pedal pusher

Outcome:
After completion of this course, students will be able to construct various garment styles
Semester –III - Core Paper X – Pattern Making Practical

Objectives

- To learn about creation of patterns manually or various styles.
- To learn about making patterns using software & grading of patterns for different sizes
- To learn about marker making, lay length estimation and fit analysis of patterns.

1. Create pattern for the following styles manually
2. CAD software is used to practice the following on the styles mentioned

Part A
1. Create Pattern on computer screen, adding details to patterns.
2. Saving, extracting & editing patterns from stock library of Patterns.
3. Grading patterns on different size scale.
5. Estimating lay length and calculating marker efficiency.
6. Fit analysis of the given pattern.

Part B –

Styles
12. Children’s Suits and Pyjama

Outcome:
After completion of this course students will be able to create, grade patterns and prepare marker.

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Semester –III - Allied Paper III – Apparel Quality Control & Quality Assurance

Objectives

- To learn about evolution of quality concepts and its importance
- To learn about quality assessment of products at different stages of production
- To learn about AQL concept and inspection procedures

Unit I
Importance of Quality. Quality terminologies. Objectives of Testing - atmospheric conditions for testing lab. Quality problems in fabric, sewing threads & other accessories. Introduction to inspection - Definition - Types of Inspection

Unit II
Fabric inspection systems Testing of Sewing thread, zippers, Buttons, elastic waist bands and fusible interlinings. In process inspection and its significance in apparel quality.
Unit III

Unit IV
Concept of AQL. Final inspection procedures & MIL STD standards. Categories of defects. Package quality testing.

Unit V
Tools of quality control. Introduction to Care labels. Brief study about Testing Standards. Brief study about Oeko-Tex Standards.

References
1. J.E. Booth, Principles of Textile Testing
3. B.P.Saville Physical testing of Textiles
4. Pradeep V Metha & Satish k. Bhardwaj, Managing Quality in Apparel Industries

Semester –III - Skill based subject I - Internship (Operator training practical)

Students have to select a factory and train 3 new operators on single operation with 50% production performance and 90% quality performance.
The observations, procedures implemented and the results obtained have to be documented and to be prepared as a report. In the examination, the students have to make a presentation and they will be assessed by viva voce examination.

Semester IV – Core Paper – XI - Industrial Engineering – II

UNIT I -Group process standardization – Overview
Introduction to group process and its importance – Need of group process improvement – Its impact in factory costing and performance improvement

UNIT II -Production systems
Different production systems – Its advantages and disadvantages – Line production system – Progressive bundle system and Single piece flow – Modular production system – Batch production system – Unit production system – Eton system

UNIT III -Takt time concept
Takt time introduction – Importance of takt time in lean methodology –How to derive Takt time – Yamazumi chart with FTT (First Time Through) – Plotting sequence of operation using Takt time cart – Initial line balancing – Operation bulletin development
UNIT IV - Bottle neck management
Importance of bottle neck management – Impact of un-balanced/ balanced line – Different bottle neck management techniques and its cost impact – Hourly production capturing – Dynamic line balancing and frequency of dynamic line balancing

UNIT V - Factors affecting production efficiency
Introduction to Non-productive Time (NPT) – Capturing Non-productive time – Machine breaktime – Feeding delays – Style changeover time – Rework impact in production efficiency – Methods of operator and the skill level

REFERENCES:
1. Industrial Engineering in Apparel Production : V.Ramesh Babu  Woodhead Publishing India in Textiles
7. AOTS PEGASUS Technical Manual

***********
Semester IV – Core Paper – XII - Production Planning, Control and Inventory Management

UNIT I - Pre-production activity and its timeline for apparel production
Different stages of pre-production – Complete order T&A understanding with Fabric, trims and accessories in-house timelines – Role of T&A in influencing production efficiency

UNIT II - Production T&A
T&A in cutting, production and finishing – T&A for printing and embroidery – Standards and issues faced in industry in meeting timelines – Critical path analysis

UNIT III - Capacity Planning
Introduction to capacity planning – Planning of capacity using minutes in Industrial Engineering – Learning curve in production development – Calculation of monthly capacity planning chart – Requirement vs. actuals – How to allot capacity and do style allocation in lines

UNIT IV - Thread consumption
Different sewing thread consumption measuring techniques – Sewing thread consumption for different types of stitches and seams – Standard – How to calculate thread consumption for knit and woven garments and its procedures

UNIT V - Inventory Management
Importance of inventory management in production floor – Allowed Work In Progress for the department and inside the workstation of different production departments – Scientific inventory management
techniques – Kanban system – Super market model – WIP monitoring template in floor and steps to ensure the WIP

REFERENCE BOOK
3. Technology Of Clothing Manufacture – Carr & Latham
5. Introduction To Clothing Manufacture – Gerry Cooklin
6. Introduction To Production Management – A. J. Chuter
7. Personal Management And Industrial Relations – Tripathi
8. Industrial Engineering And Management – OP. Khanna

*********

Semester IV – Core Paper – XIII - Operational costing

UNIT I - Introduction to Cost per Minutes (CPM)
Cost per Minute concept – CPM standards across different countries – Actual CPM – Different categories in calculating CPM and its importance

UNIT II - Direct salary contribution
Plotting direct salary in CPM chart – Cutting, Sewing and Finishing labour requirement – Salaries as per Industry Standard and Minimum Wages Act – Provident fund and ESI – Bonus – Government contribution of PF for new workers

UNIT III - Indirect salary contribution
Plotting indirect salary in CPM chart – Plotting Staff requirement for all department – Identification of staff quantity as per the standard – Fixing up of salary as per the industry standard and minimum wages act

UNIT IV - Other costs
Expenses – Factory rent, Electricity, Genset consumption, Boiler wood, Needle, Phone, Office stationeries – Vehicle cost – Labour and material transportation – Depreciation – Machinery, Furniture – Maintenance cost – Interest on working capital – Welfare expenses – Miscellaneous expenses

UNIT V - CPM format
Understanding of CPM format in MS Excel – Plotting of all costs in CPM format – Efficiency calculation to derive CPM

References
1. Industrial Engineering in Apparel Production : V.Ramesh Babu  Woodhead Publishing India in Textiles
7. AOTS PEGASUS Technical Manual

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Semester IV – Core Paper – XIV - Plant Layout – Practical

Learning of Auto CAD tools and Developing of factory layout using Auto CAD for state of art apparel manufacturing unit of 250 sewing machineries.

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Semester IV – Allied Paper – IV - HUMAN RESOURCE MANAGEMENT

UNIT I


UNIT II


UNIT III

Employee training – need, types and benefits of training – Executive development – Career Planning and development.

UNIT IV


UNIT V

Employee grievance – forms of grievance – causes – steps in grievance handling. Grievance handling mechanism – Procedure in recording and handling grievances – Role of welfare officer in grievance

Reference books


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Semester IV – Skill based subject II – Mini Project

Development of Takt time Operation Bulletin (OB) for one product in apparel factory with proper establishment of method study and time study procedure.

Students have to prepare report and assessment is done by viva voce examination.

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Semester V – Core Paper – XV - Industrial Engineering III

Unit I- Man – Machine Ratio
Procedure to derive actual Man – Machine Ratio – Importance of Man – Machine Ratio – International standard – How to reduce MMR – Self checking – Self trimming concept – Staff allocation using MMR Concept

Unit II- Operator Skill Matrix
Capturing skill level of the operators – Capacity Vs. Actual production difference – Plot of skill level in skill matrix – Skill demand analysis – Potential skill gap identification – Training of workers using skill gap analysis

Unit III- Line setting – Style changeover
Line setting checklist – Allotment of staff of line setting – Style changeover techniques using SMED concept – Procedure in SMED concept – Internal and external timing – Time allocation for each operation – Capturing of line setting time, throughput time and its analysis – Zero hour output strategy

Unit IV- Multi skilling – Floater strategy
Need of floaters – Absenteeism and Labour turnover – Skill requirement during style change – Calculating floaters requirement – Floaters development strategy – Deployment of floaters in the factory floor
Unit V - Advancements
Folders/ Aid availability – Developments – Poka-yoke (Error proofing techniques) – De-skilling aids – Engineering work station layout

References
1. Industrial Engineering in Apparel Production : V.Ramesh Babu Woodhead Publishing India in Textiles
7. AOTS PEGASUS Technical Manual

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Semester V – Core Paper – XVI - Operational costing – Practical

Calculating Cost per Minute (CPM) of a factory with give inference to the factory on the expenses and efficiency part. Students have to prepare report and assessment is done by viva voce examination.

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Semester V – Core Paper – XVII - Performance Management System – Practical

Importance of Data – KPIs to be tracked – process and its authority – Real time monitoring mechanism – Performance reviews – Visual display management and its importance-Development of one PMS tools for factory performance improvement – Implementation of the tool in the factory and analyze the impact. Consolidated report preparation of the above.

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Semester V – Core Paper – XVIII - QMS in Apparel Production

UNIT I - QMS structure

UNIT II - Development of JD
Understanding of Job description template – Understanding of roles and responsibilities – Job alternatives – Key performance indicators for Staff – Reports/ MIS to be followed

UNIT III - Process Flow designing
Understanding of process flow – Importance – Symbols in process flow and its uses – Process flow sequence – Plotting of checklist, sub processes, files, decision making with corrective actions
UNIT IV - SOP development

UNIT V - Training and Development plan
Training importance and needs – Skills analysis using JD – Development of training calendar – Types of training – Class room training and On the job training – Training methodology – Monitoring of training impact using PMS

REFERENCE BOOK
3. Technology Of Clothing Manufacture – Carr & Latham
5. Introduction To Clothing Manufacture – Gerry Cooklin
6. Introduction To Production Management – A. J. Chuter
7. Personal Management And Industrial Relations – Tripathi
8. Industrial Engineering And Management – OP. Khanna

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Semester V – Core Paper – XIX - Problem Solving – Practical

Identify 2 problems in factory and take necessary actions and show the impact. Consolidated report preparation of the above.

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Semester V – Skill based subject – III- Behavioral Intervention Skills
UNIT I
Organizational behavior –definition, nature and scope – contributing disciplines to Organizational behavior – models of Organizational behavior.

UNIT II
UNIT III

UNIT IV
Group – basic concepts and types of groups- causes for group formation. Work teams- types of teams – stages in team development.

UNIT V

Reference books

Semester VI – Core Paper XX – Lean Six Sigma
- To learn about principles of lean & six sigma
- To learn about tools and techniques of lean

UNIT I - EVOLUTION OFLEAN SIX SIGMA
Introduction to Lean Principles and Six Sigma Concepts-Similarities and differences – Synergy-Evolution of Lean Six Sigma

UNIT II - LEAN SIX SIGMA APPROACH
Lean Six Sigma Methodology- Phases of Lean Six Sigma Method, Managing Lean Six sigma Project, Six sigma Methodologies (DMAIC, DMADV, DFSS)

UNIT III - SIX SIGMA TOOLS AND TECHNIQUES

UNIT IV - LEAN TOOLS
UNIT V - LEAN SIX SIGMA IMPLEMENTATION
Identifying Lean Six Sigma Projects, Define Scope, Planning for Implementation, Selection of tools and techniques for each phase, Measuring the Benefits

REFERENCES:
5. Liker, Jeffrey; Meier, David ,Toyota Talent , Tata Mcgraw Hills

Outcome:
After completion of this course students will be able to
- Understand the concept of lean and six sigma
- Learn about the tools of lean six sigma

Semester VI – Skill based subject IV - Production Management - Project work & Viva voce


Application of all concepts for managing production floor in apparel industry and prepare a detailed project report. Students have to manage a sewing floor of 100 machines/ cutting floor/ finishing floor for 3 months time.

Semester V Elective I – A – Technology Advancements in Apparel Production

Unit 1: Application of artificial intelligence in apparel sector

Unit II : Automation for Spreading & Cutting room
Unit III: Automated Material Handling

Introduction - Definition of material handling - Properties of material and processes - Gripping technologies for textile handling - Automation in material handling related to high-performance textiles - New conveyer systems - Digital tracking with radio-frequency identification

Unit IV: Automation and robotics for sewing room

Introduction - Computer numerical control technologies for sewing process - Sewing automats and sewing units - Robotics for three-dimensional sewing operations - Real-time sewing cell with two lightweight industrial robots - Advantages and disadvantages of automation in sewing - Sewing machines with under bed trimmer - Sewing machine with automatic bobbin changer - Sewing automats for gent’s and lady’s shirts - Sewing automats for casual bottom wear - Sewing automats for formal wear - Sewing automats for knitwear and intimate wear - Sewing automats for non apparel sewn products - Sewing preparatory machines with automatic control system

Unit V: Automation in PPC & Quality Monitoring


Reference:
1. Automation in Garment Manufacturing, Rajkishore Nayak, Rajiv Padhye
2. International Journal of Production Economics, B. Dai, Neville K. S. Lee
3. Fundamentals of artificial intelligence techniques for apparel management applications Z. X. Guo, W. K. Wong

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Semester V Elective I – B : ERP in Apparel Industry

Objectives
- To learn about role and importance of ERP in apparel business
- To learn about various business models of ERP package and its management
- To learn about the MIS

UNIT I

UNIT II
Client/Server architecture; technology choices; SCM, CRM – concepts, Business Process Reengineering, Data ware Housing, Data mining, ERP system packages - Implementation of ERP: ERP
implementation lifecycle, implementation methodology, hidden costs, organizing the implementation, vendors, consultants and users, contracts with vendors, consultants and employees, project management and monitoring

UNIT III
ERP implementation strategies – organizational and social issues, data safety & security, ERP implementation in a garment production facility - The Business Modules: Business modules in an ERP package - finance, manufacturing, human resources, plant maintenance, materials management, quality management, sales and distribution. Significance and advantages of each of the modules

UNIT IV
Management Information System IN Garment Industry – management, key aspects of management, functions, management as a control system, levels of management. ERP in apparel industry: Production resource planning – principles and management of and demand chain analysis – quick response strategy - material management for ‘Quick Response’ – ‘Just in Time (JIT) Technology’; Production planning, costing and merchandising software

UNIT V
Information – requirements, properties and scope, information economics, types and characteristics. Computer Applications – EDI in garment technology; Use of Computers in Designing, Pattern making, computerized production systems, communicating with vendors and buyers; Telephone, fax, video conferencing, intranet, internet, etc; Export documentation, retailing; Methods of communicating with consumers.

References

Outcome:
After completion of this course students will be able to
- Understand the need for ERP
- Learn about the modules in ERP
- Learn about the sales and distribution

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Semester V – Elective I - C – TQM in Apparel Industry

Objectives

- To learn about concept and importance of TQM
- To learn about various quality improvement tools and its application
- To learn about International standards such as ISO, OHSAS, SA 8000

Unit I

Unit II - TQM Principles

Unit III - Control charts
Concepts and uses – Control limits – Control charts for Variables and Attributes: X Charts – R chart – P chart – NP chart – C chart – Acceptance sampling – Types of sampling plans: Single, Double and Multiple Sampling plans – OC curves – AQL and LTPD – Sampling errors and sampling risks – Producer’s risk and Consumer’s risk

Unit IV - TQM Tools

Unit V - Standards

References

1. Dr. S.P. Gupta, “Statistical Methods”
Outcome:
After completion of this course students will be able to
- Concept of TQM
- Learn about the tools of TQM
- Learn about the various standards

Semester VI Elective II - A - Entrepreneurship

Objectives
- To learn about traits required for an entrepreneur
- To learn about criteria for selecting a product, studying the feasibility and project finalization
- To understand the role of various financial institutions in support of entrepreneurship

Unit I
Entrepreneurship: Concept and Definitions; Entrepreneurship and Economic Development; Classification and Types of Entrepreneurs; Entrepreneurial Competencies; Factor Affecting Entrepreneurial Growth – Economic, Non-Economic Factors; EDP Programmes; Entrepreneurial Training; Traits/Qualities of an Entrepreneur; Entrepreneur; Manager Vs. Entrepreneur.

Unit II
Opportunity / Identification and Product Selection: Entrepreneurial Opportunity Search and Identification; Criteria to Select a Product; Conducting Feasibility Studies; Project Finalization; Sources of Information.

Unit III
Small Enterprises and Enterprise Launching Formalities: Definition of Small Scale; Rationale; Objective; Scope; Role of SSI in Economic Development of India; SSI; Registration; NOC from Pollution Board; Machinery and Equipment Selection; Project Report Preparation; Specimen of Project Report; Project Planning and Scheduling using Networking Techniques of PERT / CPM; Methods of Project Appraisal.

Unit IV
Role of Support Institutions and Management of Small Business: Director of Industries; DIC; SIDO; SIDBI; Small Industries Development Corporation (SIDC); SISI; NSIC; NISBUD; State Financial Corporation SIC; Marketing Management; Production Management; Finance Management; Human Resource Management; Export Marketing; Case Studies.

Unit V
Incentives and subsidies – Subsidized services – subsidy for market. Transport – seed capital assistance – Taxation benefit to SSI role of entrepreneur in export promotion and import substitution.

References


**Outcome:**

**After completion of this course students will be able to**

- Understand the concept of entrepreneurship
- Learn about the identification of a project and project report preparation
- Learn about the role of support institutions

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**Semester VI- Elective II – B: Leadership and Emotional Intelligence**

**UNIT-I**

Emotional Intelligence and Self-awareness-Self-awareness and Mindfulness-Emotional Intelligence Core competencies-Johari’s window-Enneagram Personality Test. Interpersonal Skills and Communication-Developing polished interpersonal skills with staff and colleagues -Listening Skills - Getting along with my manager -Transactional Analysis - Deal with tension and conflict more constructively - Conflict Management techniques - Good interpersonal behaviors - The iceberg model – the Enneagram compulsions

**UNIT-II**

High Performing Teams - The Glen Parker Team Player Types - Team Roles - Stages of Team Development - Team development model - 5 Squares game - Characteristics of high performing teams - Module 4: Building Trust in Teams - Building Trust and Cooperation - Building trust between team members

**UNIT-III**

Self-regulation: managing negative emotions - The skills of self-regulation - The skill of shifting focus and attention - Recognizing negative emotions & their negative impact - Temper negative responses - Techniques for managing and controlling one’s negative emotions - Managing anger – the Amygdala hijack - Learn how to work more effectively with difficult people - The ability to heal – the healing process - Finding the gift in difficult times -Managing stress.

**UNIT-IV**

Developing a positive emotional focus – Gratitude - Counting your blessings- The law of positive attraction - Channel energy and enthusiasm to motivate - Developing empathy - Empathy in the workplace - Emotional Intelligence Test.

**UNIT-V**

References


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Semester VI- Elective II – C: Interpersonal Skills

Objectives

- Equip students with the English language skills.
- Provide guidance and practice in general conversation and to improve general and academic listening skills
- Make effective presentations.

UNIT I
Listening as a key skill- its importance- speaking – give personal information – ask for personal information – express ability – enquire about ability – ask for clarification Improving pronunciation – pronunciation basics taking lecture notes – preparing to listen to a lecture – articulate a complete idea as opposed to producing fragmented utterances.

UNIT II
Listen to a process information- give information, as part of a simple explanation – conversation starters: small talk – stressing syllables and speaking clearly – intonation patterns – compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III
Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk – greet – respond to greetings – describe health and symptoms – invite and offer – accept – decline – take leave – listen for and follow the gist- listen for detail

UNIT IV
Being an active listener: giving verbal and non-verbal feedback – participating in a group discussion – summarizing academic readings and lectures conversational speech listening to and participating in conversations – persuade.

UNIT V
Formal and informal talk – listen to follow and respond to explanations, directions and instructions in academic and business contexts – strategies for presentations and interactive communication – group/pair presentations – negotiate disagreement in group work.

OUTCOMES:
At the end of the course Learners will be able to:
- Listen and respond appropriately.
- Participate in group discussions
- Make effective presentations
- Participate confidently and appropriately in conversations both formal and informal

TEXT BOOKS:

REFERENCES:

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**Semester VI- Elective III – A: Training & Development**

Objective:
The course aims at exposing the learner to the Concept and practice of training and development in the modern organisational setting through the pedagogy of case discussions and recent experiences.

**Unit I-Introduction:** Concepts and Rationale of Training and Development; overview of training and development systems; organizing training department; training and development policies; linking training and development to company’s strategy; Requisites of Effective Training ; Role of External agencies in Training and Development.

**Unit II- Training Needs Assessment (TNA):** Meaning and purpose of TNA, TNA at different levels, Approaches for TNA, output of TNA, methods used in TNA.

**Unit III- Training and Development Methodologies:** Overview of Training Methodologies- Logic and Process of Learning; Principles of Learning; Individual differences in learning, learning process, learning curve, learning management system; Criteria for Method Selection; Skills of an Effective Trainer; Use of Audio-Visual Aids in training; Computer Aided Instructions- Distance Learning, Open Learning, E-Learning; Technologies Convergence and Multimedia Environment. Development Techniques for enhancing decision–making and interpersonal skills, Case-study, in-basket exercise, special projects, multiple management Programme Learning, Action learning, Syndicate Work, Games, Action Maze, Role
Play; Demonstration and Practice Monitoring; Coaching; Self Diagnostic Skills, Experience Learning, Discovery Learning, Brain Storming, Counselling, Position Rotation, Team Building, and Sensitivity Training.

**Unit IV-Designing Training and Development Programs:** Organisation of Training and Development programs, Training design, kinds of training and development programs- competence based and role based training; orientation and socialization; diversity training, choice of training and development methods, Preparation of trainers; developing training materials; E-learning environment; Flexible learning modules; Self development; Training process outsourcing.

**Unit V-Evaluation of Training and Development:** Reasons for evaluating Training and development programs, Problems in evaluation; Evaluation planning and data collection, different evaluation frameworks, Problems of Measurement and Evaluation; Costing of training, measuring costs and benefits of training program, obtaining feedback of trainees; Methods of evaluating effectiveness of Training Efforts; Kirkpatrick Model of Training Effectiveness; Training issues resulting from the external environment and internal needs of the company.

**Unit VI-Emerging Trends in Training and Development:** Gamification, team training and six sigma training; Electronic Enabled Training Systems (EETS)-Concept and types, benefits and challenges in using EETS; concerns in implementation of EETS – availability, incorporation, extension, and learning renewals for EETS; use of EETS and its up scalability; follow up activities; Training and development initiatives of some selected companies from private and public sectors and MNCs.

**References**

3. Warren, M.W. Training for Results, Massachusetts, Addison-Wesley.
5. Garner, James, Training Interventions in Job Skill Development, Addison-Wesley.

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Semester VI- Elective III – B: Factory Compliance

Unit I

Unit II
Social Security - Concept, Need, Types and Schemes for the organized sector in India-Maternity, ESI Scheme, EPF Scheme, Industrial health and Hygiene, Accident and Compensation.

Unit III

Unit IV
Chemical Hazards and Specific Control Measures – Storage, handling and transportation of chemicals. Chemical Safety Data Sheets/ MSDS. House Keeping. Personal Protective Equipment. Fire and Explosion Hazards – Fire Prevention and Control; Portable and fixed fire fighting systems - Hazards area classification.

Unit V

References
2. Labour and Industrial Laws by P. K. Padhi Paperback
3. Law Relating to Leave Holidays and Absenteeism in Industries - H.L. Kumar

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Semester VI- Elective III – C: Value Stream Mapping

Unit I - Introduction

Unit II - Symbols in Value Stream Mapping
Unit III - Advanced Symbols in Value Stream Mapping


Unit IV - Stating current state


Unit V - Developing Future state

Reduce Cycle Time – Reduce setups / reduce batches – Improve quality performance – Change delivery schedules – Implement Kanban – Moving from current to future state map

REFERENCES:
5. Liker, Jeffrey; Meier, David ,Toyota Talent , Tata Mcgraw Hills