Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Apparel Production Management (APM)
(Applicable from the academic session 2018-2019)

Chemical Processing of Textile II (PC APM 501)

Name of the Course	**Chemical Processing of Textile II**
Course Code: PC APM 501	**Semester: V**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester Exam.: 15 Marks
Tutorial: Nil	Assignment & Quiz: 10(=8+2) Marks
	Attendance: Marks 5
Practical: hrs./week	End Semester Exam.: 70 Marks
Credit Points:3	

Objective:	
1	To introduce different textile printing, finishing, effluent treatment and colour fastness.
2	To illustrate the need of different finishing on textiles, colour fastness testing and effluent treatment.
3	To explain principle, mechanism, application method, style, process flow, process parameters of textile printing, finising and effluent treatment.
Pre-Requisite:	
1	Chemical processing of Textile-I (PC APM 402)
2	Chemistry, Physics, Introduction to textiles, Textile fibres and yarns

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	**Units**	**Objective Questions (MCQ only with one correct answer)**		**Subjective Questions**			
		No. of questions to	**Total marks**	**No. of questions**	**To answer`**	**Marks per**	**Total marks**

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		be set		**to be set**		**question**	
A	**1 to 7**	**10**	**10**				
B	**1 to 7**			**6**	**3**	**5**	**15**
C	**1 to 7**			**6**	**3**	**15**	**45**

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**
- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs/Unit	Marks/Unit
1	**Introduction to Textile Printing** Historical background, definition, comparative between dyeing and printing, printing paste ingredients, different types of thickeners, different methods and styles of printing, block printing, roller printing, flat screen printing, rotary screen printing, transfer printing, flock printing, digital printing, direct style, discharge style, resist style, batik style, tie and dye, methods of printing screen preparation.	12	25
2	**Printing of different types of fibres** printing of cellulosic fibre with pigment colour and reactive dyes, printing of silk, wool and nylon with acid dyes and metal complex dyes, printing of polyester with disperse dyes, different printing faults and their remedies, steaming and curing.	6	15
3	**Introduction to Textile Finishing**	5	10

	Objective, classification, application methods, advantages and disadvantages of different finishing processes,		
4	**Mechnical Finishing** Principle and mechanism of calendaring, suedening, raising, napping, decating, Sanforizing or anti-shrink finishing and corduroy cutting.	5	10
5	**Chemical Finishing** Principle, mechanism and application method of resin finishing to impart crease recovery finishing, easy care finish, wash-n-wear finish, durable press finishing, textile softener, flame retardant and flame proofing finishing, water repellent and water proofing finishing, rot resistance and mildew proof finishing, moth proofing of wool, antistatic finishing, anti-microbial finishing, organdie finishing, silky finish of polyester, denim wash, bio-wash, nano finishing, plasma finishing.	12	30
6	**Colour Fastness** Different fastness of dyed textile, light fastness, washing fastness, rubbing fastness, perspiration fastness, saliva fastness, fastness against bleaching, chemical fume, sea water, sublimation fastness.	3	5
7	**Effluent treatment plant (ETP)** Characteristic of effluent from different textile mills, chemicals and dyes creating pollution, causes of pollution,	2	5

	criteria in ETP, pollution treatment menthods.		
		45	100

Text and reference books:

1. Shenai V.A 'Technology of textile processing' Vol III, V, VII, & VIII Shevak Publications 1981.
2. Datya K. V., Vaidya A A 'Chemical processing of synthetic fibres and blends' John Wiley & Sons, Newyork,1984.
3. Peter R. H.'Textile Chemistry' Vol. I & Vol. II, Textile Institute, Manchester 1970.
4. Miles L.W.C 'Textile Printing' dyers Pub co. UK 1981.
5. Jacob Solinger, 'Apparel manufacturing Analysis' Textile Book Publisher, New York, 1988.
6. W D Schindler and P J Hauser, 2004. 'Chemical Finishing of Textiles' (Cambridge, England:
1. Woodhead)
7. M Lewin and S B Sello, Ed. Functional Finishes, Handbook of Fibre Science and Technology:
2. Volume II, Part A and B (New York, USA: Marcel Dekker)
8. J.T. Marsh, An introduction to textile finishing, B.I. Publications, India, 1979.
9. A.J. Hall, Textile finishing, Heywoods, London, 1966.

Course Outcome:

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

1. Understand different printing and finishing process, importance of process parameters & ingredients/chemicals of textile finishing and printing.
2. Formulate printing paste for cellulosic fibre, silk, wool, nylon and polyester fibre.
3. Select finishing formulation for cellulosic fibre, silk, wool, nylon and polyester fibre
4. Apply the knowledge of basic principle of Effluent treatment plant in relevant field.
5. Understand the importance of different fastness properties of coloured textiles.

Special Remarks (If any): NIL

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Chemical Processing of Textile Lab II (PC APM 591)

Name of the Course:	**Chemical Processing of Textile Lab II**
Course Code: PC APM 591	**Semester: V**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory:	**Continuous Internal Assessment:**
Tutorial: Nil	**External Assessment: 60**
Practical: 3 hrs./week	**Distribution of marks: 40**
Credit Points: 1.5	

Course Outcomes: At the end of this semester under this course student will be able to	
1	Formulate and apply printing paste recipe, process parameters of textile printing and finishing.
2	Apply the knowledge of textile printing and finishing in industrial practices.
3	Identity the type of finishing
	Evaluate the different fastness properties of coloured textiles.
Pre-Requisite:	
1	Chemical Processing of Textile II :PC APM 501
2	Chemical Processing of Textiles: I: PC APM 401
3	Chemical Processing of Textile Lab I: PC APM 492

Practical: 14 numbers of experiments	
	1) Intellectual skills 50
	2) Motor skill- 50

Laboratory Experiment:	
1	Printing of cotton fabric with pigment colour using block and flat screen

2	Printing of cotton fabric with direct dyes
3	Printing of cotton fabric with reactive dyes
4	Printing of silk and wool fabric with acid dyes in discharge style
5	Printing of cotton fabric with naphthol colour in batik style
6	Printing of nylon fabric with metal complex dyes
7	Printing of acrylic fabric with basic dyes
8	Printing of polyester fabric with disperse dyes
9	Anti-crease finishing of cotton fabric
10	Flame retardant finishing of cotton fabric
11	Softening finishing of cotton fabric
12	Colour fastness to washing
13	Colour fastness to light
14	Colour fastness to rubbing
The above list is not exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasise the activities for doing rather than the knowing.	

Text and reference books:

1. Shenai V.A 'Technology of textile processing' Vol III, V, VII, & VIII Shevak Publications 1981.
2. Datya K. V., Vaidya A A 'Chemical processing of synthetic fibres and blends' John Wiley & Sons, Newyork,1984.
3. Peter R. H.'Textile Chemistry' Vol. I & Vol. II, Textile Institute, Manchester 1970.
4. Miles L.W.C 'Textile Printing' dyers Pub co. UK 1981.
5. Jacob Solinger, 'Apparel manufacturing Analysis' Textile Book Publisher, New York, 1988.
6. W D Schindler and P J Hauser, 2004. 'Chemical Finishing of Textiles' (Cambridge, England: Woodhead)
7. Dr. Sabrie Soloman, 3D Printing and Design, Khanna Publishing House, 2020.

8. M Lewin and S B Sello, Ed. Functional Finishes, Handbook of Fibre Science and Technology:
9. Volume II, Part A and B (New York, USA: Marcel Dekker)
10. J.T. Marsh, An introduction to textile finishing, B.I. Publications, India, 1979.
11. A.J. Hall, Textile finishing, Heywoods, London, 1966.

Special Remarks (If any):

At least 10 experiments should be conducted

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APPAREL PRODUCTION –III : (Stitching & Finishing) (PC APM 502)

Name of the Course	**APPAREL PRODUCTION –III : (Stitching & Finishing)**
Course Code: PC APM 502	**Semester: V**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester Exam.: 15 Marks
Tutorial: Nil	Assignment & Quiz: 10(=8+2) Marks
	Attendance: Marks 5
Practical: hr/week	End Semester Exam.: 70 Marks
Credit Points: 3	

Objective:	
1	To impart the conceptions of basic mechanisms of stitch formation
2	To impart the knowledge of different types of stitches and seams, their properties and applications.
3	To impart the knowledge of stitch geometry and related mathematical derivations
4	To impart the knowledge of sewing sequences, stitch types and seam types for different types of garments.
5	To impart the knowledge of various types of trims & accessories.
6	To introduce different subsequent processes for finishing and packing of garment.
7	To impart the knowledge of causes and remedies of common sewing faults
8	To impart the computational and numerical knowledge for production and consumption calculations in sewing department.
Pre-Requisite:	
1	Knowledge of Planar and solid geometry
2	Analytical knowledge
3	Mathematical and numerical skill.
3	Elementary drawing skill

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End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.							
Groups	**Units**	**Objective Questions (MCQ only with one correct answer)**		**Subjective Questions**			
		No. of questions to be set	**Total marks**	**No. of questions to be set**	**To answer`**	**Marks per question**	**Total marks**
A	**1 to 9**	**10**	**10**				
B	**1 to 9**			**5**	**3**	**5**	**15**
C	**1 to 9**			**5**	**3**	**15**	**45**

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**
- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs/Unit	Marks/Unit
1	**Introduction to Stitches** Definition, Classification of stitches and stitch numbers. Constructive stitches-temporary, permanent stitches. Principles and properties of special stitches like Button sewing stitch, zig-zag stitch, blind stitch, tacking, basting etc . Their applications. Stitches used for decorative purposes, embroidery stitches and their properties --- for both hand embroidery and machine embroidery. Specification as per ASTM standards, comparison of stitch properties, standards for good stitches.	6	15
2	**Mechanism of stitch formations for major stitches**	5	10

	Lockstitch ,Chainstitch , Overlock etc.Calculation of crimp or thread-ratio in different types of stitches. Theoreticalderivation for determination of thread consumption from the stitch geometry.		
3	**Seam** Definition, types of seams and seam finishes. Their properties, suitability and application in various garments. Seam finish.	3	6
4	**Sewing sequence and types of stitches and seams** Sequence generally used for different types of garments like formal shirt Men‘s / Women‘s , casual shirt Men‘s / Women‘s , Formal / casual trousers , Denim trousers , Jackets , coats , skirts , Kurti / Kurta , Pyajama , Knitted T-shirts , Leggings , undergarments etc.	10	24
5	**Trims and accessories** Different types and their uses. Stitch types used for button attachment, zipper attachment, lace or applique attachment etc.Fasteners, labels, support materials, decorative trims.	4	8
6	**Fullness** Definition, methods of introducing fullness in garments-gathers, pleats, flares, flounces, smocking,tucks & darts, methods of controlling fullness in stitching.	4	8
7	Frequently occurred stitching faults --- their causes and remedies.	3	6
8	Finishing & pressing department, trimming department, packing department, packing materials.	4	8
9	Sewing thread size-numbers in different systems, ticket number, conversion factors . Numerical problem solving for calculation of production, efficiency, thread consumption in sewing etc.	6	15

		45	100

Text and reference books:

1. Gerry Cooklin, "Introduction to Clothing Manufacture", Blackwell Science, UK,1991
2. Harold Carr & Barbara Latham, "The Technology of Clothing Manufacture",Oxford Pub, USA, 1994
3. .Mary Mathews 'Practical clothing construction' Thomson & Co. Madras,1974 Cock V.
4. 4 .'Dress making simplified' Blackwell science,1987
5. Ruth E G, Grace I Kunz Apparel Manufacturing Sewn Product analysis, UK, 2005
6. FromFibre to Fabric. B. T. Corbman. Mc. Graw Hill
7. Sewing for the Apparel Industry. Claire Shaeffer. Prentice Hall.

Course Outcome:

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

1. Define seam classes with corresponding international standards and specific applications.
2. Apply the theoretical knowledge of stitch geometry in thread consumption calculation.
3. Apply mathematical and numerical knowledge for sewing production and consumption calculations
4. Apply the basic knowledge about different trims and accessories in apparel manufacturing.
5. Identify the common sewing defects and its possible causes and remedies.

Special Remarks (If any): NIL

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Apparel Production Lab III : Stitching & Finishing (PC APM 592)

Name of the Course:	**Apparel Production Lab III : Stitching & Finishing**
Course Code: PC APM-592	**Semester: V**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: hrs./week	**Continuous Internal Assessment:**
Tutorial: Nil	**External Assessment: 60**
Practical: 3 hrs./week	**Distribution of marks: 40**
Credit Points: 1.5	

Course Outcomes: After successful completion of this course, the students should be able to	
1	Apply the knowledge of basic mechanisms of threading and stitch formation,
2	Classify different types of stitches and seams, their properties and applications.
3	Identify the causes and remedies of common sewing faults
4	Apply mathematical and numerical knowledge for sewing production and consumption calculations in sewing department.
5	Apply the practical knowledge to different types of sewing threads, trims and accessories commonly used in the apparel market.
Pre-Requisite:	
1	Apparel Production –III : (stitching & finishing) :PC APM 502
2	Knowledge of Planar and Solid geometry and basic mechanics , Knowledge about aesthetic, shape and form.
3	Basic operational skills required for sewing.

Practical:	
	1) Intellectual skills 50 %

	2) Motor skill-Sense of proportion and basic mechanics 50 %

Laboratory Experiment:	
1	Introduction to different types of sewing machines, and machine parts.
2	Threading for SNLS,DNCS,Overlockmachines, button sewing machine, bar tacking machine etc. Thread tension adjustments. Bobbin thread winding.
3	Sample stitching of various types of stiches on muslin fabrics.
4	Creation of different types of seams and seam finishes … for flat,lapped,superimposed, bound seam etc. using muslin fabrics.
5	Practical on calculation of thread crimp , thread consumption for various types of seams and stiches
6	Using the drafted paper patterns construct, finish and press the following: 1.Formal shirt 2. Formal Trousers. Calculate thread consumption and time required in sewing. Total stoppage time and their causes. Identify sewing faults if any.
7	Using the drafted paper patterns construct, finish and press the following: 1.Sari-Blouse 2. Sari-petticoat 3. Brief and vests 4. Undergarments Calculate thread consumption and time required in sewing. Total stoppage time and their causes. Identify sewing faults if any.
8	Using the drafted paper patterns construct, finish and press the following: 1.Salwar-Kameez 2. Kurta-Pyajama 3.Skirt . Calculate thread consumption and time required in sewing. Total stoppage time and their causes. Identify sewing faults if any.
9	Using the drafted paper patterns construct, finish and press the following: 1.T-shirt 2. Leggings etc .Calculate thread consumption and time required in sewing. Total stoppage time and their causes. Identify sewing faults if any.
10	Using the drafted paper patterns construct, finish and press the following:

	1.Sherwani 2. Lehenga 3. etc .Calculate thread consumption and time required in sewing. Total stoppage time and their causes. Identify sewing faults if any.
11	Practical on analysis of given garments and identify seam and stitch types, thread consumption, fabric consumption etc.
12	Visit to wholesale markets/retails and prepare folio for different types of sewing threads,trims and accessories, their market price , applications and other technical specifications.
The above list is not exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasise the activities for doing rather than the knowing.	

Text and reference books:

1. Gerry Cooklin, "Introduction to Clothing Manufacture", Blackwell Science, UK,1991
2. Harold Carr & Barbara Latham, "The Technology of Clothing Manufacture",Oxford Pub, USA, 1994
3. .Mary Mathews 'Practical clothing construction' Thomson & Co. Madras,1974 Cock V.
4. 'Dress making simplified' Blackwell science,1987
5. Ruth E G, Grace I Kunz Apparel Manufacturing Sewn Product analysis, UK, 2005
6. FromFibre to Fabric. B. T. Corbman. Mc. Graw Hill
7. Sewing for the Apparel Industry. Claire Shaeffer. Prentice Hall.

Special Remarks (If any):

At least 10 experiments should be conducted

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Testing of Fabrics and Design Analysis (PC APM 503)

Name of the Course:	Testing of Fabrics and Design Analysis
Course Code: PC APM 503	**Semester: V**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester Exam.:15 Marks
Tutorial: Nil	Assignment & Quiz: 15(=10+5) Marks
	Attendance: 5 Marks
Practical: hrs./week	End Semester Exam.: 70 Marks
Credit Points:3	

Objective:	
1	To learn basic knowledge of different testing standards for apparel fabric
2	To learn Basic knowledge about property common textile fabrics used in garment
3	To learn basic methods for physical testing of fabric
4	To learn basic testing of dyed fabric.
5	To learn methods of analysis of fabric used in apparel
Pre-Requisite:	
1.	PC APM 301 and PC APM 391
1	General physics
2	General chemistry
3	Mathematics I and Mathematics II
4.	Textile Fibres and Yarns: PC APM 301, Textile Fabrics Formation: PC APM 401,

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	**Units**	**Objective Questions (MCQ only with one correct answer)**	**Subjective Questions**

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		No. of questions to be set	Total marks	No. of questions to be set	To answer`	Marks per question	Total marks
A	**1 to 4**	**10**	**10**				
B	**1 to 4**			**6**	**3**	**5**	**15**
C	**1 to 4**			**6**	**3**	**15**	**45**

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**
- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs/Unit	Marks/Unit
1.	**Introduction to testing standards of apparel** Introduction to Garment Testing, Objectives and significance of Garment Testing. International Standards available for Garment Testing. Introduction to REACH Audits and REACH screening. Sampling Techniques , AQL standards of Sampling. Oeko tex 100 Standards	8	16
2.	**Physical Testing of Garment** Principles, necessity and methods of various Physical Testing of Garment - Weight of Garment, Garment Thickness, Seam Strength, Pilling resistance, Button strength Testing , Zipper strength Testing , Formability and Sewability Testing of Apparel Fabrics. Air Permeability and Tearing Strength of Apparel Fabrics. Washing Shrinkage , Flammability Property . Needle damage check (for knitted garment). Symmetry check. Size fitting test. Waterproof test	14	32

	Ventilation test. Fabric appearance testing;		
3.	**Chemical testing of garment** Principles , necessity and methods of various Chemical Testing of Garment - Testing the presence of Prohibited Azo dyes, Nickel in metal parts , Pentachlorophenol, PCP , Allergenic disperse dyes, Color Fastness properties – fastness to light , fastness to rubbing , fastness to washing , fastness to Ironing , fastness to dry cleaning , fastness to chlorine water , fastness to perspiration, saliva fastness. Testing of blend composition in garment. Mold contamination prevention. Metal contamination prevention. Testing intelligent textiles.	15	36
4.	**Design Analysis** Woven fabric analysis, steps for analysis of fabric, weave, fabric name, peg plan, drafting, denting plan, knitted fabric analysis, design plan.	8	16
		45	100

Text and reference books:

1. Introduction to Textile Science, Marjor L. Joseph.
2. Textile Testing, by John H., Skinkle
3. Textile Testing: Physical, Chemical, and Microscopical , Skinkle, John H.
4. Textile Testing by J.E.Booth
5. Fabric Testing Julian Hu

Course Outcome:

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

1. Explain the measurement of fabric and apparel properties

2. Explain the measurement of apparel related accessories' properties e students sh
3. Apply basics of chemical testing in apparel industry for maintaining quality.
4. Apply basics quality systems in apparel fabric
5. Interpret and analyse the tested values

Special Remarks (If any): NIL

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Testing of Fabric and Design Analysis Lab (PC APM 593)

Name of the Course:		**Testing of Fabric and Design Analysis Lab**
Course Code: PC APM 593		**Semester: V**
Duration: 6 months		**Maximum Marks: 100**
Teaching Scheme		**Examination Scheme**
Theory: nil		**Continuous Internal Assessment:**
Tutorial: Nil		**External Assessment: 60**
Practical: 3 hrs./week		**Distribution of marks: 40**
Credit Points:1.5		
Course Outcomes: After successful completion of this course, the students should be able		
1	Apply the basic knowledge of different testing methods for apparel fabric	
2	Identify important property of common textile fabrics used in garment	
3	Test dyed fabric.	
4	Use to various testing instruments to analysis of fabric used in apparel	
Pre-Requisite:		
1	Elements of statistics	
2	General physics for measurement	
3	General chemistry about common solvents	
4	Textile Fibres and Yarns: PC APM 301, Textile Fabrics Formation: PC APM 401, Testing of Fabrics and Design Analysis (PC APM 503)	
Practical: 12 number of experiments		
		3) Intellectual skills- 60 % (average)
		4) Motor skill- 40% (average)

Laboratory Experiment:	
1	Fabric tensile, tearing strength; bursting strength, , Interlinings-Peel bond strength
2	seam slippage ,seam strength testing
3	drape, stiffness, crease recovery,
4	fabric abrasion resistance, Shrinkage testing
5	Button and Zipper strength testing
6	Pilling resistance testing
7	Air permeability testing of fabric
8	Blend composition determination of given Garment.
9	Different Colorfastness property testing.
10	Flammability Testing,
11	Fabric analysis of garment fabric : woven fabric analysis-weave –draft-peg plan Warp particulars-materials warp-ends per inch-count, direction & amount of twist; weft particulars-material weft, picks per inch, count, direction & amount of twist, crimp%, cover factor; total cover factor knitted fabric analysis- structure, Wales/inch-coarse/inch-loop length, coarse/inch loop length, coarse length, stitch density-tightness factor;
12	Garment-checking procedure testing
The above list is not exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasise the activities for doing rather than the knowing.	

Text and reference books:

1. ASTM Standard testing books 2011
2. Textile testing by J.E.Booth
3.Fabric Testing by Jinlian Hu

Special Remarks (If any):

At least 10 experiments should be conducted

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Syllabus for B. Tech in Apparel Production Management (APM)
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Knitting and Knit wear Technology (PE APM 501A)

Name of the Course:	**Knitting and Knitwear Technology**
Course Code: PE APM 501A	**Semester :V**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester Exam.:15 Marks
Tutorial: Nil	Assignment & Quiz: 15(=10+5) Marks
	Attendance: 5 Marks
Practical: hrs./week	End Semester Exam.: 70 Marks
Credit Points:3	

Objective:	
1	To impart the knowledge of various types of knitting and knitwear manufacturing technology,
	To impart the knowledge of application of the knitwear fabric
Pre-Requisite:	
1	Knowledge ofyarns and their properties, knowledge of basic fabric manufacturing.
2	Knowledge of basics of garment construction, pattern making , grading and stitching
3	PC APM 301, PC APM 391, PC APM 401, PC APM 491

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	**Units**	**Objective Questions (MCQ only with one correct answer)**		**Subjective Questions**			
		No. of questions to be set	**Total marks**	**No. of questions to be set**	**To answer`**	**Marks per question**	**Total marks**

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A	**1 to 5**	**10**	**10**				**10**
B	**1 to 5**			**5**	**3**	**5**	**15**
C	**1 to 5**			**5**	**3**	**15**	**45**

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**
- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs/ Unit	Marks/ Unit
1	**Introduction to knitting** Definition of knitting; requirement of knitted fabric for human beings; brief history invention of knitted of garment; comparison of knitting with other fabric manufacturing technology; Concept of warp and weft knitting; different types of knitted fabric and machineries; different terminology related to knitted fabric, such as loop, course, wale, loop length, loop spacing etc. knitting needles: latch, beard, compound, their functions and different parts; loop formation sequence by using different types needle.	10	25
2	**Basic knitted structure** Classification of weft knitting; circular and flat-bed knitting machines: motion transmission, yarn path, fabrics formation; role and function of sinker in knitting; Fundamental of knit, tuck and float stitches formation; basic knitted structures and their production i.e. plain, rib, interlock, purl and their structure with notational represent, graphical represent and corresponding cam profiles; adjustment of loop length; single jersey structure: properties, derivatives, ornamentation; rib structure: properties, Derivative cardigan,full cardigan-Purl Structure-properties-Derivatives-Eight lock; Double knit structures:	20	40

	single pique, double Pique, Milano rib, Swiss Pique, French pique, Pontediroma, Ottaman rib etc. concept of single track and multi-track cam assembly: design, needle set-out and cam set-out in multi-track cam. Laddering, robing back, pleating, loop constant, fabric GSM calculation; production calculation in circular knitting machine. Warp knitting; comparison of weft knitting with warp knitting. Rachel and tricot knitted machine; introduction to linking machinery; estimation of yarn consumption for knitted fabric.		
3	**Knit wear garment manufacturing** Types of knitted garment and their specifications; Sweaters , Cardigans , T-shirts , Leggings , Undergarments etc. types of yarn used for winter garments: quality specification, quality requirements offabrics for winter garments.Process flowchart for knitted garment manufacturing. General types and specifications of machines used for knitwear garments.	3	5
4.	Type of circular sweater strip machines, production techniques for sweaters. Fully fashioned sweaters description, knitting of slip-over cardigans, control of defects in fully fashioned knitting; production of fully fashioned sleeves on v-bed flat machines. Creation of Spec-sheet andbasic patterns for Sweaters , Fully Fashioned Sweaters , Cardigans , Knitted T-Shirts , Knitted Leggings etc.	6	15
5.	Cut and sew sweaters: cutting techniques, cutting machines-operating difficulties and Remedies, sewing of sweater –strips- types of stitches and seams used in sweaters;Sewing sequence of T-shirt : seam types , stitch types and types of sewing machines used in T-Shirt manufacturing. Common sewing defects and its remedies. Pressing of sweaters and T-Shirt-open buck, steam press, body form stem press; fully automatic knitting machineries and modern development like CAD, CAM etc. estimation of fabric consumptionand thread consumption for knitwear garment.	6	15
		45	100

Text and reference books:

1. D.B. Ajgaonkar, "Knitting Technology", Universal Publication Corporation, Mumbai, 1998.
2. P.K. Bannerjee, "Principle of fabric Formation", CRC Press Publication, Boca Raton, 2015.
3. S.C. Ray, "Fundamentals and Advances in knitting Technology", Woodhead Publishing India Pvt. Ltd., New Delhi, 2012.
4. David J Spencer," Knitting Technology " Woodhead Publishing Limited ,Cambridge ,England .,2001.

Course Outcome:

1. Students will be able to identify and differentiate between the structure of warp and weft knitted fabrics , single jersey , double jersey , pique etc.
2. Students will be able to select the process parameters and yarn parameters for a desired knitted fabric.
3. Students will be able to carry out the production calculations and estimation of thread consumption in knitting.
4. Students will be able to select correct knitted fabrics for a particular knitwear garment.
5. Students will be able to prepare basic patterns for knitwear garments.
6. Students will be able to select correct seam , stitch and sewing machine type for knitwear garments.
7. Students will be able to estimate the fabric and sewing-thread requirement for knitwear garments.

Special Remarks (If any): NIL

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Apparel Production Management (APM)
(Applicable from the academic session 2018-2019)
Knitting & Knitwear Technology lab (PE APM 591 A)

Name of the Course	**Knitting & Knitwear Technology lab**
Course Code: PE APM 591A	**Semester :V**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: nil	**Continuous Internal Assessment:**
Tutorial: Nil	**External Assessment: 60**
Practical: 3 hrs./week	**Distribution of marks: 40**
Credit Points:1.5	

Course Outcomes: After successful completion of this course, the students should be able	
1	Apply the basic knowledge of Knitting
2	Understand the concept of warp and weft knitted fabric formation technology.
3	Understand the properties design variation, application of knitted fabric
4	Understand the knit wear garment manufacturing process.
Pre-Requisite:	
1	Knowledge of yarns and their properties, knowledge of basic fabric manufacturing.
2	PC APM 301, PC APM, PC APM 391, PC APM 401, PC APM 491

Practical: 12 number of experiments	
	1) Intellectual skills- 60 % (average)
	2) Motor skill- 40% (average)

Laboratory Experiment:	
1	Introduction to knitting and knitting machine.
2	Study and understand the loop formation sequence in weft knitting.
3	Study the yarn path, yarn tension and fabric takeup in circular knitting.

4	Observe and understand the gearing arrangement in flat bed knitting.
5	Study the yarn path and fabric tech-up mechanism in flat bed knitting.
6	Observe and understand the gearing arrangement in circular knitting.
7	Understand the production calculation in circular knitting.
8	Study and understand the needle setout and cam setout in multi trackcircular knitting machine.
9	Pattern making, cutting and stitching of Men's T-shirt.
10	Pattern making, cutting and stitching of Female's leggings.
11	Pattern making, cutting and stitching of Kids knitted garment.
12	Pattern making, cutting and stitching of women's T-shirt.
The above list is not exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasise the activities for doing rather than the knowing.	

Text and reference books:

1. D.B. Ajgaonkar, "Knitting Technology", Universal Publication Corporation, Mumbai, 1998.
2. P.K. Bannerjee, "Principle of fabric Formation", CRC Press Publication, Boca Raton, 2015.
3. S.C. Ray, "Fundamentals and Advances in knitting Technology", Woodhead Publishing India Pvt. Ltd., New Delhi, 2012.

Special Remarks (If any):

At least 10 experiments should be conducted

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Apparel Production Management (APM)
(Applicable from the academic session 2018-2019)
Manufacturing of Apparel Allied Accessories (PE APM 501 B)

Name of the Course:	**Manufacturing of Apparel Allied Accessories**
Course Code: PE APM 501 B	**Semester: V**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester Exam.:15 Marks
Tutorial: Nil	Assignment & Quiz: 15(=10+5) Marks
	Attendance: 5 Marks
Practical: hr/week	End Semester Exam.: 70 Marks
Credit Points: 3	

Objective:	
1	To impart the knowledge of different categories of apparel and fashion accessories.
2	To impart knowledge and idea about different types of raw materials and production processes of apparel allied accessories , specially Bags , scarf , jewelries etc.
3	To impart knowledge about production processes and calculations of the production of different apparel-allied accessories like bags , footwear , scarf , jewelries etc.
4	To impart knowledge about national and international quality standards for different items like bags , footwear , jewelries , hats , scarf , socks etc.

Pre-Requisite:	
1	Knowledge of Planar and solid geometry, fashion and colour conceptions.
2	Knowledge of shapes, curves, basic perception about Fashion and colour.
3	Mathematical and numerical skill.
3	Elementary drawing skill.

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	**Units**	**Objective Questions (MCQ only with one correct answer)**	**Subjective Questions**

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		No. of questions to be set	Total marks	No. of questions to be set	To answer`	Marks per question	Total marks
A	**1 to 10**	**10**	**10**				
B	**1 to 10**			**5**	**3**	**5**	**15**
C	**1 to 10**			**5**	**3**	**15**	**45**

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**
- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs./Unit	Marks/Unit
1	Introduction to different types of apparel allied and fashion accessories – Handbags – leather bags , jute bags etc. , fashion footwear – sneakers , high heels , boots, Mittens , Socks --- Straw hats , caps – Scarf – Umbrella – Jewelry	2	5
2	Manufacturing of Handbags – Sequential steps, pattern making techniques for bags of different silhouette – application of CAD for making patterns of Bags of different silhouette -- cutting technology --- cutting machines.	6	12
3	Stitching of Leather Handbags -- Types of stitches used for stitching of leather handbags--types, configurations, settings and applications of different types of sewing machines for stitching of leather bags --- types and properties of needles and sewing threads used . Types of trims like buttons, zippers, fasteners etc. used.	6	14
4	Stitching of Jute Handbags -- Types of stitches used for stitching of leather handbags--types, configurations, settings and applications of different types of sewing machines for stitching of leather bags --- types and properties of needles and sewing threads used . Types of	6	14

	trims like buttons, zippers, fasteners etc. used.		
5	Calculation of raw materials consumptions - Testing parameters and international quality standards for Bags. Testing procedures	4	10
6	Introduction to manufacturing steps and raw materials for fashion footwear – sneakers, high heels, boots, Mittens, Socks. -- Different sizes – size standards for domestic and export markets -- Quality standards and Testing procedure. Calculation of raw materials consumptions. Application of CAD for footwear design.	4	10
7	Introduction to manufacturing steps and raw materials for Straw hats, caps. Quality standards and Testing procedure. Calculation of raw materials consumptions.	4	8
8	Introduction to manufacturing steps and raw materials for Scarf – different sizes – size standards for domestic and export markets -- Quality standards and Testing procedure. Calculation of raw materials consumptions.	6	12
9	Introduction to manufacturing steps and raw materials for Umbrella – different sizes – size standards for domestic and export markets -- Quality standards and Testing procedure. Calculation of raw materials consumptions.	2	5
10	Introduction to different types of fashion jewelry – types of raw materials -- design techniques – manufacturing steps - Quality standards and Testing procedure. Calculation of raw materials consumptions.	5	10
		45	100

Text and reference books:

1. The Fairchild Encyclopedia of Fashion Accessories' , By: Phyllis G. Tortora, BinaAbling, Bloomsbury Publishing
2. 'Handbag Designer 101: Everything You Need to Know About Designing, Making, and Marketing Handbags', By: Emily Blumenthal

3. 'Handbag Workshop: Design and Sew the Perfect Bag', By: Anna M. Mazur
4. Modern Concept of Leather and Footwear Manufacturing, By: R.D SINGH , Paperback
5. Big Book of Knitted Mittens: 45 Distinctive Scandinavian Patterns, By: JoridLinvik
6. Big Book of Knitted Socks: 45 Distinctive Scandinavian Patterns, By: JoridLinvik

Course Outcome:

1. Identify different categories of apparel and fashion accessories.
2. Differentiate between various categories of apparel and fashion accessories.
3. Understand the application of different categories of apparel and fashion accessories.for the fashion garments
4. Select the suitable raw materials and production sequence of apparel allied accessories , specially Bags , scarf , jewelries etc.
5. Estimate the raw material consumption and production time of different apparel-allied accessories like bags , footwear , scarf , jewelries etc.
6. Apply basics principle of quality standards and norms in production apparel-allied accessories like bags, footwear, scarf, jewelries etc.
7. Examine the finished product like bags, footwear, jewelries , hats , scarf , socks etc. according to the specific quality standard.

Special Remarks (If any): Nil

Maulana Abul Kalam Azad University of Technology, West Bengal
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Syllabus for B. Tech in Apparel Production Management (APM)
(Applicable from the academic session 2018-2019)

Manufacturing of Apparel Allied Accessory Lab (PE APM 591 B)

Name of the Course	**Manufacturing of Apparel Allied Accessories Lab**
Course Code: PE APM 591B	**Semester: V**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	**Continuous Internal Assessment:**
Tutorial: Nil	**External Assessment: 60**
	Distribution of marks: 40
Practical: 3 hrs./week	
Credit Points: 1.5	

Course Outcome	
1	Students will acquire hands-on knowledge of different categories of apparel and fashion accessories.
2	Students will acquirepractical knowledge and idea about different types of raw materials and production processes of apparel allied accessories , specially Bags , scarf , jewelries etc.
3	Students will acquire practical knowledge about production processes and calculations of the production of different apparel-allied accessories like bags , footwear , scarf , jewelries etc.
4	Students will acquire practical knowledge about national and international quality standards for different items like bags , footwear , jewelries , hats , scarf , socks etc.

Pre-Requisite:	
1	Knowledge of Planar and solid geometry
2	Knowledge of shapes, curves, basic perception about Fashion and colour
3	Mathematical and numerical skill.

3	Elementary drawing skill.

Practical: 12 number of experiments	
	1) Intellectual skills- 60 % (average)
	2) Motor skill- 40% (average)

Laboratory Experiment:	
1	Designing of 2/3 handbags based upon particular fashion themes … both manual designing and designing through CAD. Preparation of patterns both manually and through CAD. Estimation of raw materials and costing.
2,3	Stitching and finishing of 2/3 hand bags. Attachments of Zipper/Button/Fastener. Observation of stitching time , stoppage time etc.
4	Quality inspection of different leather bag / Jute bags collected from markets. Preparation of inspection and defect analysis report. .
5	Designing of 2/3 footwear based upon particular fashion themes -- both manual designing and designing through CAD. Preparation of patterns both manually and through CAD. Estimation of raw materials and costing.
6	Designing of 2/3 socks -- both manual designing and designing through CAD. Preparation of patterns both manually and through CAD. Estimation of raw materials and costing. Quality inspections
7	Designing of 2/3 Scarves -- both manual designing and designing through CAD. Preparation of patterns both manually and through CAD. Estimation of raw materials and costing.
8,9	Stitching of Scarves. Time study.
10	Quality inspections and preparation of inspection & analysis report for Scarves collected from markets.
11	Designing of 2/3 hats, straw-hat based upon particular fashion themes -- both manual

	designing and designing through CAD. Preparation of patterns both manually and through CAD. Estimation of raw materials and costing. Quality inspections.
12	Designing of 2/3 Jewelries based upon particular fashion themes -- both manual designing and designing through CAD .. Estimation of raw materials and costing. Quality inspections.
The above list is not exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasise the activities for doing rather than the knowing.	

Text and reference books:

1. The Fairchild Encyclopedia of Fashion Accessories' , By: Phyllis G. Tortora, BinaAbling, Bloomsbury Publishing
2. 'Handbag Designer 101: Everything You Need to Know About Designing, Making, and Marketing Handbags', By: Emily Blumenthal
3. 'Handbag Workshop: Design and Sew the Perfect Bag', By: Anna M. Mazur
4. Modern Concept of Leather and Footwear Manufacturing, By: R.D SINGH , Paperback
5. Big Book of Knitted Mittens: 45 Distinctive Scandinavian Patterns, By: JoridLinvik
6. Big Book of Knitted Socks: 45 Distinctive Scandinavian Patterns, By: JoridLinvik

Special Remarks (If any):

At least 10 experiments should be conducted

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Apparel Production Management (APM)
(Applicable from the academic session 2018-2019)
Statistical Quality Control in Apparel (PE APM 502 A)

Name of the Course	**Statistical Quality Control in Apparel**
Course Code: PE APM 502 A	**Semester V**
Duration: 6 months	**Maximum Marks: 70**
Teaching Scheme	**Examination Scheme**
Theory: 3hrs./week	Mid Semester Exam.:15 Marks
Tutorial : Nil	Assignment & Quiz: 15(=10+5) Marks
	Attendance: 5 Marks
Practical: hrs/week	End Semester Exam.: 70 Marks
Credit Points: 3	

Objective:	
1	The objective of the course is to impart the students a sound understanding of the statistical concepts and the basis of applying those concepts in a wide variety of problems in textile and apparel industry.

Pre-Requisite:	
1	Knowledge of basic statistics and probability
2	Mathematics III: BS TT 401

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	**Units**	**Objective Questions (MCQ only with one correct answer)**		**Subjective Questions**			
		No. of questions to be set	**Total marks**	**No. of questions to be set**	**To answer`**	**Marks per question**	**Total marks**
A	**1 to 9**	**10**	**10**				**10**
B	**1 to 9**			**5**	**3**	**5**	**15**
C	**1 to 9**			**5**	**3**	**15**	**45**

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the**

objective part.

- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs/Unit	Marks/Unit
1	**Introduction** Need for statistics in textile and apparelmanufacturing sector.	2	4
2	**Representation and Summarization of Data** Concept of sample and population;Frequency distribution, Cumulative frequency distribution and their graphical representation; Probability density curves; Measures of central tendency, Quartiles and Measures of dispersions. Case study and Application of these tools in different segments of Apparel Production control, i.e. Stoppage analysis, machine-wise production analysis in sewing, defect frequency distribution analysis in case of sewing defects, fabric defects.	5	12
3	**Discrete Probability Distributions** Application of discrete probability distribution (Binomial and Poisson) in textile and apparel manufacturing sector. Application and case study in the field of Apparel Production like probability distribution of thread breakage rate in sewing etc.	3	6
4	**Continuous Probability Distributions** Normal distribution, Standard normal distribution, Chi-Square distribution, Student's *t*-distribution, *F*-distribution and their application in the field of textile and apparel sector. Applications of these in Apparel research with	4	10

	numerical problem solving in the domains of cutting efficiency, marker efficiency, production planning, calculation of time allowance etc.		
5	**Sampling Distribution and Estimation** Sampling distribution; Point estimation; Interval estimation, 95% and 99% confidence intervals; Determination of sample size for given confidence level and error %. Application in Garment Inspection and Quality Control; Determination of sample size in case of garment inspection.	4	10
6	**Testing of Significance** Type-I and type-II Errors; Testing of hypothesis; Large sample test for population mean, equality of population means, population proportion, equality of proportions; Small sample test for population mean, equality of population means, population variance, equality of population variances; Problem solving with reference to textile and apparel manufacturing sector.	6	12
7	**Analysis of Variance** One-way ANOVA;Two-way ANOVA;Problem solving with reference to textile and apparel manufacturing sector.	4	10
8	**Regression and Correlation** Basic concept of regression analysis; Correlation coefficient, Coefficient of determination, Spearman's rank correlation, Coefficient of concordance; Test of significance of coefficient related to apparel and textile problems;Case studies and application of regression analysis in Apparel research, developments of simple prediction models for stitching parameters like seam slippage, seam puckering, sewing efficiency, thread consumption, marker efficiency etc.; Validation of prediction models.	5	12
9	**Statistical Quality Control**	12	24

	Acceptance sampling schemes for variables and attributes; OC-curve; AQL;Producer's risk and customer's risk;6-sigma; Shewhart's control charts; Action and warning limits; $\bar{x}$, R, p, np and c charts; Average run length; CUSUM chart;Case studies on Control charts for Apparel Production Control and Apparel Quality Control,problem solving for AQL.		
		45	100

Text and reference books:

1. Leaf, G. A. V., Practical Statistics for the Textile Industry-Part I & II, TheTextile Institute, UK, 1987.
2. Nagla, J. R., Statistics for Textile Engineers, CRC Press, USA, 2015.
3. Hayavadana, J., Statistics for Textile and Apparel Management, Woodhead Publishing India Pvt. Ltd., New Delhi, 2012.

Course Outcome:

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

1. Apply the concept of probability, central tendencies and dispersion in textile and apparel sector.
2. Apply discrete and continuous distributions in textiles and apparel sector.
3. Apply the concept of choosing sample size and confidence limits for textile and apparel variables.
4. Apply Z-test, t-test, F-test, Chi-Square test, ANOVA in textile and apparel manufacturing sector and Judge the hypothesis.
5. Apply regression analysis and establish correlation between two textile variables.
6. Apply acceptance sampling scheme and control charts in textile and apparel industry.

Special Remarks (If any): NIL

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Apparel Production Management (APM)
(Applicable from the academic session 2018-2019)

Applied Statistics in Apparel (PE APM 502 B)

Name of the Course:	**Course Code: PE APM 502 B**
Course Code: PE APM 502 B	**Semester: V**
Duration: 6 months	**Maximum Marks: 70**
Teaching Scheme	**Examination Scheme**
Theory: 3hrs./week	Mid Semester Exam.:15 Marks
Tutorial : NIL	Assignment & Quiz: 15(=10+5) Marks
	Attendance: 5 Marks
Practical: hrs./week	End Semester Exam.: 70 Marks
Credit Points: 3	

Objective:

1	The objective of the course is to impart the students a complete understanding of the statistical and probability concepts and the basis of applying those concepts in a wide variety of problems in textile and apparel industry.

Pre-Requisite:

1	Knowledge of basic statistics and probability
2	Mathematics III: BS TT401

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	**Units**	**Objective Questions (MCQ only with one correct answer)**		**Subjective Questions**			
		No. of questions to be set	**Total marks**	**No. of questions to be set**	**To answer`**	**Marks per question**	**Total marks**
A	**1 to 9**	**10**	**10**				**10**
B	**1 to 9**			**5**	**3**	**5**	**15**

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C	**1 to 9**			**5**	**3**	**15**	**45**

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**
- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs/ Unit	Marks/ Unit
1	**Introduction** Need for statistics in textile and apparel manufacturing sector.	1	2
2	**Data representation** Concept of population, sample and event; Method of data collection; Frequency distribution, Cumulative frequency distribution and their graphical representation; Probability density curves; Measures of central tendency(mean, mode and median), Quartiles and Measures of dispersions (range, mean deviation, standard deviation, CV%); Relative measures of dispersion; Skewness, Skewed frequency distribution, Measures of Skewness; Kurtosis, Measures of kurtosis; Case study and Application of these tools in different segments of Apparel Production control, i.e. Stoppage analysis, machine-wise production analysis in sewing, defect frequency distribution analysis in case of sewing defects, fabric defects.	5	12
3	**Probability** Set theoretic notation of events, sample space; Concept of probability, elementary theory of probability; Conditional probability and Bayes' theorem; Random variables: discrete and continuous, Probability distribution, join probability distribution; Expectation and variance, Moment generating function	4	8

	and characteristic function		
4	**Discrete Probability Distributions** Application of discrete probability distribution (Binomial, Negative binomial, Poisson, Poisson approximation to binomial and Geometric) in textile and apparel manufacturing sector.Calculation of mean and standard deviation of discrete probability distributions. Application and case study in the field of Apparel Production like probability distribution of thread breakage rate in sewing etc.	5	12
5	**Continuous Probability Distributions** Normal distribution, Standard normal distribution, Chi-Square distribution, Student's *t*-distribution, *F*-distribution and their application in the field of textile and apparel sector. Applications of these in Apparel research with numerical problem solving in the domains of cutting efficiency, marker efficiency, production planning, calculation of time allowance etc.	5	12
6	**Sampling Distribution and Estimation** Sampling distribution; Point estimation; Interval estimation, 95% and 99% confidence intervals; Determination of sample size for given confidence level and error %. Application in Garment inspection and Quality control chart; Determination of sample size in case of garment inspection.	4	8
7	**Testing of Significance** Type-I and type-II Errors; Testing of hypothesis; Large sample test for population mean, equality of population means, population proportion, equality of proportions; Small sample test for population mean, equality of population means, population variance, equality of population variances; Problem solving with reference to textile and apparel manufacturing sector.	6	14

8	**Analysis of Variance** One-way ANOVA;Two-way ANOVA;Problem solving with reference to textile and apparel manufacturing sector.	5	12
9	**Regression and Correlation** Basic concept of regression analysis;curve fitting by least square method (linear, quadratic, exponential equations); Multiple regression analysis; Correlation coefficient, Coefficient of determination, Spearman's rank correlation, Coefficient of concordance; Test of significance of coefficients related to apparel and textile problems; Multiple correlation analysis; Case studies and application of regression analysis in Apparel research, developments of simple prediction models for stitching parameters like seam slippage, seam puckering, sewing efficiency, thread consumption, marker efficiency etc.; Validation of prediction models.	10	20
		45	100

Text and reference books:

1. Leaf, G. A. V., Practical Statistics for the Textile Industry-Part I & II, The Textile Institute, UK, 1987.
2. Nagla, J. R., Statistics for Textile Engineers, CRC Press, USA, 2015.
3. Hayavadana, J., Statistics for Textile and Apparel Management, Woodhead Publishing India Pvt. Ltd., New Delhi, 2012.

Course Outcome:

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

1. Apply the concept of basic probability and statistics.
2. Apply the concept of measurement of central tendencies and dispersion in textile and apparel sector.
3. Apply discrete and continuous distributions in textiles and apparel sector.

4. Apply the concept of choosing sample size and confidence limits for textile and apparel variables.
5. Apply Z-test, t-test, F-test, Chi-Square test, ANOVA in textile and apparel manufacturing sector and Judge the hypothesis.
6. Apply regression analysis and establish correlation between two textile variables.
7. Apply acceptance sampling scheme and control charts in textile and apparel industry.

Special Remarks (If any): NIL

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Apparel Production Management (APM)
(Applicable from the academic session 2018-2019)

Total Quality Management (OE TT 501 A)

Name of the Course:				**Total Quality Management**			
Course Code: OE TT 501 A				**Semester:**			
Duration: 6 months				**Maximum Marks:**			
Teaching Scheme				**Examination Scheme**			
Theory: 3 hrs./week				Mid Semester Exam.:15 Marks			
Tutorial: Nil				Assignment & Quiz: 15(=10+5) Marks			
				Attendance: 5 Marks			
Practical: hrs./week				End Semester Exam.: 70 Marks			
Credit Points: 3							
Objective:							
1	To understand the concept of Quality						
2	To understand the Implication of Quality on Business						
3	To Implement Quality Implementation Programs						
4	To have exposure to challenges in Quality Improvement Programs						
Pre-Requisite:							
1	Applied Statistics in Textile PE TT 501 A/ Statistical Quality Control in Textile PE TT 501B						
End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.							
Groups	**Units**	**Objective Questions (MCQ only with one correct answer)**		**Subjective Questions**			
		No. of questions to be set	**Total marks**	**No. of questions to be set**	**To answer`**	**Marks per question**	**Total marks**

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(Applicable from the academic session 2018-2019)

A	**1 to 6**	**10**	**10**				
B	**1 to 6**			**6**	**3**	**5**	**15**
C	**1 to 6**			**6**	**3**	**15**	**45**

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**
- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs/Unit	Marks/Unit
1	**Introduction** Definition of Quality, Small q & Big Q, Quality characteristics- weaves, Dimensions, determinants, Quality Planning, Quality & profitability - idea, Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation	8	16
2	**Quality & Management Philosophies** Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement: Deming Philosophy- Chain reaction, 14	8	16

	points for management, triangle theory of variance, deadly diseases & sins, Demings wheel. Juran Philosophy- 10 steps for quality improvement, quality trilogy, universal breakthrough sequence. Crosby Philosophy- Crosby's 6 C's, Absolutes of quality, Crosby's 14 points for quality, Crosby triangle. Comparison of 3 major quality philosophies ,Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure		
3	**Managing Quality** Traditional Vs Modern quality management, the quality planning, road map, the quality cycle. Cost of quality- Methods to reduce cost of quality, Sampling plans, O.C. curve	6	15
4	**Quality Control** Objectives of quality control, seven tools of quality, Strategy & policy. Company wise quality control. Quality Assurance- Definition, concepts & objectives. Economic models for quality assurance. Statistical methodology in quality assurance. Process capability ratio,Concept of six sigma, New seven Management tools.	8	16
5	**TQM Tools**	10	25

	Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.		
6	**Quality system** Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.	5	12
		45	100

Text and reference books:

1. Dale H.Besterfiled, et al., "Total Quality Management", Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.
2. James R.Evans & William M.Lidsay, "The Management and Control of Quality", (5th Edition), South-Western (Thomson Learning), 2002 (ISBN
1. 0-324-06680-5).
2. Feigenbaum.A.V. "Total Quality Management", McGraw-Hill, 1991.
3. Oakland.J.S. "Total Quality Management", Butterworth Hcinemann Ltd., Oxford, 1989.
4. Narayana V. and Sreenivasan, N.S. "Quality Management – Concepts and Tasks", New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers", Wood Head Publishers, 1991.

Course Outcome:

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

1. Understand the importance and significance of quality

2. Manage quality improvement teams
3. Identify requirements of quality improvement program

Special Remarks (If any): NIL

Maulana Abul Kalam Azad University of Technology, West Bengal
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Syllabus for B. Tech in Apparel Production Management (APM)
(Applicable from the academic session 2018-2019)

Principle of Marketing and Management (OE TT 501B)

Name of the Course:				**Principle of Marketing and Management**			
Course Code: OE TT 501B				**Semester: V**			
Duration: 6 months				**Maximum Marks:**			
Teaching Scheme				**Examination Scheme**			
Theory: 3hrs./week				Mid Semester Exam.:15 Marks			
Tutorial: Nil				Assignment & Quiz: 15(=10+5) Marks			
				Attendance: 5 Marks			
Practical: hrs./week				End Semester Exam.: 70 Marks			
Credit Points: 3							
Objective:							
1	To understand the concepts of marketing management						
2	To learn about marketing process for different types of products and services						
	To identify factors for product life cycle						
3	To understand the marketing environment						
4	To understand the consumer behaviour						
Pre-Requisite:							
1	English HM- HU 201, Language Laboratory HM-HU 291						
2	Technical Report Writing and Language Lab						
End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.							
Groups	**Units**	**Objective Questions (MCQ only with one correct answer)**		**Subjective Questions**			
		No. of questions to	**Total marks**	**No. of questions**	**To answer`**	**Marks per**	**Total marks**

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		be set		**to be set**		**question**	
A	**1 to 7**	**10**	**10**				
B	**1 to7**			**6**	**3**	**5**	**15**
C	**1 to7**			**6**	**3**	**15**	**45**

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**
- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs/Unit	Marks/Unit
1	**Introduction** Definition & Core concept, marketing tools, P's- product, price, place and promotion	2	5
2	**Market segmentation** Definition of market segmentation and its use. The five steps involved in segmentation. The factors used to segment consumer and organizational markets The targeting and positioning & analyzing the marketing environment. The significance of heavy users in targeting markets. Development of market-product grid to use in segmenting and targeting a market.	4	10
3	**Customer relationships and value through marketing** Study consumer behavior, needs and motivation, group dynamics, social surroundings and consumer perception. Define marketing to explain the importance of discovering and satisfying consumer needs and wants. The difference	12	30

	between marketing mix elements and environmental factors The stages in the consumer decision process. The three variations of the consumer decision process: routine, limited, and extended. Psychological influences affect consumer behavior, particularly purchase decision processes. The major sociocultural influences on consumer behavior and their effects on purchase decisions. e. Recognisation consumer behavior to better understand and influence individual and family purchases by the marketers.		
4	**Management of products, services, and brands** Brand evaluation and new trends in marketing. The product life-cycle concept and relate a marketing strategy to each stage. The different approaches to managing a product's life cycle. Elements of brand personality and brand equity and the criteria for the good brand name. Reason for different branding strategies employed by companies. The role of packaging and labeling in the marketing of a product in relation to textile ---CASE STUDY **Analyze advertising, sales promotion, and public relations—CASE STUDY**	12	25
5	**Retailing and wholesaling** Importance of retailing and wholesaling – types of retailing and wholesaling – recent trends in retailing and wholesaling with reference to textiles – retail and wholesale centres with reference to textiles in India and World ---CASE STUDY	5	10

6	**Ethics and marketing** The significance of ethics in marketing. Difference between legal and ethical behavior in marketing. The factors that influence ethical and unethical marketing decisions. Different concepts of ethics and social responsibility. The meaning of ethics and social responsibility and how they relate to the individual, organizations, and society	4	8
7	**Introduction to management** Definition, nature, process, functions & skills. Evolution of management thoughts - F.W. Taylor, Henri Fayol, Max Weber, Elton Mayo. Management Approaches- System approach, contingency approach. Business Organisation - Types of ownership. Functional area of Management - Concept, objectives, scope and principle of Marketing Management, Production Management, HRM , Finance, Material management. Human resource management	6	12
		45	100

Text and reference books:

1. 1.Evans. J. R. "Marketing: Marketing In The 21st Century", 8th edition, 2003.
2. Philip Kotler, "Marketing Management", PHI publications, 2004.
3. S.Shivaramu, "Export Marketing – A practical Guide to Exporters", McGraw-Hill Book Company, 1985.
4. Ruth E.Glock and Grace L.Kunz, "Apparel manufacturing and sewn product analysis", Prentice Hall, New Jersey, 2000.
5. D. Sinha, "Export Planning and Promotion", IIM, Calcutta, 1981.
6. Tuhin K. Nandi, "Import–Export Finance", IIM, Calcutta, 1989.

7. J.A. Jarnow, M.Guerreiro, B.Judelle, "Inside the Fashion Business", MacMillan Publishing Company ISBN: 0-02-360000-4., 1987.
8. Ruth E.Glock, Grace I.Kunz, "Apparel Manufacturing: Sewn Product Analysis", Pearson Education, Fourth Edition, 2005.
9. Elaine Stone, Jean A. Samples, "Fashion Merchandising", McGrawHill Book Company, ISBN: 0–07–061742–2., 1985.
10. S.Shivaramu. "Export Marketing" – A Practical Guide to Exporters", Wheeler Publishing, ISBN: 81-7544-166-6, 1996.

Course Outcome:

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

1. Explain marketing concept in textile industry
2. Define the marketing segmentation
3. Scan the marketing environment.
4. Discuss ethics and social responsibility in marketing.
5. Define consumer behavior.
6. Recall the pricing methods and their application in relation to textile marketing

Special Remarks (If any): NIL