

**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)**

Semester-VI

Apparel Quality Assurance (PC APM 601)

Name of the Course:		Apparel Quality Assurance					
Course Code: PC APM 601		Semester: VI					
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: 5 Marks					
Practical: hr./week		End Semester Exam.: 70 Marks					
Credit Points: 3							
Objective:							
1	To impart the basic conceptions of Quality assurance and Quality Management						
2	To impart Theoretical knowledge about the principles and techniques of inspection and quality evaluations of Fabrics and Garments						
3	To impart the knowledge about Quality standards.						
Pre-Requisite:							
1	PC APM 302						
2	PC APM 401, PC APM 403						
3	PC APM 502, PC APM 503						
4	PE APM 502 A/B						
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 5	10	10				

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B	1 to 5			6	3	5	15
C	1 to 5			6	3	15	45
<ul style="list-style-type: none"> • 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	<p>Basics of Quality Assurance</p> <p>Quality systems in textile and clothing organization: the quality assurance and quality control processes , planning and documentation – quality manual , quality plan , work procedures and work instructions , implementation and monitoring quality systems. Concept of AQL .</p>	10	24
2	<p>Quality Management</p> <p>Quality management concepts - quality control and inspections - S.Q.C. - acceptance sampling - T.Q.M. - I.S.O. Laboratory testing for quality and performance.</p>	8	18
3	<p>Fabric Inspection</p> <p>Design satisfaction tests. Fabric specification - cloth defects - four point system - shrinkage potential.</p>	8	18
4	<p>Garment Inspection</p> <p>Garment specification - manufacturing specification - name of operation and associated details in respect of sewing, dyeing and washing of garments. garments</p>	12	25

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	testing-seam strength ,seam slippage, garment checking procedure, interlining-peel bond strength Style features - trims specification - stitch specification - size scale - garment dimensions and tolerances.		
5	Classes of Garment & Trim defects Quality of trims and accessories. Defects in garments and their remedies - A, B and C zones in a garment with respect to defects.	7	15
	Total	45	100

Text and reference books:

1. Mehta V., "Managing quality in the apparel industry", New Age International, Chennai, 1998.
2. Sigmon, D.M., Grady P.L., and Winchester S.C.," Computer Integrated Manufacturing and Total Quality Management", Textile Progress, The Textile Institute, Manchester, 1998.
3. Laing, R.M. and Webster J., "Stitches and Seams ",The Textile Institute, Manchester,1998.
4. Glock R.E. and Kunz G.I., "Apparel Manufacturing: Sewn Product Analysis", Prentice Hall, 1995.
5. Mehta P.V."An Introduction to Quality Control for the Apparel Industry", Marcel Dekker, 1992.
6. Cooklin G., " Garment Technology for Fashion Designers ", Black well Science

Course Outcome:

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

1. Understand the significance of quality assurance and quality management
2. Prepare the inspection plan for the fabric and garments
3. Analyze and prepare the inspection reports

Special Remarks (If any): NIL

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Apparel Quality Assurance Lab (PC APM 691)

Name of the Course:		Apparel Quality Assurance Lab
Course Code: PC APM 691		Semester: VI
Duration: 6 months		Maximum Marks: 100
Teaching Scheme		Examination Scheme
Practical: 2 hrs./week		End Semester Exam.: 60 Marks
Credit Points: 1		Internal Assessment: 40 Marks
Course Outcomes: After successful completion of this course, the student should be able to		
1	Identify the different fabric fault and garment fault.	
2	Inspect different garments (Men's, Women's and kind's wear garment) for fault analysis.	
3	Prepare measurement chart for a finished garment and make inspection of measurement with respect to standard chart.	
4	Identify A, B and C zone in a garment.	
Pre-Requisite:		
1	PC APM 302, PC APM 392	
2	PC APM 401, PC 403 PC APM 491.	
3	PC APM 502, PC APM 503, PC APM 593, PE APM 502A/B	
Practical		
1) Intellectual skills 60 %		
2) Motor skill-Sense of proportion and basic mechanics 40 %		

Laboratory experiments:	
1	Introduction to different patternmaking tools and observation of functioning.
2	Inspection of fabric according to 4 point system.
3	Inspection of fabric according to 10 point system.
4	Preparation of measurement chart of different men's wear garments. (For both knitted and woven garments).

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5	Preparation of measurement chart of different women's wear garments. (For both knitted and woven garments).
6	Preparation of measurement chart of different kid's wear garment. (For both knitted and woven garments).
7	Inspection of measurement of a final finishing garment with respect to corresponding measurement chart.
8	Final inspection of different Men's wear garments. (For both knitted and woven garments in terms of fabric faults, cutting fault, measurement fault, stitching fault, finishing fault, ornamentation fault etc.)
9	Final inspection of different Women's wear garments. (For both knitted and woven garments in terms of fabric faults, cutting fault, measurement fault, stitching fault, finishing fault, ornamentation fault etc.)
10	Final inspection of different Kid's wears garments. (For both knitted and woven garments in terms of fabric faults, cutting fault, measurement fault, stitching fault, finishing fault, ornamentation fault etc.)
11	Final inspection and fault identification for embroidered garment.
12	Seam slippage test (for men and woven garments)
The above list is not exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.	

Text and reference books:

1. Mehta V., "Managing quality in the apparel industry ", New Age International, Chennai, 1998.
2. Sigmon, D.M., Grady P.L., and Winchester S.C., " Computer Integrated Manufacturing and Total Quality Management ", Textile Progress, The Textile Institute, Manchester, 1998.
3. Laing, R.M. and Webster J., " Stitches and Seams ", The Textile Institute, Manchester, 1998.

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4. Glock R.E. and Kunz G.I., " Apparel Manufacturing: Sewn Product Analysis ", Prentice Hall, 1995.
5. Mehta P.V. " An Introduction to Quality Control for the Apparel Industry ", Marcel Dekker, 1992.
6. Cooklin G., " Garment Technology for Fashion Designers ", Blackwell Science.

Special Remarks (If any):

At least 10 experiments should be conducted

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IT & CAD/CAM in Apparel Production (PC APM 602)

Name of the Course:		IT & CAD/CAM in Apparel Production
Course Code: PC APM 602		Semester: VI
Duration: 6 months		Maximum Marks: 100
Teaching Scheme		Examination Scheme
Theory: 3 hrs./week		Mid Semester Exam.: 15Marks
Tutorial: Nil		Assignment & Quiz: 10 = (8+2) Marks
		Attendance: 5 Marks
Practical: hr./week		End Semester Exam.: 70 Marks
Credit Points: 3		
Objective:		
1	To impart the conception of application-software and its relevance in the present Apparel Industry	
2	To impart basic conception of flowchart, algorithm, reasoning , flow of information	
3	To make students familiar with different domains of application of Information Technology in Apparel Industry	
4	To make students familiar with different types of software for the information flow and production planning & control in Apparel Industry	
5	To make students aware about the difference between CAD and CAM and corresponding relevance in the field of garment design and Production	
6	To impart about the theoretical knowledge of different CAD software and tools and corresponding principles/algorithms in different fields like fashion-design, fabric design, weaving, printing, embroidery, pattern making, marker planning, cut planning.	
Pre-Requisite:		
1	ES-CS201	
2	PC APM 302, PC APM 303,	
3	PC APM 401, PC APM 403	

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4	PC APM 502, PC APM 503						
End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.							
Group s	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 7	10	10				
B	1 to 7			6	3	5	15
C	1 to 7			6	3	15	45
<ul style="list-style-type: none"> • 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. 							
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Unit	Content	Hrs/Unit	Marks/ Unit
1	<p>Introduction to software</p> <p>Different categories of software ,Basics of Data base management system -database design concepts , basic programming syntax for database management in SQL , Introduction to program Algorithms and program logics – Illustration of Algorithms and simple problem solving like cost calculation , Line balancing, SAM calculation etc. through computer programming , Algorithm for computerized Cut Planning and lay lot planning. , Order processing and sorting,</p>	6	10

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	Incentive and Labor cost calculation etc. Introduction to modern Input/Output devices		
2	<p>Computer aided production planning in Apparel Manufacturing:</p> <p>Path of information flow through the process sequence, Application of Information Technology in sourcing, inventory control, production planning and control, merchandising. Introduction to finite scheduling concept and fast react software.</p> <p>Concept of ERP, CIM, CAPP, MRP-I, MRP-II etc. in Apparel Production planning, scheduling and control. Application of RFID,IOT .</p> <p>Application of RDBMS in Apparel manufacturing , Merchandising and Supply Chain Management.</p> <p>Problem solving and Case Studies</p>	8	20
3	<p>Product Simulation and 3D Product Visualization :</p> <p>Concept and relevance of Product simulation in Fashion and Textile , product development , principles of product simulations for fabric , garment etc. , Software tools for product design and product simulation in fashion and textile. Concept of virtual reality</p> <p>Technology and application of 3D body scanner</p>	5	10
4	Application of CAD in Fashion and Textile design :	9	20

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	<p>i) Fashion Design: CAD software for creation of fashion mood board , colour board , fabric board etc. , CAD software for textile design – fabric design , fabric color-ways , weave design garment design , different modules of Textile and fashion design CAD software.</p> <p>ii) Weaving CAD : Creation of different basic and complex weaves , creation of drafting and lifting plan , basic principles and algorithms of weave simulation and drafting-lifting plan in case of weaving CAD. Features of relevant software.</p> <p>iii) Print and Embroidery Design: Application of CAD in creation of printing deisgn and embroidery designs.</p>		
5	<p>Application of CAD in apparel manufacturing:</p> <p>i) Pattern making and Grading: Features of pattern making and grading software, different modules , basic principles of computerized pattern making and grading.</p> <p>ii) Marker Planning: Principles of computerized marker planning , different features , marker efficiency , different modules and features , comparison with manual marker</p> <p>iii) Application of software in Spread planning</p>	6	15
6	<p>Applications of CAM in Apparel Industry:</p> <p>i) Fabric formation: Technical features of computerized Dobby and Jacquard Loom , features of computerized knitting machines</p> <p>ii) Embroidery: features of computerized Multi Head</p>	6	15

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	Embroidery Machines – principles of needle selection, stitch formation etc. iii) Technology of computerized spreading and cutting machines, working principles , basic algorithms ii) Sewing: New advancements in Sewing machines , technical features of computerized sewing machines		
7	Computerized Quality Control for Apparel Products: Introduction to image processing and image analysis system- Fabric and garment defect identification using image processing - Data acquisition and fault classification. - application of Artificial Neural Networks (ANN) , Fuzzy-Logic etc. in fabric or yarn fault recognition	5	10
	Total	45	100

Text and reference books:

1. Alexisleon and Mathews leon "Fundamentals of Information Technology" Leon press,1999
2. Dennis P Curtin "Information Technology", Tata McGraw hill Pvt Ltd 1999
3. James A Senn "Information Technology in Business", Prentice Hall of India Pvt Ltd 1998.
4. Windows office XP/MSOFFICE/MSACCESS/
5. Stephen Gray "CAD / CAM in clothing and Textiles ", Gower Publishing Limited, 1998,
6. ISBN 0-566-07673X.
7. Compilation of papers presented at the Annual world conference Sep 26 -29, 1984 Hongkong,
8. "Computers in the world of textiles ", The textile Institute ISBN: 0-0900739-69X.
9. W. Aldrich, "CAD in clothing and Textiles ", Blackwell Science 2nd edition, 1992, ISBN: 0-63 -3893 - 4

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10. Jacob Solinger, "Apparel Manufacturing Handbooks ", Van no strand and Reinhold Company, 1980,ISBN:0-442-21904-0.

Course Outcome:

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

1. Write program algorithms for different apparel manufacturing applications and Generate flow-charts for the path of information flow through different sub-departments in apparel manufacturing
2. Generate codes for the database management related to apparel manufacturing process and merchandising
3. Differentiate between CAD and CAM , Identify suitable software for a specific application related to apparel production planning and control
4. Identify suitable software and software tools for specific applications like fabric design, weave formation, drafting and lifting plan, embroidery or printing design, garment designing, fashion drawing and illustration, fabric inspection and garment Inspection etc.

Special Remarks (If any) : NIL

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IT and CAD / CAM in Apparel Production Lab (PC APM 692)

Name of the Course:	IT and CAD & CAM in Apparel Production Lab
Course Code: PC APM 692	Semester: VI
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: hrs./week	Continuous Internal Assessment:
Tutorial: Nil	External Assessment: 60
Practical: 3 hr./week	Distribution of marks: 40
Credit Points: 1.5	
Course Outcomes: After successful completion of this course, the student should be able to	
1	Create Database Tables and link between them to create Relational Database , relevant to apparel manufacturing
2	Execute Database query through codes and syntax relevant to apparel manufacturing
3	Create fabric design through software
4	Create embroidery and printing design through software
5	Create weave and drafting & lifting plan for different weaves
6	Generate patterns and grade the patterns for different types of garments
7	Generate marker and evaluate the marker efficiency
8	Execute application modules for the cut-planning, production planning, AQL etc. relevant to apparel manufacturing.
Pre-Requisite:	
1	Reasoning skill , programming concept (ES-CS201)
2	Computer fundamentals (ES-CS201)
3	Aesthetic and colour conceptions (PC APM 393)
4	Satisfactory knowledge of weave structure and drafting plan (PC APM 491)
5	Strong knowledge of pattern making , grading and marker planning (PC APM 392, PC APM 493)

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6	Strong knowledge of cut-planning , apparel production planning and process sequence (PC APM 493 , PC APM 592)
Practical:	
	1) Intellectual skills- Reasoning and programming skill , creative skill
	Drawing skill
	2) Motor skill- planning skill

Laboratory Experiment:	
1	Different Jobs on database software like MS-ACCESS , SQL etc. for creation of database , relevant to Apparel manufacturing , sourcing and merchandising (at least 3 jobs)
2	Different jobs on linking of databases by creating relations , query generation through database software , relevant to Apparel manufacturing , sourcing and merchandising (at least 2 jobs) , using database software .
3	Different jobs on creation of print / embroidery motif , with the application of illustration software/Textile design CAD , garment drawing, application of print and embroidery designs on garment
4	Simulations of printed or embroidered fabrics using digital images of actual thread , fabric etc. , application on garments
5	Different Jobs on creation of weave design and fabric simulation, with the application of illustration software/Textile design CAD, Application on garment, virtual draping on digital croque.
6	Different Jobs on Development of simple Dobby designs like Twill,Plain,Mat,Satin, Sateen along with Drafting and Lifting plan using weaving CAD.
7	Different Jobs on Development of complex Dobby designs like Huckaback , Mock Leno, Diamond , Herringbone etc. along with Drafting and Lifting plan using weaving CAD

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8	Jobs on digitization of manual pattern through Digitizer
9	Development of pattern, grading and marker planning using apparel-CAD for the following garments 1.Shirt 2.Trouser 3. Skirt 4. T-shirt (At least 2 jobs)
10	Development of pattern, grading and marker planning using apparel-CAD for the following garment Formal Trouser
11	Development of pattern, grading and marker planning using apparel-CAD for the following garments Skirt , T-shirt
12	Jobs on the application software for the cut-planning , production planning , AQL etc.
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) Alexis leon and Mathews leon” Fundamentals of Information Technology” Leon press,1999
- 2) Dennis P Curtin “Information Technology”, Tata McGraw hill Pvt Ltd 1999
- 3) James A Senn” Information Technology in Business”, Prentice Hall of India Pvt Ltd 1998.
- 4) Windows office XP/MSOFFICE/MSACCESS/
- 5) Stephen Gray " CAD / CAM in clothing and Textiles ", Gower Publishing Limited, 1998,
- 6) ISBN 0-566-07673X.
- 7) Compilation of papers presented at the Annual world conference Sep 26 -29, 1984
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- 8) " Computers in the world of textiles ", The textile Institute ISBN: 0-0900739-69X.
- 9) W. Aldrich, " CAD in clothing and Textiles ", Blackwell Science 2nd edition, 1992,
ISBN: 0-63 -3893 - 4
- 10) Jacob Solinger, " Apparel Manufacturing Handbooks ", Van no strand and Reinhold
Company, 1980,ISBN:0-442-21904-0.

Special Remarks (If any):

At least 10 experiments should be conducted

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Technology of Apparel Machinery and Maintenance (PC APM 603)

Name of the Course:		Technology of Apparel Machinery and Maintenance		
Course Code: PC APM 603		Semester: VI		
Duration: 6 months		Maximum Marks: 100		
Teaching Scheme		Examination Scheme		
Theory: 3hrs./week		Mid Semester Exam.: 15Marks		
Tutorial: Nil		Assignment & Quiz: 10 (=8+2)Marks		
		Attendance: 5Marks		
Practical:		End Semester Exam.: 70 Marks		
Credit Points:3				
Objective:				
1	To impart knowledge about different categories of machineries used in garment manufacturing			
2	To impart knowledge about salient functions and features of machineries.			
3	To impart the knowledge about basic technology of functioning of different machineries			
4	To impart the theoretical knowledge about settings and maintenance of relevant machineries			
5	To impart the theoretical knowledge of fault detection in and root cause analysis in case of machineries in apparel manufacturing.			
6	To impart the knowledge about different machine parameters and equipments (i.e. needle etc.) and their values/types suitable to different types of materials/garments.			
Pre-Requisite:				
1	ES TT 301, ES TT 391			
2	Through knowledge about properties of raw materials used in apparel manufacturing			
3	PC APM 302, PC APM 403, PC APM 493, PC APM 502, PC APM 592			
End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.				
Groups	Units	Objective	Questions	Subjective Questions

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		(MCQ only with one correct answer)					
		No. of questions to be set	Total marks	No. of questions to be set	To answer`	Marks per question	Total marks
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	<p>Introduction to Apparel Machineries</p> <p>Overview of the process sequence of garment manufacturing, requirements for different machineries and their functions in different processes and sub-processes. Different categories of machine according to driving mechanism , technology and application</p>	3	6
2	<p>Technology of Sewing Machine</p> <p>Different types of sewing machines and their specific functions – Lockstitch machine, Chain stitch machine, Overlock machine, button holing, button sewing , bar tacking etc.</p> <p>Classification of sewing machines according to technology, driving mechanism, bed types and applications etc.</p>	15	35

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	<p>Comparative analysis</p> <p>Major parts of sewing machines (with special highlight of SNLS , DNLS , DNCS etc.) --- functions -- driving mechanism – technology of stitch formation – thread take-up lever , Tensioner, needle bar, Presser foot , feed dog , Hook --- driving mechanisms , salient settings – parameters and different types of each of those parts --- specific applications for different types of threads , garments and fabrics.---relevant mathematical calculations .</p> <p>Different types of feeding mechanisms , advantages and disadvantages --- bottom feed , top feed , needle feed , unison feed etc. --- Feed timing -- early feeding and late feeding --- geometry of teeth of the feed dog</p> <p>Different machine adjustments and maintenance --- tension adjustment , needle stroke adjustment – presser-foot adjustments --- feed adjustment – hook adjustments and different types of hooks</p> <p>Sewing machine safety regulations.</p> <p>Technology of Sewing needle - geometry, types and selection-- - different parts – types --- standards --- relationships and compatibility with thread ----theory of needle selection</p>		
3	Maintenance and adjustment of Overlock machine	6	15

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	Parts, functions and adjustments of Over lock: Needle height, feed dog height, differential feed ratio, tilt of the feed dog, position of the upper and lower knives, sharpening of knife and loopers, trouble shooting in over lock.		
4	<p>Features of fabric inspection machine , Spreading machine and Cutting Machines</p> <p>Technology of modern spreading machines – different parts and functions --- fabric control devices in spreading machines</p> <p>Types of cutting machines --- technological features of straight knife , round knife , band knife , laser cutting , fluid-jet cutting , plasma cutting etc.</p> <p>Fabric inspection machines--Types of semi-automatic and automatic inspection machines --- technological features-- fabric tension controller and modern developments</p>	8	18
5	<p>Features of ancillary garment machines</p> <p>Collar turning machines, folding machinery, fusing and pressing machinery.</p> <p>Salient features of garment washing machines – hydro extractor – drying machines – modern drying machines – RF dryers , hot air dryer etc..</p> <p>Different types of pressing machines --- classifications and different applications--steam-bed press – dolly press ---tunnel finisher –trouser press – Carouselpress – application of robotics</p>	8	16

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	in pressing. Operating principles and technological features of the modern embroidery machines.		
6	Introduction to Computerized Garment machines Features Computer controlled cutting, sewing, folding machinery—operating principles --- comparative study with manual machines.	5	10
	Total	45	100

Text and reference books:

1. Jacob Solinger., " Apparel Manufacturing Handbook ", VanNostrand Reinhold Company (1980).
2. Peyton B .Hudson., " Guide to Apparel Manufacturing ", MEDIAApparel Inc (1989) ISBN: 0 - 945116-08-X.
3. Carr.H, Latham. B., " The Technology of Clothing Manufacture ", Blackwell Scientific Publications (1988).
4. Glock R.E. and Kunz G.I., " Apparel Manufacturing: Sewn Product Analysis ", Prentice Hall, 1995.
5. Mehta P.V. " An Introduction to Quality Control for the Apparel Industry ", Marcel Dekker, 1992.
6. Cooklin G., " Garment Technology for Fashion Designers ", Blackwell Science

Course Outcome:

At the end of this course students should able to

1. Identify different machineries and their functions in apparel manufacturing

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2. Select machine parameter values/types/Needle types/thread types suitable to different types of materials/garments.
3. Analyze the drive mechanism of different parts of the machines.
4. Analyze and identify the root-causes of quality issues due to machine problems in apparel manufacturing.
5. Identify and highlight the requirements of maintenance and types of maintenance in apparel machineries.

Special Remarks (If any):NIL

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Technology of Apparel Machinery and Maintenance Lab (PC APM 693)

Name of the Course:		Technology of Apparel Machinery and Maintenance Lab
Course Code: PC APM 693		Semester: VI
Duration: 6 months		Maximum Marks: 100
Teaching Scheme		Examination Scheme
Practical: 2 hrs./week		End Semester Exam.: 60 Marks
Credit Points: 1		Internal Assessment: 40 Marks
Course Outcomes: After successful completion of this course, the students should be able		
1	Identify different machineries and functions of different parts in apparel manufacturing	
2	Identify important settings and parameters for each of the machineries of garment industry	
3	Analyse the drive mechanism of different parts of the machines.	
4	Analyse and identify the root-causes of quality issues due to machine problems in apparel manufacturing.	
5	Identify and highlight the requirements of maintenance and types of maintenance in apparel machineries.	
Pre-Requisite:		
1	ES TT 301, ES TT 391	
2	Through knowledge about properties of raw materials used in apparel manufacturing	
3	PC APM 302, PC APM 403, PC APM 493, PC APM 502, PC APM 592	
Practical		
	1) Intellectual skills 20 %	
	2) Motor skill-Sense of proportion and basic mechanics 80 %	

Laboratory experiments:	
1	Introduction to different parts of SNLS machine and study and observation of

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	functioning.
2	Introduction to different parts of Over-lock stitch machine and study and observation of functioning.
3	Introduction to different parts of Chain stitch machine and study and observation of functioning.
4	To Study and understand the different types of motion transmission in SNLS machine.
5	Comparison between Industrial SNLS machine and domestic SNLS machine with respect to motion transmission.
6	To study and understand the stitching cycle of lock stitch in SNLS machine.
7	To study and understand the displacement behavior of needle bar with respect to main shaft rotation in SNLS machine.
8	To study and understand the displacement behavior of thread take-up lever with respect to main shaft rotation in SNLS machine.
9	To study and understand the displacement behavior of thread feed-dog with respect to main shaft rotation in SNLS machine.
10	To threading for 3 thread Over-lock machine. Also study the thread tension adjustment.
11	To threading for 4 thread Over-lock machine. Also study the thread tension adjustment.
12	To study the different parts and functioning of industrial cutting machines.
13	Dismantling and refitting of different parts of SNLS machine.
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.	

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Text and reference books:

1. Jacob Solinger., "Apparel Manufacturing Handbook ", Van Nostrand Reinhold Company (1980).
2. Peyton B. Hudson., "Guide to Apparel Manufacturing ", MEDIApappareInc (1989) ISBN: 0 -945116-08-X.
3. Carr. H, Latham. B., "The Technology of Clothing Manufacture ", Blackwell Scientific Publications (1988).
4. Glock R.E. and Kunz G.I., " Apparel Manufacturing: Sewn Product Analysis ", Prentice Hall, 1995.
5. Mehta P.V. " An Introduction to Quality Control for the Apparel Industry ", Marcel Dekker, 1992.
6. Cooklin G., " Garment Technology for Fashion Designers ", Blackwell Science

Special Remarks (If any)

At least 10 experiments should be conducted

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Apparel Merchandising, Costing & Production Planning (PC APM 604)

Name of the Course:	Apparel Merchandising, Costing & Production Planning
Course Code: PC APM 604	Semester: VI
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 3hrs./week	Mid Semester Exam.:15Marks
Tutorial: Nil	Assignment & Quiz: 10 (=8+2)Marks
	Attendance: 5Marks
Practical:	End Semester Exam.: 70 Marks
Credit Points:3	
Objective:	
1	To impart knowledge about significance and responsibilities of merchandisers in apparel industry
2	To impart knowledge about product development , product mix , product life cycles etc.
3	To impart the knowledge of Retail management and Visual Merchandising
4	To impart the conception of Industrial engineering like work measurements , method study and relevant applications in apparel manufacturing process
5	To make students familiar with different important calculation techniques relevant to apparel production
6	To make students thoroughly familiar with production planning and control techniques in apparel industry
7	To introduce the concepts of plant layouts and its salient features relevant to apparel industry
Pre-Requisite:	
	Mathematics of 10 and/or 10+2
	PC APM 302, PC APM 403, PC APM 502

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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 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	<p>Introduction to Merchandising and different Roles of Merchandiser in Apparel Industry</p> <p>Definition of merchandising , functions of merchandising division , Role and responsibilities of a merchandiser in Garment Industry , Essential qualities of a Merchandiser</p> <p>Types of merchandising, Flowchart of sequential activities of a merchandiser.</p> <p>Market Forecasting/Fashion Forecasting – product development – line planning line presentation. Factors to be considered for product mix and product , Concept of Product Life Cycle , Merchandise Mix</p>	10	24

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	<p>Sourcing: Need for sourcing - sourcing materials –concepts of MRP etc.</p> <p>Spec sheet & consumption Analysis. Understanding of Spec sheet, Interpretation of a Spec sheet, Theory and exercises/assignments on consumption calculation for fabric, thread , buttons etc.</p>		
2	<p>Visual Merchandising and Store Management in Retail Merchandising</p> <p>Visual Merchandising (VM)- concept , Objectives , Interior, exterior window display, store planning and layout-fixtures, - Different elements of VM --- types of VM .</p> <p>Store Management: Introduction, Objectives, Types of Stores, Planning a Store Layout, Various Types of Store Layouts, Store Space Allocation, Heads of space allocation in a store, Managing Customer Navigation in a Store , Collection of POS data , concept of inventory management</p>	4	8
3	<p>Apparel Costing & pricing .</p> <p>Elements of cost, Direct material, Direct labour , factory overhead; cost of goods manufactured .</p> <p>Determining Pricing of apparel products: sample costing- marginal revenue and marginal cost, cost plus pricing methods; Full cost pricing, conversion cost pricing differential cost pricing ,variable cost pricing, direct cost pricing derivation of cost of apparel products-woven/knits; The</p>	5	10

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	budgeting process: Budgeting principles for the apparel industry. Principles of cost control in Apparel Industry.		
4	<p>Fundamentals of Productivity and Work-Measurements: in apparel manufacturing</p> <p>Concept of Productivity, Concept of Basic Time , Standard Allowed Minutes (SAM), Standard Minute Value (SMV) ,Time Allowance, Performance Rating (PR) etc. – different methods of calculation of Performance rating –GSD, PMTS , Westinghouse technique . , concept of Work-sampling - case studies and numerical exercises on SAM , PR etc.</p> <p>Productivity calculation techniques, Calculation of Production efficiencies - Analysis of the factors responsible for the loss in productivity in Apparel Industry. Different methods of improving Productivity in Garment Industry.</p> <p>Concept of skill-matrix – preparation and interpretation of skill matrix</p> <p>Introduction to different production techniques in garment production : make through , batch process , QRM , USP , concept of JIT , KANBAN etc.-- - concept of Finite Capacity Scheduling</p>	8	20
5	<p>Production planning & control tools for Garment Manufacturing</p> <p>Production Planning , Scheduling & Control – objectives and techniques, Production planning and control tools, WBS ,</p>	8	18

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	<p>PERT , CPM , Gantt chart , Advanced Gantt Chart , Order-concentration Chart , production scheduling tools – job card , spread planning etc. Case studies and numerical exercises.</p> <p>Concept of line balancing – objectives – principles – techniques – case studies and numerical problems on line balancing</p>		
6	<p>Application of Method study in Apparel Industry</p> <p>Introduction to Method study – objectives – sequential steps – factors influencing Method study -- Recording tools of Method Study IN Garment manufacturing: Production control charts i.e. Operation Process Chart, Flow Process chart, Travel chart, REL Chart, Multiple Activity Chart etc. – Analysis techniques – Evaluation of alternatives. Case studies and numerical exercises.</p>	5	10
7	<p>Plant Layout</p> <p>Plant Layout Definition - Types of plant layout, methods of plant layout. Qualities of an ideal plant layout Criteria for evaluation of a plant layout, Impact of different plant layouts on costing. Case studies and mini projects on plant layout in apparel industry.</p>	5	10
	Total	45	100

Text and reference books:

1. Elaine Stone, Jean A. Samples., - "Fashion Merchandising ", McGraw Hill Book Company (1985) ISBN: 0 - 07 - 061742 –
2. Swati Bhalla & Anuraag Singha , Visual Merchandising

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3. Apple. J. M., " Plant Layout and Materials Handling ", The Ronald Press Co., New York (1950).
4. Immer , John. R., " Layout Planning Techniques ", McGraw Hill, New York, Industrial Engineering in Apparel Manufacturing, Book by Dr. Prabir Jana, Dr. Manoj Tiwari , Apparel Resources Pvt. Ltd.
5. Robert Colborne, Visual Merchandising: The Business of Merchandise Presentation
6. Laura L Bliss, Study Guide Visual Merchandising and Display III edition, Fair child Publications, 1995
7. Sultan Chand & sons" Management Accounting" New Delhi, 2nd edition 1998
8. A.J. Chuter., " Introduction to Clothing Production Management ", Blackwell Scientific Publications
9. David J. Tyler., " Materials Management in Clothing Production ", Blackwell Scientific Publications
10. Bethel , Tann , Atwater and Rung., " Production Control ", McGraw Hill Book Co., New York, (1948). Barnes, Ralph M., " Motion and Time Study ", John Wiley and Sons., New York., (1958) 4 th edition
11. Jacob Solinger., " Apparel Manufacturing Handbook ", VanNostrand Reinhold Company (1980).
12. Biegel , John. E., " Production Control ", A Quantitative Approach " Prentice Hall Inc., (1971) 2nd edition.

Course Outcome:

At the end of this course students should be able to

1. Understand the different roles of merchandisers in apparel industry and formulate the merchandising plan, product development plan and sourcing plan.
2. Create and analysis spec-sheet and Cost sheet
3. Calculate different parameters and elements related to productivity and production planning in apparel industry
4. Understand operator's skill matrix and Prepare plan for line balancing
5. Evaluate plant layout for apparel industry and analyze the production methods by applying method study tools .

Special Remarks (If any): NIL

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Advance Pattern Making and Garment Construction (PE APM 601A)

Name of the Course:	Advance Pattern Making and Garment Construction
Course Code: PE APM 601A	Semester: VI
Duration: 6 months	Maximum Marks:100
Teaching Scheme	Examination Scheme
Theory: 3hrs./week	Mid Semester Exam.:15Marks
Tutorial: Nil	Assignment & Quiz: 10 (=8+2)Marks
	Attendance: 5Marks
Practical:	End Semester Exam.: 70 Marks
Credit Points:3	
Objective:	
1	To develop different variations in design from basic patterns as per different age group.
2	To enable them to make patterns for all kind of designs for kids wear, menswear's and women's
3	To enable the students to analyse, understand and incorporate design details in upper and lower garments for kids, means and women's.
4	To enable them to construct the different types of garments of Kids wear, Mens wear and Women's wear.
Pre-Requisite:	
1	Thorough knowledge of Pattern Making (PC APM 302)
2	Fundamental knowledge of different men, women and children wear garments. (PC APM 303)
3	Through knowledge about production sequences in apparel manufacturing (PC APM 302, PC APM 403, PC APM 502)
End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.	

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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 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	Kids wear –Body measurement Measurement method, Standard body measurement and basic blocks for kinds of different age group – Infants (0 – 2 years age), Toddlers (2 – 6 year age), Pre-teens (6 – 12 year age) – Boys and Girls both.	2	5
2	Kids wear – Infant Pattern development and garment construction of different Infant wear such as Snow suit with hood, Romper, overalls, Singlet, Beanie etc.	4	8
3	Kids wear –Toddler Pattern development and garment construction of different	5	12

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	Toddler wear such as T-shirt with raglan sleeve, Jeans, Frocks- frock with yoke and petals sleeve, frock with shoulder string, Skirts- tiered, divided skirt, cascade, Hot pant, sleeveless dress with shoulder knot etc.		
4	Kids wear – Preteen Pattern development and garment construction of different Preteen wear such as Knee length pant, Jacket, Empire line dress with flare (for Girls) etc.	4	10
5	Men’s wear Pattern development and garment construction of different Men’s wear such as- Shirt – formal and casual, Coat with lapel, Trouser, Jeans, Bandi, Achkans – short and long, Kurta – short/long, panelled (with gusset), Jacket - Waistcoat (jawahar cut), long/short jacket (over garment) Pyjama – Straight, Churidar, Aligarh, lounge etc. Men’s –vests, underwear etc.	12	25
6	Women’s wear Pattern development and garment construction of different Women’s wear such as Blouse - four dart, choli cut, katori, princess line, long blouse, with lining, with collar, with yokes– shoulder, midriff, hip yokes, Skirt – A-line skirt, long skirt, Dome skirt, Peg skirt, Basic straight trouser,	18	40

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	Kurta/Kamiz - Fitted - with dart, princess line, sheath – straight and with dart, Petticoat – 8 panel, 6 panel, with hip yoke, bias Salwar - with and without belt, Patiala (semi and full) Tight Pyjama - Churidar (with and without belt) Leggings, Fully Fashioned sweaters, women under wear etc. Long Skirts/Lehenga – paneled, flared, gathered, circular, wrap-a-round, divided (with or without yoke) etc.		
	Total	45	100

Text and reference books:

1. Armstrong, H. J., Patternmaking for Fashion Design, Pearson Education/Prentice Hall, 2010.
2. Kumar, Ritu, Costumes and textiles of royal India, Antique Collectors' Club, 2006.
3. Knowles, Lori A., Practical Guide to Patternmaking for Fashion Designers: Menswear, Bloomsbury Academic, 07-Sep-2005.
4. Michael Boroian, Alix de Poix, India by Design: The Pursuit of Luxury and Fashion, John Wiley & Sons, 2009.
5. Aldrich, W., Metric Pattern Cutting for Children’s Wear and Babywear, Third edition, Blackwell Publishing, Om Books International, Delhi, 2007.
6. Aldrich, W., Metric Pattern Cutting for Menswear, Fifth Edition, Wiley India Pvt. Ltd., Delhi, 2011.
7. Aldrich, W., Metric Pattern Cutting for Menswear, Fourth Edition, Blackwell Publishing, Om Books International, Delhi, 2007.

Course Outcome:

At the end of this course students should be able to

1. Prepare measurement chart for different age group people.
2. Specify garments for different age group people.
3. Create of 2D patterns for different Infant wear, preteen wear, men’s wear and women’s wear garments.
4. Design different Infant wear, preteen wear, men’s wear and women’s wear garments.

Special Remarks (If any):NIL

Advance Pattern Making and Garment Construction Lab (PE APM 691A)

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Name of the Course:		Advance Pattern Making and Garment Construction Lab
Course Code: PE APM 691A		Semester: VI
Duration: 6 months		Maximum Marks: 100
Teaching Scheme		Examination Scheme
Practical: 2 hrs/week		End Semester Exam.: 60 Marks
Credit Points: 1		Internal Assessment: 40 Marks
Course Outcomes: After successful completion of this course, the students should be able		
1	Prepare measurement chart for different age group people.	
2	Specify garments for different age group people.	
3	Create of 2D patterns for different Infant wear, preteen wear, men's wear and women's wear garments.	
4	Design different Infant wear, preteen wear, men's wear and women's wear garments.	
Pre-Requisite:		
1	PC APM 392	
2	Fundamental knowledge of different men, women and children wear garments.	
3	PC APM 493, PC APM 592	
Practical		
		1) Intellectual skills 50 %
		2) Motor skill-Sense of proportion and basic mechanics 50 %

Laboratory experiments:	
1	Take sequential measurements of Kids – Infant/Toddler/Preteen and prepare Measurement Charts. Add Seam Allowance. Take full readymade garments and prepare standard measurement charts. Add Seam Allowance.
2	Preparation of patterns using measurement chart and Construct, finish and press for

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	an infant wear production(Snow suit with hood/ Romper/ overalls/ Singlet, Beanie)
3	Preparation of patterns using measurement chart and Construct, finish and press for a Toddler/Preteen wear production (T-shirt with raglan sleeve / Frocks- frock with yoke and petals sleeve/ frock with shoulder string/ Empire line dress with flare).
4	Preparation of patterns using measurement chart and Construct, finish and press for a Men's Kurta production (short/long/ panelled).
5	Preparation of patterns using measurement chart and Construct, finish and press for a Men's Jacket production (Waist coat/long jacket/coat with lappel).
6	Preparation of patterns using measurement chart and Construct, finish and press for a Men's Pyjama production(Straight,/Churidar/Aligarh etc.).
7	Preparation of patterns using measurement chart and Construct, finish and press for a Women's Blouse production (four dart/ choli cut/katori/princess line etc.).
8	Preparation of patterns using measurement chart and Construct, finish and press for a Women's Skirt production (A-line/Half Circle/Full Circle/ Dome Skirt etc.).
9	Preparation of patterns using measurement chart and Construct, finish and press for a Women's Salwar production (with belt/without belt/Patiala (semi and full)etc.)
10	Preparation of patterns using measurement chart and Construct, finish and press for a Women's Kamiz production (Fitted - with dart/princess line/ sheath – straight/ with dart)
11	Preparation of patterns using measurement chart and Construct, finish and press for a Women's Churidar/Lehenga production.
12	Preparation of patterns using measurement chart and Construct, finish and press for any western dress for women
The above list is not exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasis the activities for doing rather than the knowing.	

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Text and reference books:

- 1) Armstrong, H. J., Patternmaking for Fashion Design, Pearson Education/Prentice Hall, 2010.
- 2) Kumar, Ritu, Costumes and textiles of royal India, Antique Collectors' Club, 2006.
- 3) Knowles, Lori A., Practical Guide to Patternmaking for Fashion Designers: Menswear, Bloomsbury Academic, 07-Sep-2005.
- 4) Michael Boroian, Alix de Poix, India by Design: The Pursuit of Luxury and Fashion, John Wiley & Sons, 2009.
- 5) Aldrich, W., Metric Pattern Cutting for Children's Wear and Babywear, Third edition, Blackwell Publishing, Om Books International, Delhi, 2007.
- 6) Aldrich, W., Metric Pattern Cutting for Menswear, Fifth Edition, Wiley India Pvt. Ltd., Delhi, 2011.
- 7) Aldrich, W., Metric Pattern Cutting for Menswear, Fourth Edition, Blackwell Publishing, Om Books International, Delhi, 2007.

Special Remarks (If any):

At least 10 experiments should be conducted

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Home Furnishing (PE APM 601 B)

Name of the Course:		Home Furnishing					
Course Code: PE APM 601 B		Semester: VI					
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: 5 Marks					
Practical:		End Semester Exam. : 70 Marks					
Credit Points: 3							
Objective:							
1	To develop core knowledge of home furnishing in the students and enable them to serve the textile and made-ups industry.						
2	To enable the students to learn about the recent developments in furnishing, floor covering and other home textile products.						
3	To enable the students to develop research attitude for innovation activities related to home furnishing.						
4	To get exposure to carpet manufacturing technology						
Pre-Requisite:							
1	Student must have clear knowledge of fabrics properties (PC APM 401)						
2	Student must have clear knowledge about textile finishing (PC APM 402 , PC APM 501)						
3	Student must have some basic idea about household products						
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	Total	No. of	To	Marks	Total

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		questions to be set	marks	questions to be set	answers	per question	marks
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 Home Furnishing Definition - Different types of furnishings materials, Applications of textile Home furnishings	2	3
	Type of Furnishings Materials – Woven and non-woven – Factors affecting the selection of home furnishings.	2	4
	Different styles used in furnishing materials and use of colours, design and texture in home furnishings.	2	5
	Development in living room furnishing including upholstery, Wall hangings, Cushion, Cushion covers, Bolster and Bolster Covers.	3	6
2.	Floor Coverings and Bed Linens Manufacturing of floor coverings, requisite properties of floor coverings, types- Hard Floor Coverings - Resilient Floor Coverings - Soft Floor Coverings - Rugs - Cushion and Pads – Use and Care of floor coverings.	4	10

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	<p>Bed sheets - required qualities, sizes of different bed sheets, woven and printed bed sheets manufacturing processes, quality parameters of yarn used, preparatory and weaving processes, weaving machine parameters and its selection, wet processing and finishing of bed sheets</p> <p>Different types of Bed Linens - Sheets - Blankets - Blanket covers - Comforters - Comfort covers - Bedspreads - Mattress and Mattress Covers - Quilting - Pads - Pillows - Use and care</p>	6	12
3.	<p>Curtains and Draperies</p> <p>Draperies – requisite properties, choice of fabrics – Calculation of the amount of material needed - Different types of doors and windows - applications. Developments in tucks and pleats and uses of drapery rods, hooks, tape rings and pins.</p>	3	6
	<p>Curtains – types of curtains – basic requirements, quality requirements, types of fabric with respect to woven and knit, quality parameters of yarn used, weaving processes, wet processes and finishing of curtain fabrics. Knitted curtain manufacturing.</p>	5	10
4.	<p>Carpets</p> <p>Fundamentals of Carpets: Classification of Carpets, applications, history, textures and other relevant features.</p>	2	5
	<p>Materials used in carpet: Fibres - Yarns - Fabrics used, Familiarization with terms used to describe Quality and construction of Carpet. Carpet selection criteria.</p>	4	10
	<p>Basic principles of Hand knotted Carpet - Hand woven</p>	2	5

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	Carpets - Tufted Carpets - Chemical coating of Carpets. Non woven carpets – bonded, electro statically flocked, needle punched.		
	Gradation systems of Carpets. Carpet care.	1	2
5.	Kitchen Linens and Towels Kitchen linen: Definition, and types - Dish cloth - Hand towels - Kitchen apron - Bread basket - Napkins - Gloves - Mittens - Fridge handle covers - Fridge covers - Kitchen appliances cover - their use and care.	5	12
6	Table Linens Definitions - Different types of Table Linens - Placemats - Table cloth and Hand Towels - types, selection, use and care.	2	5
7	Hospital linen Hospital Linen and their importance. Nature of fabric suitable for hospital for different purposes - colour of linen and their effect on patient mind etc.	2	5
	Total	45	100

Text and reference books:

1. Wingate I.B. & Mohler J.E. ‘Textile Fabrics & their Selection’, Prentice Hall Inc. New York, 1984
2. “Advances in Carpet Manufacture” by K.K. Goswami, Woodhead Publishing. 2011
3. Donserkey K.G. “Interior decoration in India” D.B.Taraporevala sons and co. Pvt. Ltd. 1973
4. Elsasser, Virginia Henken, “Know Your Home Furnishings”, Fairchild Books & Visuals, September, 2003

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Course Outcome:

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

1. Explain about different types of home textiles
2. Understand the production method of different types of home textile products
3. Summarize the quality standards for various home textile product
4. Explain the applications of home textiles in hospital
5. Describe various carpet manufacturing methods and their care.

Special Remarks (If any): NIL

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Home Furnishing Lab (PE APM 691 B)

Name of the Course:		Home Furnishing Lab
Course Code: PE APM 691 B		Semester: VI
Duration: 6 months		Maximum Marks: 100
Teaching Scheme		Examination Scheme
Theory:		Continuous Internal Assessment: 40
Tutorial: Nil		External Assessment: 60
Practical: 2 hr./week		Distribution of marks:
Credit Points: 1		
Course Outcomes: After successful completion of this course the students should be able to:		
1	Plan and design specific product for specific application	
	Select the raw material for designing of product	
2	Produce different types of home textile products	
3	Test quality of various home textile products	
4	Create new product	
Pre-Requisite:		
1	Student must have clear knowledge of fabrics properties (PC APM 401)	
2	Student must have clear knowledge about textile finishing (PC APM 402 , PC APM 501)	
3	Student must have some basic idea about household products	
Practical:		
	Intellectual skills:- Creative ideas , Consumer psychology, Good Imagination power , Colour psychology	
	Motor skills: - Technical textiles, Functional features, Performance testing, Eco-parameters	

Laboratory Experiment:

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1	Prepare samples of living room furnishing including upholstery, Wall hangings - their use and care.
2	Prepare samples of Soft Floor Coverings - Rugs - Cushion and Pads - their use and care.
3	Prepare samples of Cushion covers, Bolster Covers - their use and care.
4	Prepare samples of 8"x10' - Curtains – their use and care
5	Developments in tucks and Pleats in Finishing of Draperies - their use and care.
6	Prepare samples of Kitchen appliances cover - Dish cloth - Hand towels - their use and care.
7	Prepare samples of Table Linens -Table cloth and Hand Towels– their use and care
8	Prepare samples of Placemats –their use and care
9	Prepare samples of 8"x10" – doormats , floor mats manually – their care and use.
10	Students are required to set up a single colour wrap (white) to weave at least 15 samples, the size of each sample to be at least 8"x10"
11	The weft used to weave these samples has to non conventional material (e.g. jute, ribbons, coir, dori)
12	The weft used to weave these samples has to non conventional material (e.g. paper, feathers, fancy yarns, laces)
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.	

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Text and reference books:

- 1) K. Amutha, A Practical Guide to Textile Testing
- 2) John E. Booth, Principles of textile testing: an introduction to physical methods of testing textile fibres, yarns, and fabrics.

Special Remarks (If any):

At least 10 experiments should be conducted

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Introduction to Java (OE TT 601 A)

Name of the Course:		Introduction to Java	
Course Code: OE TT 601 A		Semester: VI	
Duration: 6 months		Maximum Marks: 100	
Teaching Scheme		Examination Scheme	
Theory: 2 hrs./week		Mid Semester Exam: 15 Marks	
Tutorial: Nil		Assignment & Quiz: 10 (=8+2) Marks	
		Attendance: 5 Marks	
Practical:		End Semester Exam.: 70 Marks	
Credit Points: 2			
Objective:			
1	To impart knowledge about the engineering aspects of Java Programming and their application.		
2			
Pre-Requisite:			
1	ES-CS201, ES-CS291		
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
<ul style="list-style-type: none"> • 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.	<p>JAVA Basics</p> <p>Introduction to Programming Languages and algorithms, The Evolution of Java, Object-Oriented Programming Concepts and Java, Differences between C++ and Java, The Primary Characteristics of Java, The Architecture, Programming with Java, Tokens, Identifiers, Keywords, Literals, Separators, Comments and Whitespaces, Operators; Expressions; Using Data Types, Primitive Data Types, Reference Data Types; Declarations; Control Flow, Blocks and Statements, Conditional Statements, Looping Statements</p>	6	20
2.	JAVA Classes, Packages , Interfaces and Streams	10	33

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	<p>Introduction, Classes-Defining simple class, Class Variables, Class Methods, Return Types, Method Modifiers, Declaring Method Security and Accessibility, Overloading Methods; Working with Objects, Creating Objects, Destroying Objects, Constructor; Packages, Declaring a Package, Accessing Other Packages, Package-Naming Conventions, The CLASSPATH Environment Variable, Overview of the Standard Packages; Inheritance, Sub-classing, Method Overriding; Interfaces, Declaring an Interface, Implementing Interfaces, Modifiers, Using an Interface Data Flow with Java Streams, Input Streams, Output Streams,</p>		
3.	<p>Exception Handling in JAVA</p> <p>Introduction, Exception Methods, java language Exceptions.</p>	3	10
4.	<p>JAVA Threads, Applets and AWT</p> <p>Introduction; Creating Threads; The Life Cycle of a Thread; Thread Methods; Using Threads, Declaring Threads, Creating and Starting the Thread Object new and the Instantiation of Threads, Stopping the Thread, Destroying a Thread, Naming a Thread; Synchronization of Threads, Producer/Consumer Example, Locking an Object, Synchronized Blocks, Using the notify All and wait Methods, Deadlocks</p> <p>Introduction, Applet Examples, The java. Applet. Applet</p>	11	37

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	Class, The Five Stages of an Applet's Life Cycle, Methods for Adding UI Components, Methods for Drawing and Event Handling, Introduction, Control Classes-component, layout and menu classes.		
	Total	30	100

Text and reference books:

1. Introduction to Java Programming, 6th Edition, Y. Daniel Liang (2007), Pearson Prentice Hall,
2. Schaum's Outlines of Programming with Java, [J. R. Hubbard](#), [Schaums](#)
3. [Thinking in Java](#) 3rd ed- Bruce Eckel, Publisher: PrenticeHall
4. [Java Gently, 3rd Edition](#): by Judith Bishop
5. [Sams Teach Yourself Java 1.1 in 24 Hours: Rogers Cadenhead, Laura Lema, and Charles Perkins](#)
6. LEARNING JAVA by Rich Raposa, Wiley Publications
7. [Who's Afraid of Java?](#), by Steve Heller, Publisher: AP Professional
8. [Java: How to Program with an Introduction to Visual J++](#), by Harvey M. Deitel, Paul J. Deitel, Publisher: Prentice Hall
9. [Java by Example, 2nd Edition](#), by Jerry Jackson, Alan L. McClellan, Publisher: Sunsoft Press/Prentice Hall
10. [Java for Dummies, 2nd Edition](#), by Aaron E. Walsh, Publisher: Dummies Press/IDG Books

Course Outcome:

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

1. Explain object oriented programming concept.
2. Analyze fundamentals concept of JAVA.
3. Demonstrate basic application of package and interfaces.
4. Illustrate basic application of exception handling.
5. Create various programming in JAVA.

Special Remarks (If any): NIL

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Introduction to Python (OE TT 601 B)

Name of the Course:	Introduction to Python
Course Code: OE TT 601 B	Semester: VI
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2 hrs./week	Mid Semester Exam.:15Marks
Tutorial: Nil	Assignment & Quiz: 10 (=8+2)Marks
	Attendance: 5Marks
Practical:	End Semester Exam.: 70 Marks
Credit Points:2	
Objective:	
1	To impart knowledge basics of algorithmic problem solving
2	To impart basic knowledge of Python programs with conditionals and loops.
3	To make student understand Python functions and use function calls.
4	To offer knowledge of Python data structures.
Pre-Requisite:	
1	ES-CS201, ES-CS291
End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.	

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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 5	10	10				
B	1 to 5			6	3	5	15
C	1 to 5			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 Python Features of Python - Python interpreter - interactive and non-interactive mode	2	7
2.	Conditionals and Functions Operators – Boolean Values – Operator Precedence – Expression – Conditionals: If-Else Constructs – Loop Structures/Iterative Statements – While Loop – For Loop – Break Statement – Function Call and Returning Values – Parameter Passing – Local and	6	20

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	Global Scope – Recursive Functions.		
3.	<p>Object and Classes</p> <p>Classes in Python - Principles of Object Orientation - Creating Classes - Instance Methods - File Organization - Special Methods - Class Variables - Inheritance - Polymorphism - Type Identification - Custom Exception Classes</p>	7	23
4.	<p>String, Dictionaries and Modules</p> <p>Strings: Introduction, Indexing, Traversing, Concatenating, Appending, Multiplying, Formatting, Slicing, Comparing, Iterating – Basic Built-In String Functions – Dictionary: Creating, Accessing, Adding Items, Modifying, Deleting, Sorting, Looping, Nested Dictionaries Built-in Dictionary Function – Finding Key and Value in a Dictionary – Modules – Module Loading and Execution – Packages – Python Standard Libraries.</p>	8	27
5.	<p>File handling and Exception handling</p> <p>Introduction to Files – File Path – Opening and Closing Files – Reading and Writing Files – File Position – Exception: Errors and Exceptions, Exception Handling, Multiple Exceptions.</p>	7	23
	Total	30	100

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Text and reference books:

1. Reema Thareja, “Python Programming using Problem Solving Approach”, Oxford University Press, 2017.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, Second Edition, Shroff/ O’Reilly Publishers, 2016.
(<http://greentcapress.com/wp/thinkpython/>).
3. Dive into Python, Mike
4. Learning Python, 4th Edition by Mark Lutz
5. Programming Python, 4th Edition by Mark Lutz

Course Outcome:

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

1. Develop algorithmic solutions to simple computational problems.
2. Develop and execute simple Python programs.
3. Write simple Python programs for solving problems and decompose a Python program into functions.
4. Represent compound data using Python lists, tuples, dictionaries etc.
5. Read and write data from/to files in Python programs.
6. Implementing database using SQLite.
7. Access database using python programming.
8. Develop web applications using python programming.
9. Develop and use Web Services using python.

Special Remarks (If any): NIL

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Internet of Things (OE TT 601 C)

Name of the Course:		Internet of Things					
Course Code: OE TT 601 C		Semester: VI					
Duration: 6 months		Maximum Marks: 100					
Teaching Scheme		Examination Scheme					
Theory: 2 hrs./week		Mid Semester Exam.:15Marks					
Tutorial: Nil		Assignment & Quiz: 10 (=8+2)Marks					
		Attendance: 5Marks					
Practical:		End Semester Exam.: 70 Marks					
Credit Points:2							
Objective:							
1	To impart necessary and practical knowledge of components of Internet of Things.						
2	To support for development of skills required to build real-life IoT based projects.						
Pre-Requisite:							
1	ES-CS201, ES-CS291						
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 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.	<p>Introduction to IoT</p> <p>Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service (XaaS), Role of Cloud in IoT, Security aspects in IoT.</p>	6	20
2.	<p>Elements of IoT</p> <p>Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces. Software Components- Programming API's (using Python/ Node.js/ Arduino) for Communication Protocols- MQTT,</p>	8	27

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	ZigBee, Bluetooth, CoAP, UDP, TCP.		
	IoT Application Development		
3.	Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.	11	37
	IoT Case Studies		
4.	IoT case study and mini project based on Industrial automation/ Transportation/ Agriculture/ Healthcare/ Home Automation	5	16
	Total	30	100

Text and reference books:

1. V. Madiseti and A. Bahga, ĩnternet of Things, A Hands on Approach, University Press, 2015.
2. S.R.N. Reddy, R. Thukral and M. Mishra, Introduction to Internet of Things: A Practical Approach, ETI Labs, 2017.
3. P. Raj and A.C. Raman, The Internet of Things: Enabling Technologies, Platforms and Use Cases, CRC Press, 2017.
4. J. Jose, Internet of Things, Khanna Publishing House, New Delhi, 2018. 5
5. A. McEwen, Designing the Internet of Things, Wiley, 2013. 6
6. R. Kamal, Internet of Things: Architecture and Design, McGraw Hill, 2017.
7. C. Pfister, Getting Started with the Internet of Things, O Reilly Media, 2011.

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Course Outcome:

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

1. Understand internet of Things and its hardware and software components.
2. Interface I/O devices, sensors & communication modules.
3. Remotely monitor data and control devices, and develop real life IoT based projects.

Special Remarks (If any):NIL