SCHEME & SYLLABUS

OF

UNDERGRADUATE DEGREE COURSE
in

FASHION & APPAREL ENGINEERING

(w. e. f. session 2018-19)

J C BOSE UNIVERSITY OF SCIENCE AND TECHNOLOGY, YMCA

FARIDABAD

J C BOSE UNIVERSITY OF SCIENCE AND TECHNOLOGY, YMCA

VISION

YMCA University of Science and Technology aspires to be a nationally and internationally acclaimed leader in technical and higher education in all spheres which transforms the life of students through integration of teaching, research and character building.

MISSION

- To contribute to the development of science and technology by synthesizing teaching, research and creative activities.
- To provide an enviable research environment and state-of-the-art technological exposure to its scholars.
- To develop human potential to its fullest extent and make them emerge as world class leaders in their professions and enthuse them towards their socialresponsibilities.

Program Educational Objectives (PEO'S)

PEO-1:

A fundamental knowledge of the basic and engineering sciences and develop analytical skills required for fashion & apparel engineering.

PEO-2:

Graduates to be equipped with practical skills and experimental practices related to core and applied areas of fashion & apparel engineering to expand their knowledge horizon beyond books. This will prepare the students to take-up career in industries or to pursue higher studies in fashion apparel and interdisciplinaryprograms.

PEO-3:

Graduates will have improved team building, team working and leadership skills with high regard for ethical values and social responsibilities.

PEO- 4:

Fashion apparel Graduates will explore and create innovations in various aspects of engineering.

PROGRAMME OUTCOMES (PO'S) B.TECH. FASHION & APPAREL ENGINERING

Engineering Graduates will be able to:

1) **Engineering knowledge:** Apply knowledge of mathematics, science, engineering fundamentals, and fashion apparel engineering to the solution of engineeringproblems.

2) **Problem analysis:** Identify, formulate, review literature and analyze fashion apparel engineering problems to design, conduct experiments, analyze data and interpretdata.

3) **Design /development of solutions:** Design solution for fashion apparel engineering problems and design system component of processes that meet the desired needs with appropriate consideration for the public health and safety, and the cultural, societal and the environmentalconsiderations.

4).**Conduct investigations of complex problems**: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions in fashion apparel engineering.

5) **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to fashion apparel engineering activities with an understanding of thelimitations.

6) **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to fashion apparel engineeringpractice.

7) **Environment and sustainability:** Understand the impact of the fashion apparel engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainabledevelopment.

8) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the fashion apparel engineeringpractice.

9) **Individual and team work:** Function affectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings in fashion apparelengineering.

10) **Communication:** Communicate effectively on complex engineering activities with the engineering committee and with society at large, such as, being able to comprehend and write affective reports and design documentation, make effective presentations in fashion apparelengineering.

11) **Project Management and finance:** Demonstrate knowledge & understanding of the fashion apparel engineering principles and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments in fashion apparelengineering.

12) **Life- long learning:** Recognize the need for, and the preparation and ability to engage in independent research and lifelong learning in the broadest contest of technological changes in fashion apparel engineering.

PROGRAM SPECIFIC OUTCOMES (PSOs):

1) To apply practical skills, knowledge of engineering fundamentals and fashion apparel engineering engineering, to industries andinstitutions.

2) To explore, create and develop innovations in various aspects of engineering. The student will be ready to take-up career or to pursue higher studies with high regard to ethical values and social responsibilities.

Undergraduate Degree Courses in Engineering & Technology

FASHION & APPARELENGINEERING

(As per guidelines of All India Council for Technical Education Model

Curriculum)

General, Course structure & Theme &
Semester-wise credit distribution Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week 2 Hours Practical (Lab) per week	0.5 credits 1 credit

Credits - 160 for a student to be eligible to get Under Graduate degree in Engineering.

Structure of Undergraduate Engineering program*:*

S. No.	Category	Breakup of Credits (Total 160)
1	Humanities and Social Sciences including Management Courses	09
2	Basic Science Courses	25
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	29
4	Professional core courses	48
5	Professional Elective courses relevant to chos specialization/branch en	24
6	Open subjects – Electives from other technical and /or emerging subjects	09
7	Project work, seminar and internship in industry or appropriate work place/ academic and research institutions in India/abroad	16
8	Mandatory Courses [Environmental Sciences, Induction program, Indian Constitution, Essence of Indian Traditional Knowledge]	(non-credit)
	Total	**160+ 3***

*****Refer implementation of Credit Transfer/Mobility Policy of online courses ,17th meeting of Academic Council (11.6.2019) for details, regarding MOOC credits. Minimum credit to be earned is **03** through MOOC for all B.Tech. students in 2018-19 scheme.

Course Code and Definition:

Course code	Definitions
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC-FA	Professional core courses
PEC-FA	Professional Elective courses
OEC-FA	Open Elective courses
LC-FA	Laboratory course
MC	Mandatory courses
PROJ- FA	Project

HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT

S. No	Code No.	Subject	Semester	Credits
1.	HSMC101	English	II	3
2.	HSMC-FA202	Evolution of clothing & fashion	IV	3
3.	HSMC 201	Effective Technical Communication	IV	3
			Total Credits:	**9**

BASIC SCIENCE COURSES

Sl. No	Code No.	Subject	Semester	Credits
1.	BSC101	Physics (Mechanics & Mechanics of Solids)	I	5.5
2.	BSC103	Mathematics –I (Calculus, Multivariable Calculus and Linear Algebra)	I	4
3.	BSC 102	Chemistry-I	II	5.5
4.	BSC 104	Mathematics –II (Differential Equations)	II	4
5.	BSC 01	Biology	III	3
6.	BSC-FA201	Applied statistics & operations research	IV	3
			Total Credits:	**25**

ENGINEERING SCIENCE COURSES

Sl. No	Code No.	Subject	Semester	Credits
1.	ESC101	Basic Electrical Engineering	I	5
2.	ESC102	Programming for Problem Solving	II	5
3.	ESC104	Workshop Manufacturing Practices	II	3
4.	ESC105	Engineering Graphics & Design	I	3
5.	ESC201	Basic Electronics	III	3
8.	ESC212	Energy Science & Engineering	III	2
9.	ESC-FA201	Textile raw materials &Yarn formation	III	4
10	ESC-FA301	Knit & garmenttechnology	IV	4
			Total Credits:	**29**

Project/Industrialtraining

1.	Project	12 pd / week	6 Credit	VI&VII
2.	Industrial Training	one semester	10 Credit	VIII
	Total	**12+One semester Training**	**16 Credit**	

PROGRAMME CORE COURSES (PCC)

S.No.	Code	Name of the Course	No.of Credits	Semester
1.	PCC-FA201	Traditional embroidery &textile	3	III
2.	PCC-FA202	Apparel production	3	III
3.	PCC-FA203	Fashion sketching Lab/ Design Idea & fashion illustration lab	1	III
4.	PCC-FA204	Fibres identification & yarn formation lab	1	III
5.	PCC-FA205	Elementary garment manufacturing &Pattern makinglab	1	III
6.	PCC-FA206	Apparel production planning and scheduling	2	IV
7	PCC-FA207	Fabric formation	3	IV
8	PCC-FA208	Fabric formation &analysinglab	1	IV
9.	PCC-FA209	Apparel construction lab I	1	IV
10.	PCC-FA301	Colouration of Textile & Apparel products	4	V
11.	PCC-FA302	Garment production machines & equipment	3	V
12.	PCC-FA303	Colouration of Textile & apparel lab	1	V
13.	PCC-FA304	Textile &Apparel design lab	1	V
14.	PCC-FA305	Colour and design concept	3	VI
15.	PCC-FA306	Textile & apparel product testing	3	VI
16.	PCC-FA307	Textiles & Apparelprinting	3	VI
17	PCC-FA308	CAD lab	1	VI
18	PCC-FA309	Textile &Apparel Printing lab	1	VI
19	PCC-FA310	Colour& Design Lab	1	VI
20	PCC-FA311	Testing lab	1	VI
21	PCC-FA401	Textile & Apparel finishing	3	VII
22	PCC-FA402	Textile & Apparel Costing	3	VII
23	PCC-FA403	Quality assurance in apparel industry	3	VII
24	PCC-FA404	Apparel draping & grading lab	1	VII
		Total	**48**	

PROFESSIONAL ELECTIVECOURSE(PEC)

PROFESSIONAL ELECTIVE COURSE-I (PEC-I) (Semester-IV)

S.No.	Name of Course	Contact Hours	Credits
1	Engineering economics	3	3
2.	Introduction to fashion retail	3	3
3.	Supply chain management	3	3

Note: Students will have to select any one out of the list.

PROFESSIONAL ELECTIVE COURSE-II (PEC-II)(Semester-IV)

S.No.	Name of Course	Contact Hours	Credits
1.	Structure & properties of textiles	3	3
2.	Preprative wet process	3	3
3.	Introduction to fashion and apparel	3	3

Note: Students will have to select any one out of the list.

PROFESSIONAL ELECTIVE COURSE-III (PEC-III)(Semester-V)

S.No.	Name of Course	Contact Hours	Credits
1	Computer aided designing	3	3
2.	Indian business environment	3	3
3.	Fashion selection	3	3

Note: Students will have to select any one out of the list. PROFESSIONAL ELECTIVE COURSE-IV (PEC-IV)(Semester-V)

S.No.	Name of Course	Contact Hours	Credits
1.	Introduction to fashion & apparel	3	3
2.	Apparel merchandising	3	3
3.	Nonwoven technology	3	3

Note: Students will have to select any one out of the list.

Note: PEC FAEL -302-2 Apparel Merchandising: indicates that in the 5th sem. scheme subject code is PEC FAEL-302 and No. 2 is chosen in this semester.

PROFESSIONAL ELECTIVE COURSE-. V (PEC-V)(Semester-VI)

S.No.	Name of Course	Contact Hours	Credits
1	Advance Apparel construction techniques	3	3
2.	Entrepreneurship Development	3	3

Note: Students will have to select any one out of the list.

PROFESSIONAL ELECTIVE COURSE-VI (PEC-VI) (Semester-VI)

S.No.	Name of Course	Contact Hours	Credits
1	Project Writting	3	3
2.	Automation in Garment Industry	3	3

Note: Students will have to select any one out of the list.

PROFESSIONAL ELECTIVE COURSE-VII (PEC-VII) (Semester-VII)

S.No.	Name of Course	Contact Hours	Credits
1	Elements of fashion	3	3
2.	Fashion Accessories	3	3

Note: Students will have to select any one out of the list.

PROFESSIONAL ELECTIVE COURSE-VIII (PEC-VIII) (Semester-VII)

S.No.	Name of Course	Contact Hours	Credits
1	Home & industrial textile product	3	3
2.	Technical &speciality textile & apparel	3	3

Note: Students will have to select any one out of the list.

OPEN ELECTIVE COURSES (OEC) :

Note:-Students have to select two different General Elective Courses-I and II from the given list:

Courses offered by Computer Engg. Dept

S.No	Code*	Name of Subject
1	OEC-1	Intelligent Systems
2	OEC-2	Cyber laws and Security
3	OEC-3	Soft Computing
4	OEC-4	Web Technology and Information Retrieval
5	OEC-5	Intellectual Property and Rights

Courses offered by Electrical Engg. Dept

S.No	Code	Name of Subject
1	OEC-6	Installation Testing & Maintenance of Electrical Equipments
2	OEC-7	Non conventional energy resources & Utilization
3	OEC-8	Utilization of Electrical Power & Traction

Courses offered by Mechanical Engg. Dept

S.No	Code	Name of Subject
1	OEC-9	Industrial Engineering
2	OEC-10	Total Quality Management
3	OEC-11	Solid Waste
4	OEC-12	Product Design and Development
5	OEC-13	Robotics Engineering
6	OEC-14	Power Plant Engineering

- Courses offered by Electronics Engg.Deptt.

S.No	Code	Name ofSubject
1	OEC-15	Microprocessor and Interfacing
2	OEC-16	Digital Signal Processing
3	OEC-17	Instrumentation and Control
4	OEC-18	Data Communication and Networking

- Courses offered by HASDept

S.No	Code	Name of Subject
1	OEC-19	Soft Skills for Engineers
2	OEC-20	Higher EngineeringMathematics

- Courses offered by MBADept

S.No	Code	Name of Subject
1	OEC-21	Human Resource Management
2	OEC-22	Financial Management
3	OEC-23	Marketing Management
4	OEC-24	Entrepreneur Development
5	OEC-25	Principles of Management & Economics

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SCHEME OF STUDIES & EXAMINATIONS

B.TECH 2nd YEAR (SEMESTER – III) FASHION & APPAREL ENGINEERING

(2018-19)

Course No.	Course Title	Teaching Schedule				Marks for Sessional	Marks for End Term Examination		Total Marks	Credits
		L	T	P	Total		Theory	Practical		
ESC201	Basic Electronics	3	-	-	3	25	75	-	100	3
ESC212	Energy Science & Engineering	1	1	-	2	25	75	-	100	2
BSC01	Biology	2	1	-	3	25	75	-	100	3
ESC-FA201	Textile raw materials&Yarn formation	3	-	-	3	25	75	-	100	3
PCC-FA201	Traditional embroidery &textile	3	-	-	3	25	75	-	100	3
PCC-FA202	Apparel production	3	-	-	3	25	75	-	100	3
PCC-FA203	Fashion sketching ,design idea & fashion illustration lab	-	-	2	2	15	-	35	50	1
PCC-FA204	Fibres identification &yarnformation lab	-	-	4	4	15	-	35	50	2
PCC-FA205	Elementary garment manufacturing & Pattern making lab	-	-	2	2	15	-	35	50	1
	Total	14	2	8	25	220	525	105	850	21

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B.TECH 2nd YEAR (SEMESTER – IV) FASHION & APPAREL ENGINEERING (2018-19)

Course No.	Course Title	Teaching Schedule				Marks for Sessionals	Marks for End Term Examination		Total Marks	Credits
		L	T	P	Total		Theory	Practical		
BSC-FA201	Applied statistics & operations research	2	1	-	3	25	75	-	100	3
PCC-FA206	Apparel production planning and scheduling	2		-	2	25	75	-	100	2
PCC-FA207	Fabricformation	2	1	-	3	25	75	-	100	3
HCMS 01	Effective Technical Communication	3	0		3	25	75	-	100	3
HCMS-FA202	Evolution of clothing & fashion	3		-	3	25	75	-	100	3
PEC-FAEL201	PROFESSIONAL Elective Course-I	3	-	-	3	25	75	-	100	3
PEC-FAEL202	PROFESSIONAL ElectiveCourse-II	3	-	-	3	25	75	-	100	3
MC CEFAE03	Audit Course-1: Environment Science	3	-	-	3	25	75	-	-	-
PCC-FA208	Fabric formation &analysinglab	-	-	2	2	15	-	35	50	1
PCC-FA209	Apparel construction lab I	-	-	2	2	15	-	35	50	1
	Total	21	2	4	27	205	525	70	800	22

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SCHEME OF STUDIES & EXAMINATIONS

B.TECH 3rd YEAR (SEMESTER – V) FASHION & APPAREL ENGINEERING(2018-19)

Course No.	Course Title	Teaching Schedule				Marks for Sessionals	Marks for End Term Examination		Total Marks	Credits
		L	T	P	Total		Theory	Practical		
ESC-FA301	Knit & garment technology	2	1	-	3	25	75	-	100	3
PCC-FA301	Colouration of Textile & Apparel products	3	1	-	4	25	75	-	100	4
PCC-FA302	Garment production machines & equipment	3		-	3	25	75	-	100	3
PEC-FAEL301	PROFESSIONAL Elective Course-III	3	-	-	3	25	75	-	100	3
PEC-FAEL302	PROFESSIONAL Elective Course-IV	3	-	-	3	25	75	-	100	3
OEC-FAEL301	Open General Elective Course-1	3	-	-	3	25	75	-	100	3
MC01	Audit Course-II : Constitution of India	3	-	-	3	25	75	-	-	-
ESC-FA302	Knit design & development lab	-	-	2	2	15	-	35	50	1
PCC-FA303	Colouration of Textile & apparel lab	-	-	2	2	15	-	35	50	1
PCC-FA304	Apparel construction lab II	-	-	2	2	15	-	35	50	1
	Total	20	2	6	28	195	450	105	750	22

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SCHEME OF STUDIES & EXAMINATIONS

B.TECH 3rd YEAR (SEMESTER – VI) FASHION & APPAREL ENGINEERING(2018-19)

Course No.	Course Title	Teaching Schedule				Marks for Sessionals	Marks for End Term Examination		Total Marks	Credits
		L	T	P	Total		Theory	Practical		
PCC-FA305	Colour and design concept	3	-	-	3	25	75	-	100	3
PCC-FA306	Textile & apparel product testing	3			3	25	75	-	100	3
PCC-FA307	Textiles & Apparel printing	3	-	-	3	25	75	-	100	3
PEC-FAEL303	PROFESSIONAL ElectiveCourse-V	3	-	-	3	25	75	-	100	3
PEC-FAEL304	PROFESSIONAL Elective Course-VI	3	-	-	3	25	75	-	100	3
OEC-FAEL302	Open General Elective Course-II	3	-	-	3	25	75	-	100	3
PCC-FA308	CAD lab	-	-	2	2	15	-	35	50	1
PCC-FA309	Textile &Apparel Printing lab	-	-	2	2	15	-	35	50	1
PCC-FA310	Colour and Design Lab	-	-	2	2	15	-	35	50	1
PCC-FA311	Testing lab	-	-	2	2	15	-	35	50	1
PROJ-FA401	Project	-	-	2	2	15	-	35	50	1
	Total	18		10	28	225	450	175	850	23

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SCHEME OF STUDIES & EXAMINATIONS

B.TECH 4th YEAR (SEMESTER – VII) FASHION & APPAREL ENGINEERING(2018-19)

Course No.	Course Title	Teaching Schedule				Marks for Sessional	Marks for End Term Examination		Total Marks	Credits
		L	T	P	Total		Theory	Practical		
PCC-FA401	Textile & Apparel finishing	3		-	3	25	75	-	100	3
PCC-FA402	Textile & Apparel Costing	3		-	3	25	75	-	100	3
PCC-FA403	Quality assurance in apparel industry	3		-	3	25	75	-	100	3
PEC-FAEL401	Professional Elective Course-VII	3	-	-	3	25	75	-	100	3
PEC-FAL402	Professional Elective Course-VIII	3	-	-	3	25	75	-	100	3
OEC-FAEL401	Open Elective Course- III	3	-	-	3	25	75	-	100	3
PCC-FA404	Apparel draping & grading lab	-	-	2	2	15	-	35	50	1
PROJ-FA 402	Project	-	-	10	10	30	-	70	100	5
	Total	18	0	12	30	220	525	105	850	24

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SCHEME OF STUDIES & EXAMINATIONS
B.TECH. 4th YEAR (SEMESTER – VIII) FASHION & APPAREL ENGINEERING(2018-19)

Semester VIII (Fourth year)

Sl. No.	Category	Code	Course Title	Hours per week			Total contact hours	Credits
				L	**T**	**P**		
1	Industrial Training	PROJ - FA 403	Industrial Project training	0	0	**30** (Duration one semester)		10

Detailed Syllabus

ESC- 201 BASIC ELECTRONICS ENGINEERING

B. Tech IIISemester

No. ofCredits:3
L TP Total
3 0 0 3

Sessional: 25 Marks
Theory: 75 Marks
Total: 100Marks
Duration of Exam: 3 Hours

Pre- Requisite: Physics

Successive: Mechatronics, Automation in Manufacturing

Course Objectives:

To provide an overview of electronic device components to Mechanical engineering students.

Course Contents:

Semiconductor Devices and Applications: Introduction to P-N junction Diode and V-I characteristics, Half wave and Full-wave rectifiers, capacitor filter. Zener diode and its characteristics, Zener diode as voltage regulator. Regulated power supply IC based on 78XX and 79XX series, Introduction to BJT, its input-output and transfer characteristics, BJT as a single stage CE amplifier, frequency response and bandwidth.

Operational amplifier and its applications: Introduction to operational amplifiers, Op-amp input modes and parameters, Op-amp in open loop configuration, op-amp with negative feedback, study of practical op-amp IC 741, inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator.

Timing Circuits and Oscillators: RC-timing circuits, IC 555 and its applications as astable and mono-stable multi-vibrators, positive feedback, Barkhausen's criteria for oscillation, R-C phase shift and Wein bridge oscillator.

Digital Electronics Fundamentals :Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, de-multiplexers, flip-flops, shift registers, counters, Block diagram of microprocessor/microcontroller and their applications.

Electronic Communication Systems: The elements of communication system, IEEE frequency spectrum, Transmission media: wired and wireless, need of modulation, AM and FM modulation schemes, Mobile communication systems: cellular concept and block diagram of GSM system.

Course Outcomes:

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

1. Understand the principles of semiconductor devices and theirapplications.

2. Design an application using Operationalamplifier.

3. Understand the working of timing circuits andoscillators.

4. Understand logic gates, flip flop as a building block of digitalsystems.

5. Learn the basics of Electronic communicationsystem.

Text /Reference Books:

1. Floyd ," Electronic Devices" Pearson Education 9th edition,2012.

2. R.P. Jain , "Modern Digital Electronics", Tata McGraw Hill, 3rd Edition,2007.

3. Frenzel, "Communication Electronics: Principles and Applications", Tata McGraw Hill, 3rd Edition,2001

ESC212	Energy Science & Engineering	1L:1T:0P	2 credits

The objective of this Course is to provide *an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternative energy sources and their technology and application. The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternatives, renewable energy sources such as solar, biomass (conversions), wind power, waves and tidal, geothermal, ocean thermal, hydro and nuclear.*

Proposed Syllabus

Module 1*: Introduction to Energy Science:* Scientific principles and historical interpretation to *place ener*gy use in the context of pressing societal, environmental and climate issues; Introduction to energy systems and resources; Introduction to Energy, sustainability & theenvironment

Module 2: *Energy Sources:* Overview of energy systems, sources,

transformations, efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiencybatteries).

Module 3:*Energy& Environment:* Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; introduction to the economics of energy; How the economic system determines production and consumption; linkages between economic and environmental outcomes; How future energy use can be influenced by economic, environmental, trade, and research policy.

Module 4: *Engineering Projects connected with the Energy Sources:* Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.; Nuclear reactor containment buildings and associated buildings, design and construction constraints and testing procedures for reactor containment buildings; Spent Nuclear fuel storage and disposal systems.

Module 5: *Engineering for Energy conservation:* Concept of Green Building and Green Architecture;Green building concepts (Green building encompasses everything from the choice of building materials to where a building is located, how it is designed and operated); *LEED ratings;* Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates; Embodied energy analysis and use as a tool for measuring sustainability. Energy Audit of Facilities and optimization of energy consumption.

Text/Reference Books:

1. Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford UniversityPress
2. Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford UniversityPress
3. Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living,Gaiam
4. Jean-Philippe; Zaccour, Georges (Eds.), (2005), Energy and Environment Set: Mathematics of Decision Making, Loulou, Richard; Waaub,XVIII,
5. Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A. (2006) Energy and the Environment, 2nd Edition,JohnWiley
6. UNDP (2000), Energy and the Challenge of Sustainability, World

Energyassessment
7. E H Thorndike (1976), Energy & Environment: A Primer for Scientists and Engineers, Addison-WesleyPublishingCompany
8. Related papers published ininternationaljournals

Upon successful completion of the course, the students will be able to:

a) List and generally explain the main sources of energy and their primary application nationally andinternationally. Have basic understanding of the energy sources and scientificconcepts/principles.
b) behindthem
c) Understand effect of using these sources on the environmentandclimate
d) Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on theenvironment.
e) List and describe the primary renewable energy resources andtechnologies.
f) To quantify energy demands and make comparisons among energy uses, resources, andtechnologies.

BSC 01	**Biology**	**2L:1T:**	**3 credits**

Module 1.*(2 hours)- Introduction*

Purpose: To convey that Biology is as important a scientific discipline as Mathematics, Physics and ChemistryBring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18^{th} Century that lead to majordiscoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientificinquiry.

Module 2.*(3 hours)- Classification*

Purpose: To convey that classification *per se* is not what biology is all about.The underlying criterion, such as morphological, biochemical or ecological behighlighted.Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes oreucaryotes. (c) energy and Carbon utilization -Autotrophs,

heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster,
C. elegance, A. Thaliana,M.musculus

Module 3.*(4 hours)-Genetics*

Purpose: To convey that " Genetics is to biology what Newton's laws are to Physical Sciences"Mendel's laws, Concept of segregation and independent assortment. Concept of allele.Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring.Concepts of recessiveness and dominance.Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation usinghumangenetics.

Module 4.*(4 hours)-Biomolecules*

Purpose: To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine
Molecules of life. In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins.Nucleotides and DNA/RNA.Two carbon units and lipids.

Module 5.*(4 Hours). Enzymes*

Purpose: To convey that without catalysis life would not have existed on earth
Enzymology: How to monitor enzyme catalyzed reactions. How does an enzymecatalyzereactions. Enzyme classification.Mechanism of enzyme action. Discuss at least two examples. Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNAcatalysis.

Module 6.*(4 hours)- Information Transfer*

Purpose: The molecular basis of coding and decoding genetic information is universal Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code.Universality and degeneracy of genetic code. Define gene in terms of complementation andrecombination.

Module 7.*(5 hours). Macromolecular analysis*

Purpose: How to analyses biological processes at the reductionistic level
Proteins- structure and function. Hierarch in protein structure.Primary secondary, tertiary and quaternary structure.Proteins as enzymes, transporters, receptors and structuralelements.

Module 8.*(4 hours)-Metabolism*

Purpose: The fundamental principles of energy transactions are the same in physical and biological world.

Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergoincreactions.Concept of K_{eq} and its relation to standard free energy.Spontaneity.ATP as an energy currency. This should include the breakdown of glucose to CO_2 + H_2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO_2 and H_2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge

Module 9.*(3 hours)- Microbiology*

Concept of single celled organisms.Concept of species and strains.Identification and classification of microorganisms.Microscopy.Ecological aspects of single celled organisms.Sterilization and media compositions.Growthkinetics.

References:

1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa;Cain,M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley andSons
3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox,M. M.W.H. Freeman and Company
4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain forCBSPublisher
5) Microbiology, Prescott, L.M J.P. Harley andC.A.Klein1995. 2nd edition Wm, C.BrownPublishers.

Course Outcomes

After studying the course, the student will be able to:

- Describe how biological observations of 18th Century that lead to majordiscoveries.
- Convey that classification *per se* is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical andecological
- Highlight the concepts of recessiveness and dominance during the passage of genetic material from parenttooffspring
- Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as onecanimagine
- Classify enzymes and distinguish between different mechanisms of enzymeaction.
- Identify DNA as a genetic material in the molecular basis of informationtransfer.
- Analyse biological processes at thereductionisticlevel
- Apply thermodynamic principles tobiologicalsystems.
- Identify and classifymicroorganisms.

Upon successful completion of the course, student will have:

- Ability to apply mathematics, science, andengineering
- Ability to design and conduct experiments, as well as to analyze and interpretdata
- Ability to identify, formulate, and solveengineeringproblems
- Ability to apply modern engineering tools, techniques and resourcesto

solve complex mechanical engineering activities with an understanding of thelimitations.

- Ability to comprehend the thermodynamics and their corresponding processes that influence the behaviour and response of structuralcomponents

ESC-FA201F Textile raw material &Yarn formation
B. Tech (FASHION & APPAREL ENGINEERING) lll Semester

No. ofCredits: 4	**Sessional: 25Marks**
L T PTotal	**Theory: 75Marks**
3 1 0 4	**Total: 100 Marks**
	Duration of Exam: 3Hours

UNIT I General definitions and important terminologies related to textiles; Classification of fibres; Essential and desirable properties of textile fibres and their role in final products; Advantages and disadvantages of natural and manmadefibres.
Cotton: structure and properties (physical and chemical); Different Varieties including organic as well as Bt cotton and their properties;Applications.
Bast and leaf fibres such as jute, hemp, sisal and ramie etc: Geographical distribution, extraction, properties and their uses.

UNIT II

Varieties of natural silk, rearing of silk worm, properties and uses of various types of silk; silkreeling,
Varieties, sorting and grading of wool, chemical and physical properties of wool, processes involved in the removal of impurities from raw wool; numbering systems of woollen and worsted yarns.

Brief outline of the manufacturing processes of important man-made fibres, viz. rayons (Viscose and Acetate), polynosic, tencel, nylons, polyester, acrylics, polypropylene, like spandex/lycraetc (only flow charts); their Important physical and chemical properties and applications.

UNIT III Introduction to objectives of processes like ginning, mixing and blending. Introduction to various preparatory processes involved in the production of yarn viz. opening and cleaning (blow room and card), drawing (draw frame), combing (comber) and rove formation (speed frame) with the objectives of each process

Concept of yarn quality and its importance, Yarn numbering systems and calculations pertaining to conversions,

UNIT IV Introduction to different processes involved in the production of yarn viz. conventional (ring spinning) and unconventional (rotor, air-jet and friction spinning etc) with the objectives of each. Properties and end uses of different types of yarns such as ring spun, rotor spun, friction spun and air-jet spun etc. Objectives of plying and twisting of spun and filament yarns.

Course Outcomes:

- To understand general morphological structure, physical and chemical properties of various natural and synthetic textilefibres
- To understand the cultivation and harvesting processes of various natural and synthetic textilefibres.
- To understand the manufacturing processes of various synthetic textilefibres.
- Understand the concept of yarn quality and itsimportance

Text Books &ReferenceBooks:	**Author:**
Handbook ofTextileFibres	J GordonCook
TextileFibres	HVSMurthy
ManmadeFibres	RWMoncrieff
ManufacturedFibreTechnology	V B Gupta &VK Kothari
SpunYarn Technology	EricOxtoby
TextileScience	Corbmann
Short StapleSpinningSeries	W. Klein

PCC-FA-201F Traditional embroidery & textile
B. Tech (FASHION & APPAREL ENGINEERING) lll Semester

No. ofCredits: 3	**Sessional: 25 Marks**
L T PTotal	**Theory: 75 Marks**
3 0 0 3	**Total: 100 Marks**
	Duration of Exam: 3Hours

UNIT I Basic know-how embroidery techniques: Requirements of embroidery. Tools and Equipment required for embroidery

UNIT II Sample preparation with basic embroidery stitches and their derivatives like chain stitch; stem stitch, darning stitch, Herring-bone, open chain, satin, button-hole, bullion knot, Lasydaisy stich

UNIT III Working with Indian Traditional Embroidery with special reference to fabric, embroidery threads, colors, colors, stitches, and motifs Chickankari – Lucknow, Phulkari – Punjab, Kanthas – Bengal, Applique work – Orissa and Gujarat

Working with Asia Traditional Embroidery with special reference to fabric, embroidery threads, colors, colors, stitches, and motifs suzani Embroidery of Uzbekistan, Traditional Embroidery vitnam, Traditional gold Embroidery ofmalaysia, Philippine Embroidery

UNIT IV Sampling and Sourcing of Traditional Indian Textiles with the special reference of materials, colors, motifs and production processes –

Ikat and Patola, Kalamkari, Chanderi , Kota, Brocades, Bandhani , Block Printed Textiles

Preparation of atleast two samples with machine embroidery techniques

Course Outcomes:

- To understand the basics of embroidery techniques, tools, equipments and theirneed.
- To understand different types of stitches by their unique samplepreparation.
- To understand various traditional embroideries with related to fabricused.
- To understand the various sampling and sourcing of traditional textile material related to their colour, motif and productionprocess.

Text Books &ReferenceBooks:	**Author:**
Complete Guide toNeedlework	Readers Digest
The Dictionary ofNeedlework	Sophia Cauteild and Blanche Saward
Ethnic embroideryofIndia	UshaShrikantVandana
Embroidery	Arora's

PCC-FA-202F Apparel production

B. Tech (FASHION & APPAREL ENGINEERING) lll Semester

No. of Credits: 3		**Sessional :**	**25 Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 0 0	**3**	**Total :**	**100 Marks**
		Duration of Exam: 3 Hours	

UNIT I Global Textiles and Apparel industry: History and evolution. Indian Textiles and Apparel Industry: History and Evolution .Indian Garment industry vis-à-vis leading countries. Apparel manufacturing countries: their features level of technology, productmix.

UNIT II Cutting: Objectives and methods of cutting; the planning, drawing, and reproduction of the marker, requirement of marker planning, marker plan efficiency, methods of marker planning and use. Aids and Tool equipment for cutting- Band knife, clamp, click press, electrical cloth notcher, Straight knife cutter, Circular knife, portable rotary knife cutter, Cutting Board, Cutting Table, Drill, Pattern perforator, razor blade, Scissors, Shears, Face to face spreader, Manual spreader, one way spreader, Tubular knitspreader.

UNIT III Understanding of various fabrics and its effect on spreading and cutting techniques in relation to quality and productivity, the spreading of fabric to form a lay, requirement of spreading and different spreading method. Tracing and marking Terminology - Chalked marking, chalked thread, color coding, pin marking, tailors tacks, thread tracing

UNIT IV Types of pattern – Commercial pattern, Drafted pattern, Draped pattern, Graded pattern, Production pattern, Trade back pattern Pattern Lay-out – Border design fabric, check fabric, Diagonal design fabric/ Diagonal print fabric, Diagonal weave fabric, Irregular design fabric, Knit fabric, Large print fabric, Light reflecting fabric, Napped fabric, Balanced plaid, pile fabric, unbalanced plaid, uneven plaid, plastic fabric, Even stripe, Uneven stripe.

Course Outcomes:

- To gain the knowledge of global textile and apparel industry by their history and evolution of various apparel marketstrategies.
- To understand garment manufacturing processes by means of spreading, marker planning, and cutting with different types of spreading techniques and marker planningprocesses.
- To understand various types of cutting devices, types of patterns, tracing and marking terminologies.
- To understand different types of pattern layoutstechniques.

Text Books &ReferenceBooks:	**Author:**
ClothingTechnology	Carr andLatham
ApparelIndustryMagazine	WorldClothing Manufacturer

PCC-FA203 Basic sketching, Design Idea & Fashion Illustration Lab

B. Tech (FASHION & APPAREL ENGINEERING) lll Semester

No. of Credits: 1

		Sessional:	**15Marks**
L T P	**Total**	**Practical:**	**35Marks**
0 0 2	**2**	**Total:**	**50Marks**
		Duration of Exam: 2 Hours	

1. Usage of different dry and wet colour mediums in sketching e.g. shading, filling etc. Normal figure proportions, Grid theory for formation of fashion figure. Fashion Figure proportions, Fashion figure in different views, as Front View, 3/4th View, Back View, Side View. Flashing of the fashion figure in different views. Movement figures - principles to form a movement figure, sketching of the movement figures in various postures /body positions. Variations of body parts - Arms, Hands, legs, Feet.Facial figure proportions - Features, Hairstyles. Developing Silhouettes – draping, fold lines, prints etc. Photo analysis, Fabric rendering, Simple illustration on fashionfigures.
2. Developing fabric textures like velvet, tie and dye, batik, denim, fur, leather, net, satin, organdie,etc.
3. Illusion in garments: line, print, color and silhouette Designing of various garments from the following categories: Children wear, Ladies' wear, Men's wear, Evening wear, Nightwear, Kitchen wear, summer wear, winter wear and party wear,etc.
4. Advanceddesigningofthegarmentsbaseduponinnovative/motivationaldesigning e.g. electronics, sports, jewelry, modules, camouflage, etc.

Course Outcomes:

- To familiarize students with different sketching mediums, body figures , movements of figures and various fashion silhouettetechniques.
- To give practical training to students in understanding the designing of basic fashion details, develop basic fabric textures on different fabrics, illusion of garments on different types of garments and advanced designing on garments based upon different technicalgarments.
- Designing and sketching of different types of fashion details: necklines, sleeves, collars, pockets, yokes, skirts, waistlines, pleats, tucks and plackets.

PCC-FA204 Fibres Identification &Yarn Formation Lab

B. Tech (FASHION & APPAREL ENGINEERING) lll Semester

No. of Credits: 1

Sessional: 15 Marks

L T PTotal	**Practical: 35Marks**
0 0 2 2	**Total: 50Marks**
	Duration of Exam: 2 Hours

UNIT I Principle of microscopy, Microscopic identification of fibres, preparation and mounting of specimen for longitudinal view, Cross-section cutting. Microtomy - cork method, metal plate method, Hardy's Microtome, Mountants and reagents for fibre microscopy; Identification of fibre by burning as well as solubility tests. Standard scheme of analysis of homogenous fibre blends by physical and chemical methods, Qualitative and quantitative determination of components. Preparation of reagents used for chemicalanalysis.

UNIT II Discussion and demonstration of the various machines and of manufacturing processes involved in converting fibres to yarn viz. mixing, blending, opening, cleaning, carding, drawing, combing, rove formation, spinning, doubling etc.; Introduction to unconventional spinning machines/processes; Rotor spinning, Air-jet spinning and Friction spinning etc.; Simple Calculations pertaining to these machines/processes

Course Outcomes:

- To illustrate various fibres on microscopic and also chemical and burningtest.
- To familiarize the students with various machinery and process involve in conventional fibres to yarnmanufacturing.

PCC-FA205 Elementary Garment Manufacturing & Pattern Making Lab

B. Tech (FASHION & APPAREL ENGINEERING) lll Semester

No. of Credits: 1

		Sessional:	**15Marks**
L T P	**Total**	**Practical:**	**35Marks**
0 0 2	**2**	**Total:**	**50Marks**
		Duration of Exam: 2 Hours	

1. Selection for different types of needle according to stitchingcomponents.
2. Selection procedure for different types of sewing and embroidery threads.Utility of different Aids and tools for Garment Construction, Basting Operation.Study of sewing machineries, Different tools and Work aids, Application of different trims and components. Study of Fusing and pressing machineprocedure
3. Introduction to the tools and material used for drafting.Drafting of child's basic and adults bodiceblocks.
4. Drafting of different commonly used sleeves as set-in, puff, raglan, flared, leg'o'mutton,etc.
5. Drafting of different collars as peter-pan, sailor, mendarin and shirt collarsetc.

Course Outcomes:

1. To understand basic tools, thread types, needle types, trims andcomponents and also fusing and pressingmachineries.
2. To analyse different aids, tools and equipments for cutting and their applications as well.
3. To understand different types of pattern and patternlayout
4. To understand equipments for drafting and to develop basic bock construction and also prepare different sleeves andcollars.

BSC-FA-201 Applied Statistics & Operations Research

B.Tech (FASHION & APPAREL ENGINEERING) IV Semester

No. ofCredits: 4	**Sessional: 25Marks**
L T P Total	**Theory: 75Marks**
3 1 0 4	**Total: 100 Marks**
	Duration of Exam: 3Hours

UNIT I Measures of Dispersion: Range, quartile deviation, standard deviation, moments, skewness and Kurtosis (definition, properties and associated numerical only) Regression and Correlation: Karl Pearson's coefficient of correlation, rank correlation and line's of regression, curve fitting (linear, parabolic, andexponential)

UNIT II Theory of Probability: The concept of probability, additive and multiplicative laws of probability (Statements and associated numerical only) Probability Distributions: Random variate, mathematical expectation, theorems on expectation, discrete and continuous probability distributions (definition and problems only). Univariate Binomial, Poisson and Normal distribution (properties and applications)

UNIT III Sampling Theory: Population and sample, types of sampling, sampling distribution of means and proportions (definition only) Tests of Hypothesis and Significance: Definition of statistical hypothesis, null hypothesis, type I and type II errors and level of significance. Tests of significance for large and small samples (discussion) problem based on X2 test for goodness of fit, t-test, F-test and Analysis of variance (one way and two wayclassifications)

UNIT IV Operations Research: Linear programming problem (formulation and solution by graphical approach only). Transportation problem including time minimizing problems, Basic Assignment problem, sequencing problems (n jobs, 2 machines and n jobs, m machine problems) Project scheduling by PERT/CPM: Definition of network, critical path, floats, finding of critical path and floats.

Course Outcomes:

- To familiarize students with basic statistics and their applications in apparelsector.
- To understand sampling Theory: Population and sample, types of sampling, sampling distribution of means andproportions
- To understand theory ofprobability
- To understand project scheduling byPERT/CPM

Text Books &ReferenceBooks:	**Author**
1. MathematicalStatistics	Ray andSharma
2. BusinessStatistics	Gupta and Gupta
3. Theory and problems of probabilityand Statistics	Murray PSpiegel
4. OperationResearch	P.K. Gupta,Manmohan
5. Operations ResearchforManagement	Gupta andSharma
6. HigherEngineeringMathematics	B.S.Grewal

PCC-FA206 Apparel ProductionPlanning and Scheduling

B. Tech (FASHION & APPAREL ENGINEERING) lV Semester

No. of Credits: 3

		Sessional:	**25Marks**
L T P	**Total**	**Theory:**	**75 Marks**
2 0 0	**2**	**Total :**	**100 Marks**
		Duration of Exam: 3 Hours	

UNIT I Introduction to production, Operations, Concept of production, Productivity components
of production, Production planning & control, its Objective, function & organization of various departments in apparel industry.

UNIT II Production planning order preparation, material planning, process planning, loading &
scheduling in apparel industry. Work measurement: Uses of work measurement, data, and basic procedure of work measurement.

UNIT III Motion& Time study: Definition & scope of motion & time study, Data for sewing work study, improvement of production efficiency, Production analysis (qualitative & quantitative).

UNIT IV Co-ordination of activities: Layering & marker planning , Cutting room planning, planning of sewing room, Material management in clothing production Quick response in apparel manufacturing . Different production system.

Course Outcomes:

- Tounderstand concept of production planning and control in an apparel industry using workstudy.
- To analyse motion study , quick response and various production systems involve in an apparelindustry
- To understand and operate different sewing data analysis software (GSDtechniques).

TEXT BOOKS:

1. Introduction to clothing production management -- A.J.Chutter
2. Production management in apparel industry -- RajeshBheda

PCC-FA207 Fabric Formation

B. Tech (FASHION & APPAREL ENGINEERING) lV Semester

No. of Credits: 4

		Sessional :	**25 Marks**
L T P	**Total**	**Theory:**	**75 Marks**
2 1 0	**3**	**Total :**	**100 Marks**
		Duration of Exam: 3 Hours	

UNIT I Introduction to warp and weft preparatory processes in relation to production of fabrics with flow charts.Winding : Objectives of winding, Flow of material through a winding machine, brief introduction of variousparts

Warping: Objectives of warping, types of warping Types of creel. Sizing: Objectives of sizing. Brief introduction to Types of sizing viz aqueous and solvent slasher sizing machine, foam sizing, sinter roller sizing, hot melt sizing and single end sizing, Sizing ingredients: adhesives and different categories of additives.

UNIT II Pirn winding and Drawing-in: Objectives and flow of material through these operations.Shuttle Looms: Definition of handloom, plain loom, and automatic loom.

Introduction to various mechanisms of a loom viz. primary, secondary and auxiliary motion

Shuttleless looms: Classification, Their advantages over shuttle looms. Brief description of Sulzer projectile loom, rapier looms, air-jet looms, water jet looms and their salient features.

Fabric Analysis: Simple calculations for fabric weight per unit area, linear weight, cover and cover factors.

UNIT II Basic Concepts: Importance of fabric structure, Classification of fabrics, Notation of Weave, drafting plan, peg plan anddenting.

Weaves: plain weave and its derivatives, ornamentation, Twill weave and its derivatives, ornamentation, Sateen and Satin and their extensions

UNIT IV Crepe weave, diamond, mockleno, Cork-screw, honey comb, huck-a-back, bedford cords, welt and pique fabrics. Decorative Weaves: Extra warp and weft figuring, Backed cloth, Double cloth, treble and multiply belting structures.

Course Outcomes:

- To understand fabric manufacturing technology and also different devices used for windingmachine.
- To familiarize students among various types of warping process and sizing machines involve in fabricmanufacturing.
- To gain the knowledge of students of different types of looms (Handmade and automatic loom) involve in fabricmanufacturing.
- To understand the concept of new advanced types of looms incorporate and also fabric analysis technique.
- To analyse different types of decorative terry pile weave.

Text Books & Reference Books:

1. Principles of Weaving -- Marks & Robinson 2. Cotton Yarn weaving -- ATIRA 3. Textile Science -- Corbmann 4. NCUTE'sManual
2. Textile Design and Color --Watson
3. Watson's Advanced Textile Design -- WWatson
4. Grammer of Textile Design -- HNisbet

HSMC201	Effective Technical Communication	3L:0T:0P	3 credits

Module 1: Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for onlinemedia.

Module 2: Technical Writing, Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Hunan factors, Managing technical communication projects, time estimation, Single sourcing,Localization.

Module 3: Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

Module 4: Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, eventreport.

Module 5: Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving,Creativity.

Course Outcomes:

- To develop communication and technicalwriting.
- To develop the habit of Self assessment, Awareness, Perception andvalues.
- To gain the knowledge of Engineering ethics, Managing time, Role and responsibility of engineer.
- To understand different types of technicaldocuments.

Text/Reference Books:

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. NewYork,2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN0312406843)
3. Shiv Khera, You Can Win, Macmillan Books, NewYork,2003.
4. Raman Sharma, Technical Communications, Oxford Publication,London,2004.
5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN:07828357-4)
6. Sharma, R. and Mohan, K. Business Correspondence and ReportWriting,

Evolution of Clothing & Fashion

B. Tech (FASHION & APPAREL ENGINEERING) lV Semester

No. of Credits: 3

		Sessional:	**25Marks**
L T P	**Total**	**Theory:**	**75Marks**
3 0 0	**3**	**Total:**	**100 Marks**
		Duration of Exam: 3Hours	

UNIT I Origin of clothing. Objectives of clothing and costumes, Main archetypes of costumes, Principles of history of fashion.Theories of clothing-Protection, adornment, modesty and combined need theory etc.Fashion and its meaning, Principles and history of fashion, Classification of fashion.Fashion product Life cycles. Sources of Fashion, Factors affecting fashion movement like cultural, socio-pychological, etc.

UNIT II Effect of various factors such as communication, industry, economy, sports etc on fashion. Fashion leadership theories. Important fashion capitals, National and International fashion designers, National and International fashion markets and fashion weeks.

UNIT III Indian history of costumes: Concept and comparison of costumes of all stages of prehistpric and medieval period, Study of Costumes, jewellary, footwear, hairstyles etc. in India in different periods as – Vedic and post vedic period, Maurian Period, Gupta period Kushan and Kanishka period.

UNIT IV Global history of costumes: Concepts and history of classical costumes in Greek civilization and Roman civilization. History of costumes in Egyptian and Byzantine civilization.History of costumes in the western world starting from the origin up to the Reign of Charles and Louis with the emphasis on famous fashion centers and famous fashion designers.Important national and international fashion designers.

Course Outcomes:

- To understand the evolution of clothing and fashion since old civilised to modern civilisation through various archetypes, fashion lifecycles, sources offashion.
- To analyse various fashion leaders theories, national and international designers and also fashion week and fashioncalendars.
- To understand the various fashion centre capitals and factors affecting fashion industry.

TEXT BOOKS: 1. The guide to historic costumes -- Karen Baclaw Ski

2. Inside Fashion Business -- KittyG.Dickerson

3. Inside Fashion Design -- Sharon LeeTate

PCC-FA208 Fabric Formation &Analysing Lab

B. Tech (FASHION & APPAREL ENGINEERING) IV Semester

No. of Credits: 1

	Sessional:	**15Marks**
L T PTotal	**Practical:**	**35Marks**
0 0 2 2	**Total:**	**50Marks**
	Duration of Exam: 2 Hours	

Basic principles of woven fabric analysis: estimation of data for cloth reproduction, Identification of yarns and materials used in their construction.

Weave analysis, Sett, Cover factor, Count and weight calculations for simple and compound woven structures, Specifications of standard woven fabric.

Discussion and Demonstration of various machines and of manufacturing processes involved in converting yarns to fabric winding, warping, sizing, Drawing-in, weaving by Hand looms, Plain Looms.

Automatic Shuttle Looms, Shuttleless Looms and Knitting, Passage of material through them and brief study of their essential components and mechanisms.

Simple production and efficiency calculations pertaining to these processes.

Course Outcomes:

- To understand the fabric formation onlooms
- The understand mechanism involved and as well as developing creativity in designing unique fabric structures along with fabricanalysis.
- To analyse manufacturing processes involved in converting yarns to fabricwinding.

PCC-FA209 Apparel Construction Lab –I

B. Tech (FASHION & APPAREL ENGINEERING) IV Semester

No. of Credits: 1

				Sessional:	**15 Marks**
L	**T**	**P**	**Total**	**Practical:**	**35Marks**
0	**0**	**2**	**2**	**Total:**	**50Marks**
				Duration of Exam: 2 Hours	

Developing the basic blocks, marking information on blocks. Adaptations of the basic blocks, principle of dart manipulation by (i) slash and spread method (ii) pivotal transfer method.

Style variations of dart manipulation – pleats, tucks, gathers, dart clusters, radiating darts, terminating darts.

Fitting problems and their identification. Commercial paper pattern – symbols used in commercial patterns, envelopes for commercial paper patterns, guide sheet and other relevant information.

Flat pattern technique – drafting, developing paper pattern, designing and construction of garments of children, men and women using different construction and decorative features.

Course Outcomes:

- Understanding the basic block information, ,dart manipulation and drafting techniques.
- To analyse style variations of dartmanipulation
- To understand designing and construction of garments of children, men and women using different construction and decorativefeatures.

Suggested Text Books & References:

1. Armstrong, Pattern Making for Fashion Design, Dorling Kindersleypublication.
2. Aldrich, Metric Pattern Cutting Men's wear 4th Ed., Blackwellpublication.
3. Aldrich, Metric Pattern Cutting for Children wear & baby wear, Blackwell publication.
4. Aldrich, Pattern Cutting for Women tailored Jacket, Blackwellpublication.
5. Holman, Pattern Cutting Made Easy, Batsfordpublication.
6. Cooklin, Pattern Grading Men's cloth, Blackwellpublication
7. Cooklin, Pattern Grading Women's cloth, Blackwellpublication

PCC-FA301 Colouration of Textile & Apparel Products

B. Tech (FASHION & APPAREL ENGINEERING) V Semester

No. ofCredits: 4		**Sessional:**	**25Marks**
L T P	**Total**	**Theory:**	**75Marks**
3 1 0	**4**	**Total:**	**100 Marks**
		Duration of Exam: 3Hours	

Course Objectives:

- To introduce students with preparatory wet processing and concept of dyeing withrelevant machines andprocedure..

Unit1: Elementary knowledge and Process line for preparatory wet processing, Natural and added impurities in greige cotton fabrics. Overview of singeing, desizing, scouring operations with their objective, principal and mechanism, general recipe, drawbacks and advantages. Introductory idea of machines used in preparatory wetprocessing.

Unit 2: General introduction to bleaching and mercerisation with their objectives, mechanism,machine used, drawbacks and advantages.

Introduction to heat setting: objectives and mechanism. Pretreatment processing of wool and silk textile., General concept of dyeing i.e. dye-fibre interaction, dye uptake, shade percentage.Introductory idea of dyeing of fibre, yarn and fabric on different dyeing machines.

Unit 3: Introductory idea of dyeing of cellulosic fibres with direct, acid, basic, reactive, vat, metal complex, sulphur, azoic and pigments (overview).

Unit 4: Dyeing concept of synthetictextile materials such as Polyester, Nylon (disperse), etc .Dyeing of denim using Indigo dye. Chemical auxiliaries used in dyeing. Colour measurement and fastness (light, washing, perspiration, sublimation, chlorine, etc.) properties, Garment dyeing and processing: concept and machineused.

Text Books &Reference Books:

1. Gohl E P G and Vilensky LD, “Textile Science”, CBSPublishers.
2. Chakarverty J N, “Fundamental and practices in colouration of textiles”, Woodhead Publishing India Pvt Ltd,2008
3. Trotman E R, “Textile Scouring and Bleaching”, Griffin, 1968.
4. Shenai VA, “Technology of Bleaching &Mercerising”, Sevak Pub.,Mumbai.
5. Gulrajani M L, “Chemical Processing ofSilk”.
6. Shenai V A,“Technology of Dyeing”, Sevak Pub.,Mumbai.
7. Trotman E R, “Dyeing and Chemical Technology of Textile Fibres”, B.I. Publications Pvt.Ltd.
8. Hall David M, Chemical testing of textiles: a laboratory manual, Dept of Textile Engineering, Auburn University,1981

ESC-FA301 Knit & Garment Technology
B. Tech (FASHION & APPAREL ENGINEERING) V Semester

No. ofCredits: 4	**Sessional: 25Marks**
L T PTotal	**Theory: 75Marks**
3 1 0 4	**Total: 100 Marks**
	Duration of Exam: 3Hours

UNIT I Definition of knitting, Type of Knitted fabrics and their characteristics, End-uses of knitted fabrics.FundamentalStitches : Knit, Tuck and float stitches and their uses. Stitch diagrams. Knitting cycles of Latch, Beard and Compound Needles. Basic weft knitted structures (Plain, Rib, Interlock and Purl) and their properties, description of machine for production of these. Design and timings of their cams.

UNIT II Patterning devices in weft knitting like multi-cam track, swing cam, pattern wheel jacquard and electronic jacquard, their mechanisms of operation.Development of knit structures on Circular and Flat Knitting Machine. Quality control of various knitting processes

Ornamentation of knitted fabrics. Derivatives of basic structures like Le-coste, Accordian, Half and Full Cardigan, Milano Rib, French Rib, Swiss Rib, Single Pique, Taxi Pique, Pin Tuck.

Classification of warp and weft knitting machines.Classifications of warp knitting machines.Description of Raschal and tricot machines. Characteristics of Raschal and Tricot structures Calculations for Tightness factor, fabric cover, stitch density, areal density and knitting machine production

UNIT III Introduction to Knitted Garments- types and flowchart including the steps of production. Fully Cut garments – spreading – hand and machine spreading, types of lays. Marking – manual and computerized marking Cutting devices as die-cutter. Hand shears, laser cutting, etc. Cut stitch shaped – Fitting blocks as easy fitting and close fitting blocks. Consideration of visual stretch, stretch in action, etc. Shaping of various garments, e.g., in body sleeve angles, etc., Cutting in case of cut stitch shaped garmentsIntegral garments – Basic techniques as course shaping Wales shaping, tubular knitting, running-on, change of stitch type, casting -off, etc. Machine knitted integral garments as berets,, half hose, upper and lower bodice garments as Jacket, Wagnall garment, Tubular garment,etc

UNIT IV Fully fashioned garments – Concepts of use of basic forms i.e., circle, bell, and balloon, triangle, overlays in the generation of a garment shape. Broader classification of integral garments. Fashioning for shaping, fashion frequency. Most commonly used fashion details- Necklines, sleeves, etc. Application of each in Linking and Mock Linking.Linking machine and Cup seamer.Quality control of knitted garments.

Course Outcomes:

- To analyse knitted fabrics, their properties, manufacturing techniquesas well as ornamentation.
- To understand the concepts of fully fashionedgarments

- Understand the classification of warp and weft knittingmachines
- To understand the quality control of various knittingprocesses.

Text Books &ReferenceBooks:	**Author:**
1. KnittingTechnology	Wignal
2. KnittingTechnology	Azgaonkar
3. KnittingTechnology	Spence

PCC-FA302 Garment Production Machines & Equipment
B. Tech (FASHION & APPAREL ENGINEERING) V Semester

No. ofCredits: 3	**Sessional : 25Marks**
L T PTotal	**Theory: 75Marks**
3 0 0 3	**Total: 100 Marks**
	Durationof Exam: 3Hours

UNIT I Overview of the Garment Manufacturing processes, Introduction to the latest advancements in the Garment manufacturing processes. Fabric cutting Process: Pre-requisites for the fabric cutting. Tools and equipment needed for the cutting process. Advancements in the fabric cutting technology.

UNIT II Garment assembly processes: Basics of sewing, Functional parts of sewing machines (SNLS): Feed mechanisms, Run-in-ratio, Effect of sewing process on the sewing thread strength. Principle, mechanism and utility of following machines: Interlock machine, Overlock machine, Double needle Lock stitch and chain stitch sewing machines, Bar- tacking machine, Feed off the arm, Button attaching and buttonhole making machine and computerized embroiderymachines.

.**UNIT III** Study of sewing needle temperature: Factors affecting and remedial measures, Methods for the needle temperature measurement..Study of the measurement of the sewing forces and pressure during sewing. Study of the measurement techniques of the sewing thread tension on the sewing machine: SNLS and overlock machines. Applications of Programmable logic circuits (PLC) in the Garment manufacturing processes. Robotics: Basic analogy, its applications, scope and limitations in the Garment Industry.

UNIT IV Pressing and Fusing process and equipment.Handling of garments between different processes in the apparelindustry

Course Outcomes:

- To understand garment manufacturing process , sewing machineries , sewing needle etc.
- To understand sewing machine and computerized embroiderymachines.
- To analyse the handling of garments between different processes in the apparel industry.
- To understand the applications of Programmable logic circuits (PLC) in the Garment manufacturingprocesses

Text Books &ReferenceBooks:	**Author:**
KnittedClothingTechnology	Brackenburry

The Technology ofClothingManufacture	Harold Carr, Barbara Latham
Introduction toClothingManufacture	GerryCooklin
ApparelProduction	JacobSolinger
Robotics & Automation in theTextile Industry	
	M.G.MahadevanFashionPr
oductionTerms	Debbie AnnGiocllo&Berle

PCC-FA303 Colouration of Textile & Apparel Lab

B.Tech (FASHION & APPAREL ENGINEERING) V Semester

No. of Credits: 1	**Sessional : 15 Marks**
L T P Total	**Theory: 35 Marks**
0 0 2 2	**Total : 50 Marks**
	Duration of Exam: 2 Hours

Desizing of cotton by various methods and determination of desizing efficiency. Scouring and determination of scouring efficiency, Bleaching of cotton using hydrogen peroxide. Assessment of bleached goods.Mercerization of cotton, Scouring and bleaching of wool.Deguming and bleaching ofsilk

Dyeing of Cotton, by direct, reactive, sulfur, vat, azoic dyes. Dyeing of Wool and Silk by acid, metal complex dyes, Nylon with acid dyes, Carrier, HTHP, Thermosoling dyeing of PET, Dyeing of Acrylic with basic dyes, Dyeing of Cotton/Polyester and Polyester/Viscose blend. After treatment of direct dyes, Rectification and Stripping of dyes .. Measurement of fastness properties, Perspiration, light, washing, rubbing, etc, Computer colourmatching

Course Outcomes:

- To understand various preparatory wetprocessing.
- To analyse dyeing applications on various type offabrics.
- To understand dyeing of Wool and Silk by acid anddyes.

PCC-FA304 Textile & Apparel Design Lab

B.Tech (FASHION & APPAREL ENGINEERING) V Semester

No. ofCredits: 1	**Sessional:**	**15Marks**
L T PTotal	**Practical:**	**35Marks**
0 0 2 2	**Total:**	**50 Marks**
	Durationof Exam:	**2Hours**

Principle of dart manipulation by (i) Slash and spread method (ii) Pivotal transfer method Style variations of dart manipulation – pleats, tucks, gathers, dart clusters, radiating darts, terminating darts Commercial paper patterns- symbols used in commercial patterns, envelopes for commercial paper patterns, guide sheet and other relevantinformation.

Course Outcomes:

- To understand the basic dart manipulation.
- To analyse different types of patterns involve in designing ofgarments

ESC-FA302 WOVEN Knit Design & Development Lab

B.Tech (FASHION & APPAREL ENGINEERING) V Semester

No. ofCredits: 1	**Sessional:**	**15Marks**
L T PTotal	**Practical:**	**35Marks**
0 0 2 2	**Total:**	**50 Marks**
	DurationofExam:	**2Hours**

Study of warp patterning through sectional warping.Study of weft patterning through drop box motion.Study of weft patterning though electronic dobby and jacquard. To prepare fabric samples on desk looms/hand looms with basic weaves like plain, twill, satin, sateen, matt and some decorative weaves like honey comb, mock-leno, crepe, screw etc. To study single jersey, rib, interlock circular weft knitting m/cs. Practice of fabric sample preparations on these m/cs. To study flat bed weft knitting m/cs. Practice of fabric sample preparations on these m/cs. To prepare different knitted fabric design by combination of knit tuck and float using pattern wheel jacquard in circular m/c. Study of different types of fabrics and their specifications according to their enduse.

Course Outcomes:

- To impart knowledge among students with basics of differentwoven
- To analyse knitted fabricsstructures
- Design samples on handloom, power loom and knittedmachineries.

PCC-FA305 Colour and Design Concept

B. Tech (FASHION & APPAREL ENGINEERING) VI Semester

No. of Credits: 3	**Sessional: 25 Marks**
L T P Total	**Theory: 75 Marks**
3 0 0 3	**Total : 100 Marks**
	Duration of Exam: 3 Hours

UNIT I COLOUR – Concept and specifications of colour, Light and colour phenomenon, Additive and Subtractive combinations, Colour theories as light theory, pigment/ Brewster colour theory. Colour wheel – primary, secondary, sub-secondary and tertiary colours, Rainbow colours. Colour combination techniques in fabric and garments. Psychological effects of colour, Warm and Cool colours. Colour harmony. Definition of Colour as per C.I.E., Tristimulus value, Hue and Chroma; Colorgamut

UNIT II Colour combination techniques in fabric and garments.Colour contrast in fabric and garments. Application of colour combination and harmony in designing of clothing/fabric. Modification of colours as formation of tint, shades and coloured grays etc. Colour intensity charts. Outline for the movement of colours in fashion with the factors affecting the choice of colour. Elements of design of a motif : line, dot, curve, colour and texture. Different Types and their applications.

UNIT III Composition of designs Geometric ornamentation, conventional treatment of natural and artificial forms, adoption and reproduction of earlier designs. Construction of symmetrical figures, Reversing inclined figures.

Arrangement of figures - unit-repeating design, the drop device, drops reverse designs, sateen system of distribution (with reference to half drop, diamond base, ogee base, rectangular base lines). Construction of designs from incomplete repeat.

UNIT IV

Study of Pattern:– historical precedents. Symmetry – principle concepts, perspectives and its application, classification of motifs, border patterns, all over patterns, Counterchange motifs, border patterns and allover patterns.

Course Outcomes:

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

- To understand various terminology and theories ofcolours.
- Design ideas concepts and their role and application in apparelconstruction
- To understand the composition of designs and geometricornamentation
- To understand colour combination and intensitycharts.

Text Books &ReferenceBooks:	**Author**
1. Watson's Textile Designandcolour	Watson
2. ColourmixingBible	Watson – GuptillPublication
3. Colour: right fromthestart	Watson – GuptillPublication

PCC-FA306 Textile & Apparel Product Testing

B.Tech (FASHION & APPAREL ENGINEERING) VI Semester

No. ofCredits: 3	**Sessional:**	**25Marks**
L T PTotal	**Theory:**	**75 Marks**
3 0 0 3	**Total:**	**100 Marks**
	Durationof Exam:	**3 Hours**

UNIT I Introduction to testing and its importance, Standard atmospheric conditions for testing and its effect on test results.Testing of yarn strength, elongation, twist, evenness and hairiness. Fabric dimensions measurement – length, width, thickness, weight/area, thread/length, andcrimp.

UNIT II Tensile strength and elongation: Definition of different units, tensile strength and elongation, work of rupture, tearing strength, bursting strength. Serviceability: Snagging test, Pilling test, Abrasion resistance.

UNIT III Comfort: Water vapour repellency, Wicking properties, Air permeability, Thermal insulation and wettability. Fabric handle: Bending length, Crease recovery, Drape, Low stress mechanical properties. FAST, Kawabatta Evaluation System.

UNIT IV Garment Testing: Dimensions, Seam strength, Seam slippage, Adhesion between interlining and fabric, shrinkage, zippers, buttons, snap fasteners and other general garment properties . Needle Cutting/Yarn severance.

Course Outcomes:

- Tounderstand methods of testing relevant to fibres, yarn and fabrics with brief description of relevantequipment.
- To understand garmentTesting
- To understand testing and itsimportance.
- To understand adhesion between interlining and fabric, shrinkage, zippers, buttons, snap fasteners and other general garmentproperties

Text Books &ReferenceBooks:	**Author:**
1. Principles ofTextiletesting	J.E Booth
2. TextileTesting	V.K. Kothari
3. Apparel qualityControl	V.K.Mehta
4. Physical Testingof Textile	Saville

PCC-FA307 Textiles &Apparel Printing

B.Tech (FASHION & APPAREL ENGINEERING) VI Semester

No. ofCredits: 3		**Sessional:**	**25Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 0 0	**3**	**Total :**	**100 Marks**
		Duration of Exam:	**3 Hours**

UNIT I Different methods and styles of printing of natural and synthetic fabrics, machinery involved: Block, Roller, Rotary & Screen, Transfer Printing.

UNITII Design making and screen exposing - Table, Flat-bed, Rotary screen. Ink-jet printing, Xerographic printing, Lithographic printing, etc.

UNIT III Printing with reactive dyes and pigments. Special effects like – Batik, Tie and dye.

UNIT IV Some special printing: Wax prints, Java prints, Fancy prints, Bleeder style, Crimp style.

Course Outcomes:

- To understand fundamentals of printing, various methods and styles of printing.
- To understand applications of printingprocedure
- To understand detail chemistry of dyes and printingauxiliaries.
- To analyse some special printingprocess.

Text Books &ReferenceBooks:	**Author**
1. Technologyof printing	VAShenai
2. Textile Printing SecondannualSymposium	R BChavan

PCC-FA310 Colour and Design Lab

B.Tech (FASHION & APPAREL ENGINEERING) VI Semester

No. ofCredits: 1		**Sessional:**	**15Marks**
L T PTotal		**Theory:**	**35Marks**
0 0 2	**2**	**Total:**	**50 Marks**
		DurationofExam:	**2Hours**

Specification of color with hue, value and chroma, color combinations according to pigment theory of colour.Arrangement of the primary, secondary and intermediate colours in the Brewster's theory.Colour illusions , warm and cool colour effects, Modification of pigment colour with formation of tint, shades and colouredgraysetc, Colour and gray intensity charts. Types of lines, dots and curves and their effects, To produce floral, geometrical, abstract and border designs. Enlargement and reduction of designs. Simple Weave and colour effects. Compound colour and weave effects – stripe colour and weave effect, Check colour and weave effect, Special colour and weave effect, figured colour and weave effect. Placement of figures and motifs – half drop, double ½ drop, diamond base, ogee base, rectangular, horizontal, vertical etc.

Course Outcomes:

- To analyse construction of motif or design and furtherapplication.
- To understand water colours to fill.
- To understand arrangement of the primary, secondary and intermediate colours in the Brewster'stheory.

PCC-FA401 Textile & Apparel Finishing

B. Tech (FASHION & APPAREL ENGINEERING) VII Semester

No. of Credits: 3		**Sessional:**	**25 Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 0 0	**3**	**Total :**	**100 Marks**
		Duration of Exam:	**3 Hours**

Course Objectives:

- To introduce various mechanical and chemical finishes, their application in textileand garmentindustries.

UNIT I Introduction to textile finishing. Aim and scope.Classification of finishes.Concept of permanent and temporary finishes.Various finishes in industrial practices such as raising and shearing, drying.Calendering - its types, construction and function of various calendering m/cs.

UNIT II Mechanism of shrinking and pre-shrunk fabric.Sanforizing – method and mechanism. Brief concept of finishing of wool: Crabbing, decatising, milling, shrink finishing, etc. General chemical finishes like softening, stiffening, delustering of rayon, polyester. organdy finish. Silky finish of polyester. Weighting of silk

UNIT III Introduction and preliminary concepts of specialty finishes such as durable press textile and garments, anti-crease finish. Water repellent and water proof finish, Flame-proof and flame-retardant finish.

UNIT IV Introduction and preliminary concepts of specialty finishes such as Soil and oil repellent finish, anti-static finish, antimicrobial finish. Introduction of enzymes and their applications in finishing of textiles and garments. Finishing of denim: stone wash, enzyme wash, etc. enzyme wash and some other specialty finishes. Brief introduction to garment finishingmachines.

CourseOutcomes:

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

- To develop water repellent and water proof finish, flame-proof and flame-retardant finish.
- To understand mechanism of shrinking and pre-shrunk fabric.
- To understand finishing of denim: stone wash, enzyme wash, etc. enzyme washand some other specialtyfinishes.

- To analyse various finishes in industrialpractices.

Text Books & References:

1. Gohl E P G and Vilensky LD, “Textile Science”, CBSPublishers
2. JT Marsh, An Introduction to Textile Finishing, Chapman and Hall, 2nd Ed, London, 1966.
3. Shenai V A, Textile Finishing, Sevak Pub.,Mumbai.
4. J N Chakarverty, “Fundamental and practices in colouration of textiles”, Wood Head Publication, India,2008.

PCC-FA402 Textile& Apparel Costing

B. Tech (FASHION & APPAREL ENGINEERING) VII Semester

No. of Credits: 3		**Sessional:**	**25 Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 0 0	**3**	**Total :**	**100 Marks**
		Duration of Exam:	**3 Hours**

Course Objectives:

- To familiarise students with different costing techniques of yarn, fabricandgarment.

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

UNIT II Methods of costing: Single or output costing, job order cost system, introduction to other methods of costing. Cost control techniques: standard costing, variance analysis (Materials and labour, overheads, sales and marketing). Cost control and cost reduction.

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

UNIT IV Dollar Planning and control: Introduction, Responsibilities for a dollar plan, Requirements of a dollar plan, Approach to a dollar plan, Elements of the dollar plan (planned sales, Planned Stock – Stock turnover, Stock/Sales ratio. The relationship between stock turnover and stock/sales ratio). Retail inventory method- Advantages, Applications, The dollar plan in action. Control system, Controls and Fashionconsideration.

Course Outcomes:

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

- To develop water repellent , water proof finish, flame-proof and flame-retardant finish.
- To understand methods ofcosting.
- To understand cost analysis of different garments with example.

- To understand finishing of denim: stone wash, enzyme wash, etc. enzyme wash and some other specialtyfinishes.
- To analyse the dollar plan in action, control system, and fashion consideration in practices.

Text Books & References:

1. Sidney Packard, “Fashion Buying & Merchandising”,Fairchild.
2. B.M.L. Nigam, G.L. Sharma ,“Advanced cost accounting”, Himalaya Publishing House, Delhi,2007.
3. Harold Carr / John Pomeror ,“Fashion Design & Product Development”, WielyIndia.
4. Michael Jeffry,“Costing ofapparel”.
5. Dodge, R., Foundation of Business Accounting, Chapman and Hall,1993.
6. Drury, C., Costing, An Introduction, Chapman and Hall,1998.
7. Holmes, G. and Sugden, A., Interpreting Company Reports and Accounts, Woodhead-Faulkner,1999.
8. Horngren, C.T., Introduction to Management Accounting, PrenticeHall,1996..

PCC-FA403 Quality assurance in apparel industry

B. Tech (FASHION & APPAREL ENGINEERING) VII Semester

No. of Credits: 3		**Sessional:**	**25 Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 0 0	**3**	**Total :**	**100 Marks**
		Duration of Exam:	**3 Hours**

Course Objectives:

- To introduce students with various aspects of quality and theirmanagement.

UNIT I Definition& importance of Quality, Tools of quality control,

UNIT II Quality Control – Principles of Quality Control, total quality control, statistical qualitycontrol, quality circle, quality and profitability, Quality control in fusing.

UNIT III Inspection – Definition, inspection, loop, raw material inspection, in-process inspection, final inspection, comparability checks.

UNIT IV ISO-9000 series of standards. Quality assurance, TQM, Six Sigma. Care labeling of apparel and textiles – American care labeling system, British care labeling system, Japanese care labelingsystem.

Course Outcomes:

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

- To understand Tools of qualitycontrol.
- Tounderstand Principles of quality control, total quality control, statistical quality control .
- To understand ISO-9000 series of standards. Quality assurance, TQM, Six .
- To analyse the various care labelingsystem.

Text Books & References:

1. An Introduction to Quality Control for the apparel Pradip VMehta
2. Managing Quality in the Apparel Industry SatishBhardwaj& VMehta
3. The Technology of Clothing Manufacture Harold Care & BarbaraLatham

PCC-FA404 Apparel draping & grading lab

B. Tech (FASHION & APPAREL ENGINEERING) VII Semester

No. of Credits:1		**Sessional:**	**15Marks**
L T P	**Total**	**Practical:**	**35Marks**
0 0 2	**2**	**Total :**	**50 Marks**
		Duration of Exam:	**2 Hours**

Course Objectives:

- To give training on students with different techniques of draping and grading of bodice block to the dressform.

Illustration for the techniques of draping to get the fault free draped pattern. Practice of draping of basic bodice to the dress-form. Variations in bodices as per the designing details. Draping of basic skirt and hence skirt variations.

Fundamentals & techniques for Grading with the use of size-charts etc.Grading of basic bodices by z-track and 3-track method.Computerized grading on Lectra software. Practice on software available for draping and grading.

PROFESSIONAL ELECTIVE COURSE (PEC)

PROFESSIONAL ELECTIVE COURSE –I(SEMESTER-IV)

Supply chain management

B. Tech (FASHION & APPAREL ENGINEERING) lV Semester

No. ofCredits: 3	**Sessional: 25 Marks**
L T P Total	**Theory: 75Marks**
3 0 3	**Total: 100 Marks**
	Duration of Exam: 3Hours

Unit-1: Introduction of Supply Chain, Supply Chain Concepts: flow of materials, flow ofInformation, Supply Chain Drivers.
Unit-2: Objective of supply chain, decision phases in a supply chain, process view of supplychain- cycle view and push/pull view, importance of supply chain flows.
Unit-3: Safety Inventory, cyclic inventory, role of sourcing in a supply chain – supplier scoringand assessment, supplier selection, design collaboration, procurement process, sourcing planning and analysis, procurement process, making sourcing decisions in practice.
Unit-4 : Reverse supply chain (RSC), difference with forward supply chain, cost considerationsinvolved , industries participation , factors leading to application of concept of RSC in specific industries and its restricted application, benefits, cost effectiveness of RSC compared to forward supply chain. Overview on critical path management, the role of IT in supply chain.

Course Objectives:

- To gain the basic idea about supply chain by means of flow and various drivers involve in supply chainmanagement.
- To understand various supply chain management decisiontechniques.
- To understand the concept of inventorymanagement.
- To understand the importance of reverse supply chain and forward supply chain and theirapplication.

Suggested Text Books & References:

1. Martin Christopher, "Logistics & supply Chain Management: Strategies for Reducing Cost and Improving service", 2nd Edition, Pitman Publishing,1998.

2. Sunil Chopra and Peter Meindl, "Supply Chain Management : Strategy, Planning and Operation", Prentice Hall Inc.,2001

3. Douglas Macbeth and Ferguson N., "Partnership Sourcing: An Integrated Supply Chain Management Approach", Financial Times Management,1994

PROFESSIONAL ELECTIVE COURSE –I(SEMESTER-IV)

Engineering Ergonomics

B. Tech (FASHION & APPAREL ENGINEERING) lV Semester

No. ofCredits: 3	**Sessional: 25 Marks**
L T PTotal	**Theory: 75 Marks**
3 0 3	**Total: 100 Marks**
	Duration of Exam: 3Hours

UNIT I Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve Economic laws and their nature. Relation between Science, Engineering,Technology and Economics. Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

UNIT II Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand. Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

UNIT III Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run. Meaning of Market, Types of Market - Perfect Competition,Monopoly, Oligoply, Monoplistic Competition (Main features of thesemarkets)

UNIT IV Supply and Law of Supply, Role of Demand & Supply in Price Determinition and effectof changes in demand and supply on prices. Nature and characteristics of Indian economy(brief and elementary introduction), Privatization - meaning, merits and demerits. Globalisation of Indian economy - merits and demerits.Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

Course Outcomes:

- To understand brief idea about ergonomics by their practical utility andimportance.
- To understand the concept of market demand and their practical application.
- To gain the knowledge of various types of cost accountingtechniques.
- To understand the role of supply and demand, globalisation of Indian economy by their meritrs and demerits with affect the international marketscenario.

TEXT BOOKS & REFERENCE BOOKS:

1. Principles of Economics -- P.N. Chopra (KalyaniPublishers).
2. Modern Economic Theory – K.K. Dewett(S.Chand)
3. A Text Book of Economic Theory Stonier and Hague (Longman'sLandon)
4. Micro Economic Theory -- M.L. Jhingan(S.Chand)
5. Micro Economic Theory -- H.L. Ahuja(S.Chand)
6. Modern Micro Economics --S.K. Mishra (PragatiPublications)

7. Economic Theory - A.B.N. Kulkarni& A.B. Kalkundrikar (R.Chand&Co.)

PROFESSIONAL ELECTIVE COURSE –I(SEMESTER-IV)

Introduction To Fashion Retail

B. Tech (FASHION & APPAREL ENGINEERING) lV Semester

No. ofCredits: 3	**Sessional: 25 Marks**
L T PTotal	**Theory: 75 Marks**
3 0 3	**Total: 100 Marks**
	Duration of Exam: 3Hours

Unit 1: Retail, fashion retailing - types of retail formats, retail formats operating fashion inIndia-franchised retail, chain store retailing, specialty stores, factory outlets, discount retailing, non store retailing like online retailing, level of service offered, franchising system-characteristics, retail marketing decisions.

Unit 2: Wholesalers-difference between retailers and wholesalers, types of wholesalers, majorfunctions and services provided by wholesalers, product line of wholesalers, modes of physical distribution, marketing logistics, inventory management

Unit 3: Retail marketing –nature, concept and importance, objectives of retail marketing, retail marketing mix, mix planning and composition, key elements of retail mix, retail marketing planning and its types, retail buying sequence and communication. Various modes of fashion retail promotions. Influence of promotion on the business, limitations.

Unit 4: Changing dimensions of fashion retailing - growth of private labels: retailers into manufacturing, concentration of retail power, globalization of retailing, relationship marketing, partnerships, logistics and distribution.

Course Outcomes:

- To gain the importance of fashion retail sector by means of various fashionstores.
- To understand the concept idea behind retailer andwholesaler.
- To gain the knowledge of concept of retail marketing, retail mix and various promotion mix comes underretailing.
- To understand the dimension of retailingsector.

Text Books & References:

1. Kitty G.Dickerson, Inside the Fashion Bussiness, 7th Edition, Pearson Education, India

Philip kotler and Kevin Keller, Marketing Management, 13th Ed, Prentice Hall

PROFESSIONAL ELECTIVE COURSE –II(SEMESTER-IV)

Structure & Properties of Textiles

B.Tech (FASHION & APPAREL ENGINEERING) IV Semester

No. of Credits: 3		Sessional :	25 Marks
LT P	Total	Theory:	75 Marks
3 0 0	3	Total :	100 Marks
		Duration of Exam:	3 Hours

Course Objectives:

- To impart knowledge, importance and structure and properties relevant to fibres, yarnandfabrics with brief description of relevantequipment.

UNIT I Structure and Properties of Ring, Rotor, DREF spun yarns, multifilament and textured yarns. Importance of Yarn structure in relation to different mechanical properties of Apparel Fabrics. Cloth setting theories: Ashenhurst's, Armitage's, Law's, Brierley's and Peirce's theory: its basic seven equations and idea ofjamming.

UNIT II Tensile property of fabrics: tensile curve for fabrics and geometrical changes during tensile deformation, factors affecting tensile strength of fabrics, Bending property of fabrics: Different bending stiffness parameters by cantilever testing, Bending hysteresis testing and different parameters measured by it, Bending hysteresis curve, Factors affecting bending stiffness offabrics

UNIT III Shear stiffness of fabrics: problems during shear testing and their remedies. Shear hysteresis curve, Spring- friction block model of shear behaviour. Creasing of fabrics: Mechanism of creasing, different motions within fabric structure while creasing. Factor affecting crease resistance and crease recovery of fabrics.

UNIT IV Comfort of fabrics, different constituents of comfort. Flow of heat, moisture and air through textile material, Factors affecting thermal insulation, moisture propagation and air permeability of fabrics. Drapability of fabrics, Drape testing, drape parameters and factors affecting drape behaviour. Introduction to the term Tailorability and Formability for apparel fabrics. Handle of fabrics. Objective evaluation of fabric handle. Constituent properties of handle.

Text Books &ReferenceBooks: **Author:**

1. Textile Yarns-Technology, StructureandApplications Goswamietal
2. Structural Mechanics of Fibres, Yarnsand Fabrics Hearleetal

PROFESSIONAL ELECTIVE COURSE –II(SEMESTER-V)

B. Tech (FASHION & APPAREL ENGINEERING) lV Semester

Sub: Preparative wet process

		Sessional :	**25 Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 0 0	**3**	**Total :**	**100 Marks**
		Duration of Exam: 3 Hours	

Unit I

Greige Fabric checking, Preparation of process chart. Elementary knowledge of processing department, identification of impurities in greige, cotton, wool, silk and synthetics.Identification of size materials on fabric. Recipes, conditions and machinery use for removing impurities from griege fabric, yarn and fibres

Unit II

Introduction to different processes (Desizing, Scouring, bleaching, mercerising, milling, etc.) involved for the above and the machinery used

Unit III

Heat and steam setting of synthetic fibres / fabrics / yarns (polyester, nylon, acrylic, polypropylene, spandex fibre etc.). Physical principles involved in detergency, condition for efficient detergency. Commercial detergents. Dry cleaning, Stain removals

Unit IV

Modern developments in pre-treatments.Continuous processing machinery. Auxiliaries used in Desizing, scouring, bleaching and mercerizing.

Course Outcomes:

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

- To understand the elementary pre-treatment processes of various natural and synthetic textilematerials.
- To know how various recipes and machineries involved for removing impurities in greigefabric.
- To understand knowledge of various modern textile pre treatment processes involved in textile wet processingsector.
- To gain the knowledge of various auxiliaries suitable of wetprocessing.

Text Books & Reference Books:

1. Textile Chemistry RHPeters
2. Mercerising JT Marsh
3. Textile Scouring and Bleaching E RTrotman
4. Technology of Bleaching &Mercerising VAShenai
5. Chemical Processing of Silk MLGulrajni

Principles Of Management

B. Tech (FASHION & APPAREL ENGINEERING) V Semester

No. of Credits: 3		**Sessional:**	**25 Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 0 0	**3**	**Total :**	**100 Marks**
		Duration of Exam:	**3 Hours**

Course Objectives:

- To stimulate managerial skills to upcoming technocrats so they can deal and manage futurechallenges.

UNIT I: Introduction to management: Science as well as Art, Management and Administration –brief out lines of Management Thoughts, Process of Management- Planning: Nature and Purpose-Steps involved in Planning- Objectives- Setting Objectives- Process of Managing by Objectives- Strategies, Policies and Planning Premises- Forecasting – Decision making

UNIT II Nature and Purpose, types of organisation structure, Organising: departmentationbydifference, Line and Staff authority, Benefits and Limitations, De-Centralization and Delegation of Authority, Staffing – nature and process, brief concept and role of HRD.

UNIT III Directing: Scope - Human Factors - Creativity and Innovation - Leadership-Types ofLeadership, styles and qualities of leadership, Motivation: meaning, types, significance and motivational theories

UNIT IV Controlling: Management control- concept and process, overview of controltechniques (traditional and modern), managing ethics and social responsibility. The Global Environment - Globalisation and Liberalisation, Introduction to RTI act.

Text Books & References:

a. Robbins, S.P. and Decenzo, D. A., Fundamentals of Management, pearson Education Asia, NewDelhi.

b. Harold Kooritz and Heinz Weihrich, Essentials of Management, TataMcGraw-Hill, New Delhi,1998

c. Joseph L. Massie, Essentials of Management, Prentice Hall of India, Pearson Fourth Edition, New Delhi,2003.

d. Tripathy P.C. and Reddy P.N., Principles of Management, Tata McGraw-Hill, New Delhi,1999.

e. Decenzo David and Robbins Stephen A., Personnel and Human Resource Management,Prentice Hall of India, New Delhi,1996.

PROFESSIONAL ELECTIVE COURSE –III(SEMESTER-V)

PEC FAEL 301-1: Computer Aided Designing

B.Tech (FASHION & APPAREL ENGINEERING) V Semester

No. ofCredits: 3		**Sessional:**	**25Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 00	**3**	**Total:**	**100 Marks**
		Duration of Exam:	**3 Hours**

Course Objectives:

- To introduce and give hand on training on computer software and hardware, basic tools and designing techniques which help in apparelsector.

UNIT I Fundamentals of CAD: Definition, History , Hardware and Software requirements of CAD, Design Process, Application, Use, Creating the manufacturing Data base and benefits ofCAD.

UNIT II Hardware in CAD: Introduction, Design workstation, Graphics terminal, input and output devices, central processing unit and secondary storage.

UNIT III Introduction to Computer Graphics – What is Computer Graphics, Computer graphics applications, Computer Graphics Hardware and Software. Two dimensional graphics primitives – Point and Lines, Line drawing algorithms: DDA, Bresenham's; Circle drawing algorithms: midpoint circle drawing algorithm, Bresenham's circle drawing algorithm.

UNIT IV Introduction to Software Packages: Introduction to Auto-CAD: Features, Basic Drawing Techniques: Drawing Line, Circle, Rectangle, Arc, Polyline, Ellipse, Elliptical Arc, Polygons, Donuts, Corner rounding, Chamfering, Displacing, Duplicating, Removing Objects. Introduction to Corel Draw – Features and basic drawing techniques.Introduction to Photoshop – Features and basic drawingtechniques.

Text Books &ReferenceBooks:	**Author**
1. Computer Aided Design&Manufacturing	Mikcle P Groover, Emory W.ZimmersJr
2. Computer Graphics Principles&Practices	James D Foley,Andeies
3. SecondEdition	Van Da Shvan K Feiner. John FHughes
4. ComputerGraphics	Donald Mearn& M Pauline,Baker
5. Mastering AUTOCAD 2004&	
6. AUTOCAD LT2004	George Omur

PROFESSIONAL ELECTIVE COURSE –III(SEMESTER-V)

Indian Business Environment

B.Tech (FASHION & APPAREL ENGINEERING) V Semester

No. ofCredits: 3	**Sessional: 25Marks**
L T P Total	**Theory: 75Marks**
3 0 0 3	**Total: 100 Marks**
	Durationof Exam: 3 Hours

Course Objectives:

- To familiarise students with Indian and global business environment and theirpolicies.

UNIT I Nature, Components and Determinants of Indian Business environment. General concept: GNP, GDP, BOT, BOP, Fiscal Policy, Monetary Policy, Fiscal Deficit, etc.

UNIT II New economic policy, EXIM Policy, Economic Reforms – Liberalization, Privatization, Globalization., Public enterprise reforms and Disinvestmentsprogrammes.

UNITIII Financial Institutions and their role.Concept of Stock exchanges and Role of SEBI.World Bank and IMF and their impact on Indian BusinessEnvironment.

UNIT IV WTO – Genesis, Agreement, Rounds, Impact on Indian Business Environment, Indian Business Scenario.National textile policy and Role of BIFR.

Text Books &ReferenceBooks:	**Author**
1. Indian Economy	TR Jain
2. Economic Environment ofIndian Business	Mishra &Puri
3. BusinessEnvironment	FrancisCherunilam
4. InternationalMarketing	Cateora
5. InternationalMarketing	Onkvisit&Shaw

PROFESSIONAL ELECTIVE COURSE –IV (SEMESTER-V)

PEC FAEL -302-2 Apparel Merchandising

B. Tech (FASHION & APPAREL ENGINEERING) V Semester

No. of Credits: 4		**Sessional:**	**25 Marks**
L T P Total		**Theory:**	**75 Marks**
3 1 0 4		**Total :**	**100 Marks**
		Duration of Exam:	**3 Hours**

Course Objectives:

- To familiarise the students with merchandising, retailing, wholesaling and their functions, marketsegmentation, product development and budgeting etc

UNIT I: Merchandising: Concept and definition. Uniqueness of apparel merchandising. Different components and activities of merchandising–line, planning, line development and line presentation Fashion forecasting and its importance. Factors influencing fashion, Role of a merchandiser in an apparel industry, Essential qualifications of a merchandiser.

UNIT II Concept of retailing and wholesaling. Classification of retailer and wholesaler. Function performed by distribution channel members. Decision making in retailing. Pricing consideration and pricing strategy. Factors affecting pricing strategy. Setting up and changing of price. Terms and definitions used in pricing. Pricing strategy commonly adopted by an apparel merchandiser. Mode of disposition of unsold merchandise.

UNIT III Product line planning. Importance of planning, Different steps involved in product line planning. Different approaches of merchandise planning: Top -Down and Bottom –up, Approach and contemporary line planning. Relative merits and demerits of different approach. Concept and definition of assortment planning.Objective of assortment planning.Importance of balanced assortment.Product line development. Various ways of product line development. Line presentation and its importance in retailing.Visualmerchandising.

UNIT IV Budgeting –concept and definition. Importance of budgeting. Various steps involved in budgeting. Dollar And unit control system. Integrating dollar and unit concept. Planning of inventory and reorder point. Cost associated with inventory. Economic order quantity..

Text Books&References: **Author:**

1. ApparelMerchandising — MartinKunj
2. Fashion Merchandisingand Marketing — Cynthia R. Easterling and Marian H. Jernigan
3. Fashion: From ConcepttoConsumer — Gini Stephens Fring
4. FashionBuying — Helen Goworek
5. FashionMarketing — TonyHines

PROFESSIONAL ELECTIVE COURSE –IV(SEMESTER-V)

Nonwoven Technology

B.Tech (FASHION & APPAREL ENGINEERING) VSemester

No. ofCredits: 3	**Sessional: 25Marks**
L T P Total	**Theory : 75 Marks**
3 0 0 3	**Total : 100 Marks**
	Duration of Exam: 3 Hours

Course Objectives:

- To introduced detailed description about nonwoven and their classification, techniques, finishing andapplication.

UNIT I Introduction to Nonwovens, Historical Development, Definitions of nonwovens, classification of Non-Woven fabrics, Development of nonwoven industry & future perspective, Raw materials: Natural and synthetic fibres, bonding agents, Types of bonding agent

UNIT II Web formation techniques: fibre preparation, brief introduction to dry laying, wet laying, parallel laying, cross laying and random laying methods, spun laying, melt blowing, SM, SMS fabrics**.**

Mechanical bonding: Needle punching technology, needle punching machine, felting needles, needle classification and their specifications, factors affecting the properties of needle punched fabrics.

UNIT III Brief introduction to spunlacing technology, factors affecting the spunlaced fabric, stitch bonding techniques.

Chemical bonding: Adhesive bonding, methods of bonding agent application, drying by convection, conduction, radiation, infrared and high frequency driers.

Thermal bonding: Thermal bonding techniques, Area bonding, point bonding & their properties

UNIT IV Finishing of nonwoven fabrics: shrinkage, calendaring, pressing, splitting, grinding, washing, dyeing, printing, softening, coating andlaminating.

Applications: Medical and hygiene, apparel, household & home textiles, geotextiles, filtration, automotive textiles, agriculture, leather industry, Brief introduction to methods of testing nonwovenfabrics.

Text Books &ReferenceBooks:	**Author:**
Non-wovenfabrics	N.N.Banerjee

PROFESSIONAL ELECTIVE COURSE –V(SEMESTER-VI)

ADVANCE APPAREL CONSTRUCTION TECHNIQUES

B.Tech (FASHION & APPAREL ENGINEERING) VI Semester

No. ofCredits: 3		**Sessional:**	**25Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 0 0	**3**	**Total :**	**100 Marks**
		Duration of Exam:	**3 Hours**

Course Objectives:

- To impart knowledge of advanced apparel construction techniques by means of presentation on flat sketches, mood board , story board and fashionportfolio.

UNIT I Production Scheduling, Patterning and cutting procedures, Garment assembly.

UNIT II Pattern making and construction techniques of shirts, pants/trousers and Jackets/Coats, Swimwear, sportswear/Actionwear, Capes or hoods.

UNIT III Development of Men's Ready-to-wear, Design and production procedures of Men's tailoredclothing.

UNIT IV Presentation techniques – Flat sketches, Mood board, Storyboard, Portfolio.

Text Books &ReferenceBooks:	**Author**
1. Inside theFashionBusiness	K G Dickerson
2. Fashion from ConcepttoConsumer	G S Frings
3. Pattern-making forFashionDesign	H JArmstrong
4. Introduction to FashionDesign	

PROFESSIONAL ELECTIVE COURSE –V(SEMESTER-VI)

Entrepreneurship Development

B.Tech (FASHION & APPAREL ENGINEERING) VI Semester

No. ofCredits:3		Sessional :	25Marks
LT P	Total	Theory:	75Marks
3 0 0	3	Total :	100Marks
		Duration of Exam: 3 Hours	

Course Objectives:

- To introduced entrepreneurship and their development in fashion and apparel industry

UNIT I Introduction entrepreneurship, development of entrepreneurship, role of entrepreneurs in development of apparel and fashion industry, entrepreneurship with reference to fashion and apparel industry inIndia.

UNIT II Entrepreneurial support by state, central financial institutions, organizations, Government policies with references to textile and apparel industry.Business planning-Starting a new venture related to apparel industry, essentials of a successful center.

UNIT III Location & plant layout-factors influencing plant location, building, structure, lighting, ventilation, material handling, availability of labour, material management and transportation.

UNIT IV Industrial sickness and remedies, tax planning, VAT, Patent Rules, Factory Act, Minimum wages, knowledge of exemptions &deductions.Environmental considerations and social responsibilities

Text Books & Reference Books:

1. New Initiatives in Entrepreneurship Education & Training Jain GR&Gupta
2. Fashion Entrepreneurship Retail Business planning.D, MicheleGananagar

PROFESSIONAL ELECTIVE COURSE –VI(SEMESTER-VI)

AUTOMATION IN GARMENT INDUSTRY

B.Tech (FASHION & APPAREL ENGINEERING) VI Semester

No. ofCredits:3	Sessional : 25Marks
LT P Total	Theory: 75Marks
3 0 0 3	Total : 100Marks
	Duration of Exam: 3 Hours

Course Objectives

- know about the advancementin apparel industry.
  their advancement.

Section-A Automation in the apparel Industry.Automation in the retail industry. Computer integrated manufacturing in the textile industries.

Section-B Automated material handling.Robotics.Requirement for automation in today's textile manufacturing environment.

Section-C Quick response & Technology, Evolution of computer integrated manufacturing systems. Emerging technologies,

Section-D Nature of trade & future of the apparel industry.

TEXT BOOKS:

\1. Automation in the textile industry -- G.A. Berkstresser, D.R. Buchanan, P. Grady
2. From fibres to apparel -- D.R. Buchanan , G.A. Berkstresser, P. Grady

PROFESSIONAL ELECTIVE COURSE –VI(SEMESTER-VI)

PROJECT WRITING

No. of Credits: 3	**Sessional: 25 Marks**
L T P Total	**Theory: 75 Marks**
3 0 0 3	**Total : 100 Marks**
	Duration of Exam: 3 Hours

COURSE Objective

Know about project writting method.
Learn how to write paper in format.

Unit 1**:**Planning and preparation, word order ,Breaking up long sentences, structuring paragraphs and sentences ,Being concise and removing redundancy.

Unit2:Clarifying who did what highlighting your finding, Hanging and Criticizing ,paraphrasing and plagiarism ,Section of a paper, Abstract,Introduction.

Unit3:Review of the Literature, Methods, Results ,Discuss, Conclusions ,The final check.

Unit4:Key skills are needed when writing a Title, Abstract, Introduction, literature, Methods ,Result, Discussion,Conclusion.

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Suggested Studies:

(1)Goldbort R(2006)writing for science, Yale University press (available on Google books).
2) Day R (2006) how to write and publish a scientific paper ,Cambridge University press.
(3)Highman N(1998) handbook of writing for the mathematical science, SIAM highman's book .
4) Adrian wallwork ,English for writing research paper Springer new work New York detached.

PROFESSIONAL ELECTIVE COURSE VII
Fashion Accessories

B. Tech (FASHION & APPAREL ENGINEERING) VII Semester

No. of Credits: 3		**Sessional:**	**25 Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 0 0	**3**	**Total :**	**100 Marks**
		Duration of Exam:	**3 Hours**

Course Objectives

- To introduce different types of apparel accessories range, their raw materials, briefmanufacturing details andapplications.

UNIT I Fashion Accessories – definition and classification. Usage of different raw materials as leather, fur, beads, metal etc. Various notion and trims used in fashion accessories.

UNIT II Leather Accessories: Brief idea about processing of leather, fashion leather terminology, care of leather. Leather Garments: Pattern making, needle and sewing thread specifications and finishing of garments. Leather Footwear: Parts of shoe, brief shoe designing – as last, development last, pattern making, die-manufacturing, cutting, fitting, assemblage of remaining components, bottoming, finishing, caring of footwear. Handbags and belts: Construction and style ofeach.

UNIT III Jewellery Designing: Different metals and stones, faceted cuts used for jewellery designing. Brief production tech as fusing, soldering, cutting etc, stone settings, Different jewellery styles as rings, bracelets, necklaces, tiara etc. Different stone setting as buttercup, inlay etc.

UNIT IV Other accessories: Glove: Material used, component part of glove, glove construction, care of glove. Hosiery: Materials, Construction, Sizes and Care. Hats: Construction, care of hats. Scarves: Construction, Care and styles.

Text Books & References:

1. Know your Fashion Accessories Meadows
2. Fashion Apparel & Accessories Diamond, Jay &Ellen

PROFESSIONAL ELECTIVE COURSE VII

ELEMENTS OF FASHION

B. Tech (FASHION & APPAREL ENGINEERING) VII Semester

No. of Credits: 3		**Sessional:**	**25 Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 0 0	**3**	**Total :**	**100 Marks**
		Duration of Exam:	**3 Hours**

Section-A Origin of fashion, Origin of clothing, Fashion language, Philosophy of design, Nature of fashion .Elements of fashion, Terminology of fashion: style, design, taste, classic, fad.

Section-B Component of fashion: Silhouette, Texture, Details. Study of leading fashion designers; French, Italian, American, Indian.Costumes of ancient civilization; Egypt, Roman, French.Fashion trends.

Section-C Principle of fashion. Environmental factor Demographic & Psychographics, Economic factors, Sociological factor, Psychological factor.Fashion influence & theories of fashion adoption. Movement of fashion, the cycle of fashion; stages of cycle. Factors influencing fashion movement (accelerating & retarding factors). Fashion prediction

Section-D Leaders of fashion, Birth of fashion; designers role, manufacturer's role, retailer's role, insight & intuition of sources of design.Trade shows, fashion promotion and advertisement. Retailing: an overview on different types of retail store. Merchandising: role of a merchandiser, little idea about visual merchandising

PROFESSIONAL ELECTIVE COURSE –VIII(SEMESTER-VII)

Home & Industrial Textile Product

B.Tech (FASHION & APPAREL ENGINEERING) VII Semester

No. ofCredits: 4		**Sessional:**	**25Marks**
L T P	**Total**	**Theory:**	**75 Marks**
3 1 0	**4**	**Total :**	**100 Marks**
		Duration of Exam:	**3 Hours**

Course Objectives:

- To impart knowledge on various home fashion and industrial textile products range, their properties,designing aspect andapplications.

UNIT I Introduction to Home Fashion, Present scenario of Home Fashion/Textile market in the domestic and international market.

UNIT II Selection of raw material and the essential characteristics of Home Textile materials.Different home fashion fabrics – Table Linens, Bedspreads, Curtains, other draperies.

UNIT III Advanced fabric structures for Home Textile materials – Brocade, Damask, Gauze, Leno, Upholstery fabrics. Floor Coverings – Carpets (domestic and machine made and rugs).

UNIT IV Design criteria of Home Fashion/Textile material Presentation techniques – Flat sketches, Mood board, Storyboard, Portfolio.

Text Books &ReferenceBooks: **Author:**

1. Watson's AdvancedTextileDesign — Z JGrosicki
2. Textile Fabrics and theirSelection,7thEd — IsabelB.Wongate
3. Fashion & Furnishing Intenrational Inside theFashionBusiness — K GDickerson
4. Fashion from ConcepttoConsumer — G SFrings
5. Pattern-making forFashionDesign — H JArmstrong
6. SewingReaders — Digest

PROFESSIONAL ELECTIVE COURSE –VIII(SEMESTER-VII)

Technical &speciality textile & apparel

B. Tech (FASHION & APPAREL ENGINEERING) VII Semester

No. ofCredits: 4		**Sessional:**	**25Marks**
L T P	**Total**	**Theory:**	**75Marks**
3 1 0	**4**	**Total:**	**100 Marks**
		Duration of Exam: 3Hours	

Course Objectives:

- To give overview and brief knowledge on the advancement in technology andits tremendous impact in various spheres of life including electronics, sports, medical, defence by bringing functionality inapparels

UNIT I High Tech Garments – Definition and different types. Brief idea about properties and uses of Specialty fibers like Nomex, Kevlar, Glass fiber, components as conductive yarns, shapememory materials, phase change material used in high techgarments.

UNIT II Protective clothing: General requirement of protective clothing. Chemical protective clothing (CPC) – Areas of use, CPC items for air-born, liquid hazard. Different chemicals used, parts of CPC, Performance evaluation – Permeation, Solubility and diffusion theory, Barrier effectiveness, structural integrity.Thermal Protective Clothing - Combustion mechanism, fire governing parameters, Requirements, designing of TPC, Construction, various parameters affecting flame retardency, Performanceevaluation.

Pesticide Protective Clothing – Requirements of protective clothing, different areas, different parts of PPC, Performance evaluation of PPC. Antimicrobial clothing – Requirement, microbiology of skin clothing interface, approach toproduce antimicrobial fabrics, performance evaluation. Ballistic Protective clothing – Requirements, principle of mechanism, different fibers and fabrics, soft and hard armor, Factors influencing performance.

UNIT III Medical Responsive Garments – Definition, requirements, fibres, classification, working of artificial tandem and alignments, kidney, heart, surgical product, cardiovascular graft,sterilization, wound care. Smart Electronic Clothing – Requirement, different sensor, processing of conductive yarn,implementation level of SOT, superhuman wardrobe, application in defense. Sportswear – Requirement, different fibers used, approaches for manufacture.

UNIT IV Breathable apparel – Introduction, principle, classification and use.Moisture management fabric, polar technology, power dryetc. High visibility apparels – Introduction, requirements, material, different classifications, design features. Smart Colourants – Definition different types and application.. Different parts of space suit.Different parts of space suits. Different textiles used as packaging material-types andproperties

Text Books & References:

1. The Super modern Wardrobe Bolten,Andrew
2. Smart Fibres, Fabrics & Clothing Tao, Xiaoming
3. Protective Clothing System & Material Raheel,Masturaed

Syllabusfor Open Elective Subjects(OEC)

Four different from the below list:

Intelligent Systems (OEC-1)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT 1: Fundamental Issues In IS : Defi of AI , History ,Domains AI ,AI problems & State space ,Some examples problems representations like Travelling Salespersons ,Syntax analysis Problem .Basic issues to solve AI problems ,Underlying assumptions ,AItechniques ,Level of model ,Criteria for success ,Control strategies ,DFS,BFS

UNIT 2:Heuristic Search Techniques :Generate & Test ,HillClimbing(simple &stipest),Best first search ,A*, AO*, Constraint satisfaction.

UNIT 3:Knowledge Representation Issues :Systax& Semantic for Propositional logic ,Syntax & Semantic for FOPL, Properties for WFF's, Resolution Basics :conversion to clausal form ,Resolution of proposition logic ,Resolution algorithms for predicates ,Problems with FOPL ,Semantic nets ,Frames,Scripts

UNIT 4:Reasoning Under Uncertainity :An introduction ,Default reasoning & Closed world assumptions ,Model & Temporal logic ,Fuzzy logic ,BasianProbabilstic inference Dempster Shafer theory ,Heuristic reasoning methods

UNIT 5:Planning & Learning :Planning ,Planning in Situational calculus ,Representation for planning ,Partial order palnning, Partial order palnning algorithm ,Learning by Examples ,Learning by Analogy ,Explanation based learning ,Neurals nets ,Genetics algorithms

Unit 6: Minimax: Game playing strategy ,Natural language processing ,Overview of linguistics, Grammer& Language ,Transformation Grammer ,Basic ParsingTechniques,

Expert System ,Architecture of Rule based Expert system ,Non Rule based Expert system.

REFERENCES

1. Artificial Intelligence by Elain Rich & Kevin Knight, Tata McGraw HillsPub.
2. Principals of AI by Nills .J.Nilsson, Pearson EducationPub.
3. Artificial Intelligence by DAN. W.Petterson. Printice Hall ofIndia
4. Artificial Intelligence by Petrick HenryWinston,
5. Artificial Intelligence by Russel and Norvig, Pearson EducationPub.

Cyber Laws and Security (OEC-2)

No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT-I :History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles.

UNIT-II: Security Threats to E Commerce, Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards. Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control- Biometrics, Factors in BiometricsSystems,Benefits,Criteriaforselectionofbiometrics,DesignIssuesin Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal

Challenges

UNIT-III : Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN

UNIT-IV : Security metrics- Classification and their benefits Information Security & Law, IPR, Patent Law, Copyright Law, Legal Issues in Data mIning Security, Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy Cyber Crime Types & overview of CyberCrimes

REFERENCES

1. Godbole," Information Systems Security", Willey
2. Merkov, Breithaupt, " Information Security", PearsonEducation
3. Yadav, "Foundations of Information Technology", New Age,Delhi
4. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGrawHill
5. Sood,"Cyber Laws Simplified", McGraw Hill
6. Furnell, "Computer Insecurity", Springer 7. IT Act2000

Soft Computing (OEC-3)

No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT-I.Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artificial NeuralNetworks.

UNIT-II.Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

UNIT-III.Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

UNIT-IV:Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, FuzzyEquations.

UNIT-V.Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges. Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets. Genetic Algorithms, Scope & application areas, solution of 0-1Knapsack problem using GA

REFERENCES

1. "Fuzzy sets and Fuzzy Logic: Theory and applications",G.J. Klir,B.Yuan,PHI
2. "Introduction to Fuzzy sets and Fuzzy Logic", M.Ganesh ,PHI
3. "An Introduction to Fuzzy Control", D Driankov, H Hellendoorn, MReinfrank, Narosa PublishingCompany
4. " Neural Networks: A classroom approach", Satish Kumar , Tata McGrawHill
5. Haykin S., "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey,1999.

Web Technology & Information Retrieval(OEC-4)

No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT 1. Web Server Technology: Web's Robot global access to information, HTML, HTTP, Accessing a web server, publishing on web server, secureHTTP, Secure Sockets Layer, WWW Proxies, IIS, Case understand of apache web server.

UNIT 2 .Web search basics:Background and history,Anatomy of WWW, Web characteristics, Spam, The web graph, The Web Search Users, search engines, architecture of search engines, search tools, DNS resolution, The URL frontier, Link analysis,PageRank,

UNIT 3. Web Crawlers: Basics of Web crawling, Various crawling techniques , incremental crawler, parallel crawler, distributed crawlers, focused crawler, agent based crawler, Hidden web Crawler

UNIT 4. Introduction to Information Retrieval: Information retrieval problem, an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval, an inverted index, Bi-word indexes, Positional indexes, Combination schemes

UNIT 5. Index construction: Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Other types of indexes Index compression: Statistical properties of terms in information retrieval, Heaps' law: Estimating the number of terms, Zipf's law: Modeling the distribution of terms, Dictionary compression, Dictionary as a string, Blocked storage, Postings file compression.

Intellectual Property Rights(OEC-5)	
No. of Credits: 3 L T P Total 3 0 03	Total :100 Duration of Exams: 3Hours

UNIT 1: Introduction to Intellectual Property: Concept of Intellectual Property, Kinds of Intellectual Property, Economic Importance of Intellectual Property, Indian Theory on Private Property: Constitutional Aspects of Property, Constitutional Protection of Property and Intellectual Property, Economic Development and Intellectual Property Rights Protection

UNIT II: Introduction to Patents: Overview, Historical Development, Concepts: Novelty, Utility, Patentable Subject-matter: Patent Act, 1970- Amendments of 1999, 2000, 2002 and 2005, Pharmaceutical Products and Process and Patent , Protection, Software Patents, Business Method, Protection of Plant Varieties and Farmers' Rights Act, 2001, Patenting of Micro-organism

UNIT III: Procedure of Obtaining of Patents: Concepts of a Patent Application,, Specification: Provisional, Complete, Disclosure Aspects, Claims: Principal, Dependant, Omnibus, Examination of Application, Opposition of Application, Sealing ofPatents

UNIT IV: Working of Patents – Compulsory License: Commercialization of Inventions: License- Terms of License Agreement, Assignments of Patents, Revocation of Patents

UNIT V: Infringement: What is Infringement?, How is Infringement determined? Who is an Infringer?, Direct, Contributory and Induced, Defences of Infringement: Research Exemption, Invalidity, Misuse, Failure to mark, Laches and Estoppel and first sale doctrine

References Books:

1. W.R. Cornish, Intellectual Property, Sweet & Maxwell, London(2000)

2. P. Narayana, Patent Law, WadhwaPublication

3. Merges, Patent Law and Policy: Cases and Materials,1996

4. Brian C. Reid, A Practical Guide to Patent Law, 2nd Edition, 1993

5. Brinkhof (Edited), Patent Cases, WoltersKluwer.

6. Prof. Willem Hoyng & Frank Eijsvogels, Global Patent Litigation, Strategyand

Practice, WoltersKluwer.

7. Gregory Stobbs, Software Patents Worldwide, WoltersKluwer.

8. Feroz Ali Khader, The Law of Patents- With a special focus on Pharmaceuticalsin

India, Lexis Nexis Butterworths Wadhwa,Nagpur.

9. Sookman, Computer Law,1996

10. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009). Eastern Book Company,Lucknow.

Installation Testing & Maintenance of Electrical Equipments(OEC-6)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT-1.Installation Of Electrical Equipements: IntroductionUnloadingof electrical equipment at site Inspection Storage Foundation Alignment of electrical machinesTools/Instruments necessary for installation Inspection, storage and handling of transformer, switchgear and induction motor Preparation of technicalreport

UNIT-2.Commissioning And Testing:Tests before commissioningofelectrical equipment :Electrical and Mechanical test Specific tests on -transformer,induction motor, alternator, synchronous power and electrical power installation Needof gradually loading of Various Tests to be performed after commissioning and before starting the machine Various instruments required for testing Commissioning ofswitchgearTest report on commissioning and test certificate electrical equipment Preparations before commissioningof

power transformer Commissioning- power transformer,threephase induction motor Transformer insulation oil: Properties as per IS, sampling,testingand filtering/purifying, standard tests as per IS Measurement of insulationresistanceof different equipments/machines Methods of Drying the winding ofelectricalequipments and its record Classification and measurement of insulation resistance, Polarization Index Appropriate insulation test for specific purpose Factoraffecting

UNIT-3.Maintenance Of Electrical Equipments: General aspect of maintenance, Classification Preventive maintenance-concept, classification, advantages, activities, functions of the Maintenance Department Breakdown maintenance-concept, advantages, activities Reasons of failure of electrical equipment due topoormaintenance Factors for preparing maintenance schedule Frequency ofmaintenanceMaintenance schedule of transformer below and above 1000kVA Maintenance schedule -inductionmotor, circuit Breaker, overhead line, storage Battery Probable faults due topoormaintenance in transformer, induction motor, circuit breaker, overhead lines andbattery

UNIT-4.Trouble Shooting:Causes of fault in electrical equipments-Internaland external Instruments and tools for trouble shooting Common troubles in electrical equipment – DC Machines, AC Machines, Transformers, Circuit-breaker,under-ground cable, electrical Installation Need of trouble shooting chart, advantagesTroubleshooting chart – DC Motor, DC Generator, Transformer, Synchronous Motor, Induction Motor, Circuit-breaker Trouble shooting chart for Domestic appliances- electricaliron,ceiling fan, Washing machine, Air cooler, Vacuum cleaner Fluorescent tubelight:Construction, working and troubleshootingchart

UNIT-5.Earthing:Necessity of earthing System earthing : advantage of neutral earthing of generator in power station Equipment earthing: Objective Types of earth electrodesMethods of earthing : plate earthing,pipeearthing and coil earthingEarthing inextrahigh voltage and underground cable Earthing resistance- factor affectingDetermination of maximum permissible resistance of the earthing system Measurement ofearthresistance: voltmeter-ammeter method, earth tester method, ohm meter method and earthloop tester method

Define: earthing , grounding and bonding Comparison between equipment earthing and system grounding Earthing procedure - Buildinginstallation,Domestic appliances, Industrial premises Earthing in substation, generating station and overheadline

UNIT-6.Electrical Accidents And Safety: Causes of electricalaccidentsFactors affecting

the severity of electrical shock Actions to be taken when a persongets attached to live part Safety regulations and safety measures Indian electricity supply act1948-1956 Factory act 1948 Procedure of shut down for sub- station and power linesPermitto work : certificate of (i)requisition for shut down(ii) Permit to work and(iii)Lineclear certificate Instruction for the safety of persons working on a job with a permitto workFire extinguishers- For fixed installation and portabledevices

REFERENCE/TEXT BOOKS:

1. Testing Commissioning operation and maintenance of Electrical Equipments by Rao S, Khanna Publication (Latestedition)

2. Installation, commissioning & maintenance of Electrical equipments by Singh TARLOK, S.K.Kataria& Sons, New Delhi, Secondedition-2012

3. Electrical power system by Wadhwa C.L., New Age internationalPublications

Non-Conventional Energy Resources And Utilisation(OEC-7)

No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT 1. Energy resources and their utilization : Indian and global energy sources, Energy exploited, Energy planning, Energy parameters (energy intensity,energy-GDP elasticity), Introduction to various sources of energy, Solar thermal, Photovoltaic, Water power, Wind energy, Biomass, Ocean thermal, Tidal and wave energy,Geothermal energy, Hydrogen energy systems, Fuel cells, Decentralized and dispersed generation.Solar radiations: Extra terrestrial radiation, Spectral distribution, Solarconstant, Solar radiations on earth, Measurement of solar radiations, Solar radiation geometry, Fluxona plane surface, Latitude, Declination angle, Surface azimuth angle, Hourangle, Zenith angle, Solar altitude angle expression for angle between incident beam and thenormalto a plane surface (no derivation), Local apparent time, Apparent motion of sun, Day length, Solar radiation data forIndia.

UNIT 2 :Solar energy: Solar thermal power and it's conversion, Solar collectors, Flat plate, Performance analysis of flat plate collector, Solar concentrating collectors, Types of concentrating collectors, Thermodynamic limits to concentration, Cylindrical collectors, Thermal analysis of solar collectors, Tracking CPC and solar swing. Solar thermal energystorage, Different systems, solar pond. Applications, Water heating, Space heating & cooling, Solar distillation, solar pumping, Solar Cooking, Green Houses, Solar Power plants, solar photovoltaic system: Photovoltaic effect, Efficiency ofsolar cells, Semiconductor materials for solar cells, Solar photovoltaic system, Standardsofsolar photovoltaic system, Applications of PV system, PV hybridSystem.

UNIT 3 : Biogas: Photosynthesis, Bio gas production, Aerobic and anaerobic bio-conversion process, Raw materials, Properties of bio gas, Producer gas, Transportation ofbiogas, bio gas plant technology & status, Community biogas plants, Problems involvedin bio gas production, Bio gas applications, Biomass conversion techniques, Biomass gasification, Energy recovery from urban waste, Power generation fromliquid waste, Biomass cogeneration, Energy plantation, Fuel properties,Biomassresource development in India. Wind energy: Properties of wind, Availability of windenergyin India, wind velocity, Wind machine fundamentals, Types of wind machines and their characteristics, Horizontal and Vertical axis wind mills, Elementarydesignprinciples, Coefficient of performance of a wind mill rotor, Aerodynamic considerationsin wind mill design, Selection of a wind mill, Wind energy farms, Economicissues,Recent development.

UNIT 4 : Electrochemical effects and fuel cells: Principle of operation of an acidic fuel cell, Reusable cells, Ideal fuel cells, Other types of fuel cells, Comparison between acidic and

alkaline hydrogen-oxygen fuel cells, Efficiency and EMF of fuel cells, Operating characteristics of fuel cells, Advantages of fuel cell power plants, Future potential of fuel cells, Tidal power: Tides and waves as sources of energy, Fundamentals oftidalpower, Use of tidal energy, Limitations of tidal energy conversion systems.Hydrogen Energy: Properties of hydrogen in respect of its use as source of renewable energy,Sourcesof hydrogen, Production of hydrogen, Storage and transportation, Problemswithhydrogen as fuel, Development of hydrogen cartridge, Economics of hydrogen fuel and its use.

UNIT 5.Thermoelectric systems: Kelvin relations, power generation, Properties of thermoelectric materials, Fusion Plasma Generators, Geothermal energy: Structure of earth's interior, Geothermal sites, earthquakes & volcanoes, Geothermalresources,Hot springs, Steam ejection, Principal of working, Types of geothermalstationwith schematic representation, Site selection for geothermal power plants.Advancedconcepts, Problems associated with geothermal conversion. Ocean energy: Principle ofocean thermal energy conversion, Wave energy conversion machines, Power plantsbasedon ocean energy, Problems associated with ocean thermal energyconversionsystems, Thermoelectric OTEC, Developments of OTEC, Economics. Impact of renewableenergy generation on environment, Kyoto Protocol, Cost of electricity productionfromdifferent energy sources, Energy options for Indian economy.

REFERENCE/TEXT BOOKS:

1. BansalKeemann, Meliss," Renewable energy sources and conversion technology", Tata McGrawHill.
2. Kothari D.P., "Renewable energy resources and emerging technologies", Prentice Hall of IndiaPvt.Ltd.
3. Ashok V. Desai, "Non conventional Energy", New Age International PublishersLtd.

Utilization Of Electric Power And Traction(OEC-8)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours
UNIT-I :Illumination : Basic laws of illumination, illumination due to a strip and circular disc, light sources and their characteristics, sources of light, design of lighting schemes, incandescent lamp, sodium lamp, mercury lamp and fluorescent lamp, comparison of various lamps. UNIT-II. Electric Heating: Principle and application of resistance,induction, dielectric heating and temperaturecontrol UNIT-III. Electric Welding: Resistance welding, arc welding, welding generator and welding transformer, properties of arcingelectrode UNIT-IV.Electrolyting Process: Principles and applicationsofelectrolysis, Faraday‘s	

law of electrolysis, electroplating, charging and discharging,capacityand efficiency of battery, defects inbattery. UNIT-V.Electric Traction :Advantages of electric traction, requirements of an ideal traction system, train movement, mechanism of train movement, traction motors, traction motor control, multi unit control, braking of electric motors, thyristor control of electric traction
REFERENCE BOOKS: 1. Utilization of electric energy: Open Shaw Taylor;ELBS 2. Art and Science of Utilization of Electrical energy: H.Pratab; DhanpatRai 3. Generation, distribution and utilization of electric power: C.L. Wadhwa; Khanna Publications

Industrial Engineering(OEC-9)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours
UNIT 1. Basic Concepts of Industrial Engineering: Definition,Objectives, Method understand, Principle of motion economy, Techniques of method understand - Various charts, THERBLIGS, Work measurement - various methods, Time Understand - PMTS, determining time, Work sampling, NumericalProblems.	

UNIT 2. Productivity, Workforce & Information Management: Productivity
Definition, Various methods of measurement, Factors effecting productivity, Strategies for improving productivity, Various methods of Job evaluation & merit rating, Various incentive payment schemes, Organizational & information systemstructure,

UNIT 3. Manufacturing Cost Analysis: Fixed &variable costs, Direct, indirect & overhead costs, & Job costing, Recovery of overheads, Standard costing, Cost control, Cost variance Analysis - Labour, material, overhead in volume, rate & efficiency, Break even Analysis, Numerical Problems.

UNIT 4. Materials Management : Strategic importance of materials in manufacturing industries, Relevant costs, Inventory control models - Economic order quantity (EOQ), Economic batch quantity (EBQ) with & without shortage, Inventory control systems - P,Q,Ss Systems,determination of order point & safety stock, Selective inventory control - ABC, FSN, SDE, VED,SCM , NumericalProblems.

UNIT 5. Sales Forecasting: Importance, Objectives, Forecasting and Prediction, Types, Classification of Forecasting Methods, Forecast Errors, Costs and Accuracy of Forecasts, Numerical Problems.

UNIT 6. Entrepreneurship : Planning a New Business Venture, Small-scale Industries, Government Policies for Small-scale Industries, Project Identification and Project Formulation, Project Appraisal, Laws Concerning Entrepreneurs, Role of Various National and State Agencies that Render Assistance to Small-scale Industries.

Text Books

1. Production & Operations Management – Chary, TMH, NewDelhi.
2. Management Information Systems - Sadagopan, PHI NewDelhi.

Reference Books

1. Modern Production Management – S.S. Buffa, Pub.- John Wiley.

2. Operations Management - Schroeder, McGraw Hill ISE.

4. Operation Management - Monks, McGraw Hill ISE.
5.
4. Production & Operations Management - Martinich, John Wiely SE.

6. Industrial & Systems Engineering - Turner, MIZE, CHASE, Prentice Hall Pub.
7.
7. Industrial Engineering & Operations Management – SK Sharma, Pub-S. K. Kataria
8.
7. Industrial Engineering – Ravi Shankar, Galgotia Pub.

Total Quality Management (OEC-10)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT 1: Introduction : Quality – Basic concepts, dimensions, economics of quality, quality Gurus.TQM: Definition, evolution, journey from inspection to TQM, comparison at different stages, dimensions of TQM, TQM viewpoints, reasons for adopting TQM.

UNIT 2: Introspection to TQM environment: Sphere of TQM, components of TQM, TQM Managing Total Quality, Factors affecting TQM environment, Classification and interaction among factors, Researchers' viewpoint, TQM as a system, stepsinTQM implementation, Roadblocks in TQM implementation, Reasons for TQM failure.

UNIT 3:Role of soft options in TQM :Hard vs. Soft factors, Role and expectation of employer, employee, customer and supplier from organization and vice versa. Human factors in TQM, Role of top management commitment, work culture, motivation, coordination, attitude, innovation.

UNIT 4:Quality initiatives in organizations :Role of tools and techniques in TQM, Classification of tools and techniques – Problem identification, Data analysis, Graphical, Creativity, Company wide. Brief description of Quality awards – MBNQA, Deming award, European quality award, Australian quality award.

UNIT 5: TQM Effectiveness : Impact of TQM, Need and difficulty in measuring TQM effect, Parameters governing effect of TQM .

Reference books:

1) "Total Quality Management" by Oakland (Butterworth – HeinamannLtd.)
2) "Managing for total quality from Deming to Taguchi and SPC" by Logothetis N. (PHI)
3) "Total Quality Control" by Feigenbaum A.V.(MGH)
4) "Total Quality Management" by Besterfield Dale H (PearsonEducation)
5) "A slice by slice guide to TQM" by John Gilbert (Affiliated East WestPress)
6) "The TQM toolkit – a guide to practical techniques for TQM" by Waller Jenny, Allen Derek and Burna Andrew (KoganPage)

Solid Waste(OEC-11)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT I : Sources And Types Of Municipal Solid Wastes :Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

UNIT II : On-Site Storage & Processing :On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options

UNIT III : Collection And Transfer :Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indianconditions.

UNIT IV : Off-Site Processing :Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

UNIT V : DISPOSAL :Dumping of solid waste; sanitary land fills – site selection, design and operation of sanitary landfills – Leachate collection & treatment.

Text Books/Reference Books:

1. George Tchobanoglouset.al., "Integrated Solid Waste Management", McGraw-Hill Publishers, 1993.
2. B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, "Waste Management", Springer, 1994
3. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
4. R.E.Landreth and P.A.Rebers, "Municipal Solid Wastes – problems and Solutions", Lewis Publishers, 1997.
5. Bhide A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSDOC, 1993

Product Design and Development(OEC-12)	
No. of Credits: 3 L T P Total 3 0 0 3	 Total :100 Duration of Exams: 3Hours

UNIT 1. Introduction: Design theory, design materials, human factors in design, man-machine system, applied ergonomics, characteristics of successful product development, challenges to product development.

UNIT 2.Development process and product planning: Generic development process, Concept development, product development process flows, product planning process, identify customerneeds.

UNIT 3. Product specifications and concept generation:Product specification, steps to establish the target specifications, Concept generation, five step concept generation method, concept selection, concept screening, concept testing, product architecture

UNIT 4.Product design methods:Creative and rational, clarifying objectives - the objective tree method, establishing functions- the function analysis method, setting requirements – the performance specification method, determining characteristics – the QFD method, generating alternatives – morphological chart method, evaluating alternatives – the weighted objective method, improving details – the value engineering method and design strategies.

UNIT 5. Design for manufacture: Estimating manufacturing cost, reducing component, assembly and support costs, design for assembly, design for disassembly, design for environment, design for graphics and packaging, effective prototyping – principle and planning

UNIT 6. Industrial design: Its need, impact and quality, industrial design process and its management, legal issues in product design, design resources, economics and management of product development projects.

*UNIT 7.*Prototyping: Basics and principles of prototyping, prototyping technologies, planning forprototypes

Text Books

1. K.T. Ulrich and S.D. Eppinger, “Product design and development”, Tata McGraw Hill
2. Chitale& Gupta, “Product Development”, Tata McGrawHill
3. Monks, J. G., “Operations Management”, McGraw Hill,1997.
4. George Dietor, A material and Processing approach, McGrawHill

Power Plant Engineering (OEC-13)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT 1. Introduction: Energy resources and their availability, types of power plants, selection of the plants, review of basic thermodynamic cycles used in powerplants.

UNIT 2. Hydro Electric Power Plants : Rainfall and run-off measurements and plotting of various curves for estimating stream flow and size of reservoir, power plants design, construction and operation of different components of hydro-electric power plants, site selection, comparison with other types of powerplants.

UNIT 3. Steam Power Plants: Flow sheet and working of modern-thermal power plants, super critical pressure steam stations, site selection, coal storage, preparation, coal handling systems, feeding and burning of pulverized fuel, ash handlingsystems,dust collection-mechanical dust collector and electrostatic precipitator.

UNIT 4. Combined Cycles: Constant pressure gas turbine power plants, Arrangements of combined plants (steam& gas turbine power plants), re-powering systems with gas production from coal, using PFBC systems, with organic fluids, parameters affecting thermodynamic efficiency of combined cycles.Problems.

UNIT 5. Nuclear Power Plants: Principles of nuclear energy, basic nuclear reactions, nuclear reactors-PWR, BWR, CANDU, Sodium graphite, fast breeder, homogeneous; gas cooled. Advantages and limitations, nuclear power station, wastedisposal.

UNIT 6. Power Plant Economics: load curve, different terms and definitions, cost of electrical energy, tariffs methods of electrical energy, performance & operating characteristics of power plants- incremental rate theory, input-out put curves, efficiency, heat rate, economic load sharing,Problems.

UNIT7.Non-Conventional Power Generation: Solar radiation estimation, solar energy collectors, low, medium & high temperature power plants, OTEC,wind

power plants, tidal power plants, geothermal power plants.

UNIT 8. Direct Energy Conversion Systems: Fuel cell, MHD power generation-principle, open & closed cycles systems, thermoelectric power generation, thermionic power generation.

Text Books

1. Power station Engineering and Economy by Bernhardt G.A. skrotzki and William A. Vopat – Tata McGraw Hill Publishing Campany Ltd., NewDelhi
2. Power Plant Engineering: P.K. Nag Tata McGraw Hill second Edition2001.

Robotics Engineering(OEC-14)

No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT 1 . Introduction: Automation and Robotics, Historical Development, Definitions, Basic Structure of Robots, Specifications of Robots, Robot Anatomy, Complete Classification of Robots, Fundamentals about Robot Technology, Factors related to use Robot Performance, Basic Robot Configurations and their Relative Merits and Demerits, Types of Drive Systems and their Relative Merits, the Wrist & GripperSubassemblies.

UNIT 2. Control of Robots:Concepts and Model about Basic Control System, Transformation and Block Diagram of Spring Mass System, Control Loops of Robotic Systems, PTP and CP Trajectory Planning, Different Types of Controllers, Control Approaches of Robots.

UNIT3. . Kinematics of Robot Manipulator: Introduction, General Description of Robot Manipulator, Mathematical Preliminaries on Vectors & Matrices, Homogenous Representation of Objects, Robotic Manipulator Joint Co-Ordinate System,EulerAngle &Euler Transformations, Roll-Pitch-Yaw(RPY)Transformation,Relative Transformation, Direct & Inverse Kinematics' Solution, D HRepresentation& Displacement Matrices forStandardConfigurations,GeometricalApproachtoInverseKinematics.Homogeneous Robotic Differential Transformation: Introduction, JacobianTransformation in Robotic

Manipulation.

UNIT4 . Robotic Workspace & Motion Trajectory: Introduction, General Structures of Robotic Workspaces, Manipulations with n Revolute Joints, Robotic Workspace Performance Index, Extreme Reaches of Robotic Hands, Robotic Task Description.

UNIT5 . Robotic Motion Trajectory Design: Introduction, Trajectory Interpolators, Basic Structure of Trajectory Interpolators, Cubic Joint Trajectories. General Design Consideration on Trajectories:-4-3-4 & 3-5-3 Trajectories, Admissible MotionTrajectories.

UNIT6 .Industrial Applications: Objectives, Automation in Manufacturing, Robot Application in Industry, Task Programming, Goals of AI Research, AI Techniques, Robot Intelligence and Task Planning, Modern Robots, Future Application, Challenges and Case Studies.

Text Books/ Reference Books:

1. A Robot Engineering Textbook – Mohsen Shahinpoor – Harper & Row publishers, NewYork.
2. Robotics, control vision and intelligence, Fu, Lee and Gonzalez. McGraw Hill International.
3. Introduction to Robotics, John J. Craig, Addison WesleyPublishing.
4. Robotics for Engineers ,YoramKoren, McGraw HillInternational.
5. Industrial Robotics, Groover, Weiss, Nagel, McGraw HillInternational.
6. Company Fundamentals of Robotics Analysis and Control, Schilling,PHI.
7. Introduction to Robotics, Niku, Pearson Education,Asia.
8. Robotics, control vision and intelligence, Fu, Lee and Gonzalez. McGraw Hill International.

icroprocessor and Interfacing(OEC-15)

No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT1. Architectureof8085:Functionalblockdiagram—Registers,ALU,Bussystems. Pinconfiguration, Timingandcontrolsignals,Machinecycleandtimingdiagrams.

Interrupts—Types of interrupt, interrupt structure.

UNIT2. Programming of 8085: Instruction format, Addressing modes, Instruction set. Development of assembly language programs.

UNIT3. Interfacing Devices:(a).The 8255 PPI chip: Architecture, pin configuration, control words, modes and Interfacing with 8085. (b). The 8254 PIC chip: Architecture, pin configuration, control words, modes and Interfacing with 8085.

UNIT4. Interrupt and DMA controller: The 8259 Interrupt controller chip: Architecture, pin configuration, control words, modes

UNIT5. Architecture of 8086: Functional block diagram of 8086, details of sub-blocks such as EU, BIU,memory segmentation, physical addresscomputations,pin configuration, programrelocation, Minimum and Maximum modes of8086— Block diagrams and machinecycles.

UNIT6. Programming of 8086: Instruction format, Addressing modes, Instruction set and programs.

TEXT BOOKS:

1. Microprocessor Architecture, Programming & Applications with 8085: Ramesh S Gaonkar; Wiley EasternLtd.

2. Microprocessor and applications – A.K.Ray. ,TMH

REFERENCE BOOKS:

1. Microprocessors and interfacing : Hall;TMH

2. The 8088 & 8086 Microprocessors-Programming, interfacing,Hardware&Applications :Triebel& Singh; PHI

3. Microcomputersystems:the8086/8088Family:architecture,Programming&Design:

Yu-Chang Liu & Glenn A Gibson; PHI.

4. Advanced Microprocessors and Interfacing :Badri Ram; TMH

Digital Signal Processing(OEC-16)

No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT1. DISCRETE-TIME SIGNALS: Signal classifications, frequency domain representation, time domain representation, representation of sequences by Fourier transform, properties of Fourier transform, discrete time random signals, energy and power theorems.

UNIT2. DISCRETE-TIME SYSTEMS: Classification, properties, time invariant system, finite impulse Response (FIR) system, infinite impulse response (IIR) system.

UNIT3. SAMPLING OF TIME SIGNALS:Sampling theorem, application, frequency domain representation of sampling, reconstruction of band limited signal from its samples. Discrete time processing of continuous time signals, changing the sampling rate using discrete timeprocessing.

UNIT4. Z-TRANSFORM: Introduction, properties of the region of convergence, properties of the Z-transform, inversion of the Z-transform, applications ofZ-transform.

UNIT5. BASICS OF DIGITAL FILTERS: Fundamentals of digital filtering, various types of digital filters, design techniques of digital filters : window technique for FIR, bi-linear transformation and backward difference methods for IIR filter design, analysis of finite word length effects in DSP,FIR &IIR Filter structure-direct1,direct2,cascadeand parallel, Application of DSP

TEXT BOOKS :
1. Digital Signal Processing :Proakis and Manolakis;PHI
2. Digital Signal Processing: Salivahanan, Vallavaraj andGnanapriya;TMH

REFERENCE BOOKS:
1. Digital Signal Processing: Alon V.Oppenhelm;PHI
2. Digital Signal processing(II-Edition): Mitra,TMH

Instrumentation and Control(OEC-17)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT 1. OSCILLOSCOPE: Block diagram, understand of various stages in brief, high frequency CRO considerations. Sampling and storage oscilloscope.

UNIT 2. ELECTRONIC INSTRUMENTS: Instruments for measurement of voltage, current & other circuit parameters, introduction to digitalmeters.

UNIT 3. GENERATION & ANALYSIS OF WAVEFORMS: Block diagram of pulse generators, signal generators, function generators wave analysers, distortion analysers, spectrum analyser, Harmonic analyser, introduction to power analyser.

UNIT 4. FREQUENCY & TIME MEASUREMENT: Understand of decade counting Assembly(DCA),frequencymeasurements,periodmeasurements,universalcounter, introduction to digital meters.

UNIT 5. TRANSDUCERS: Classification, Transducers of types: RLC photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, liquid level & temperature.

UNIT 6.CONTROL SYSTEM : Concept of transfer function, relationship between transfer function and impulse response, order of a system, block diagram algebra, signal flow graphs : Mason's gain formula & its application, characteristic equation,derivation of transfer functions of electrical and electromechanical systems. Transferfunctionsof cascaded and non-loading cascadedelements.

TEXT BOOK:

1. A course in Electrical & Electronics Measurements &Instrumentation :A.K.Sawhney; DhanpatRai&Sons.
2. Control System Engineering : I.J.Nagrath&M.Gopal; NewAge
3. Modern Control Engg :K.Ogata; PHI.

REFERENCEBOOKS.

1. Electronics Instrumentation & Measurement Techniques : Cooper;PHI.

Data Communication and Networking(OEC-18)

No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT1. Introduction : Data Communication, Networks, Internet, Intranet, Protocols, OSI & TCP/IP Models Addressing. Physical Layer – Signals, Analog, Digital, Analog VS Digital, Transmission impairment, Data Rate Limits, Performance. Digital Transmission – Line Coding (Umipolar, Polar, Biphase), Block Coding (4B/5B Encoding), Analog to digital conversion, PCM, Transmission Modes. Analog Transmission – Digital to analog conversion (ASK, FSK, PSK, QAM), Analog to Analog conversion. Multiplexing – FDM, WDM, Synchronous TDM (time slots & frames, interleaving, data rate management). Spread Spectrum – FHSS, DSSS Transmission Media – Guided and Unguided. Switching – Switching, Circuit-Switched Networks, Datagram networks, Concept of Virtual circuit networks, structure of circuit and packet switch. Concepts of DSL and ADSL.

UNIT 2. Data Link Layer : Error correction & detection. Types of errors. Detection VS Correction, Block Coding, Hamming Distance, Linear Block codes (single parity check, hamming codes), Cyclic codes, CRC Encoder & Decoder, DRC Polynomial and its degree, Checksum.

UNIT 3.Network layer protocol : Internetworking,IPv4, IPv4 protocol packet format, IPv6 Protocol & Packet format, IPv4 VS IPv6, Transition from IPv4 to IPv6,Address Resolution protocols (ARP, RARP), BOOTP, DHCP, Routing Protocols – Delivery, forwarding, routing, types of routing, routing tables, Unicast Routing, Unicast Routing protocols, RIP, Concepts of OSPF, BGP & Multicast Routing Transport Layer – Process to process delivery, UCP, TCP Congestion Control & Quality of Service – Data traffic, Congestion, Congestion Control (Open Loop, Closed Loop & Congestion control in TCP), QoS and Flow Characteristics Application Layer – DNS, Remote Logging (Telnet), SMTP, FTP, WWW,HTTP

Soft Skills for Engineers (OEC-19)	
No. of Credits: 3 L T P Total 3 0 0 3	 Total :100 Duration of Exams: 3Hours

Unit-I- CORPORATE INTERACTION, LEADERSHIP & COMMUNICATION

Part I.Audio/Video Lessons and Observation/Listening Skills (Practical)Interviews Lectures by Eminent Engineers, scientists and technocrats. Other inspiring speeches on social issues as well as related to the corporate world andindustry.

Part-II.Group Discussions, Corporate Dialogue/Role Play (conflict and resolution);Mock-interviews.Discussions with briefs on CSR and IPR and role of important international bodies like WTO and IMF; Presentations; Technical/Business vocabulary; BodyLanguage.

Part-III: Leadership &Participation:Review of social, politicalandcorporate scene; Leadership skills, Attitudes, Sensitivitytraining.Learning/'Take-aways'from scenarios/situations. Crisis-handling; Negotiation-Conflict resolution exercises; Communication Skills; Seven Cs of Communication; Barriersof/to Effective Communication

Unit –II- CREATIVE COMPOSITION& TECHNICAL WRITING : Exercisesin creative writing:USP and image building; Setting Goals; Charting Objectives; Minutes ofaMeeting; Reports; Interoffice Memorandum; Resume and

Covering Letter.

Unit –III- SEMANTICS &SYNTAX : Idioms & Proverbs, Vocabulary building, Crosswords, Neologisms, Portmanteau words, Correct sentences/usage.

Unit-IV- DISSERTATION & PRACTICAL ASSESSMENT :Short Multimedia Dissertation on any topic of student's interest; Group Discussion and Mock-interview.

Resources

- Stephen Robbins and SeemaSanghi.OrganizationalBehaviour. Pearson. Latest edition.
- Kotler, Philip and Kevin Lane Keller.Marketing Management. 13 th edition.2008 Eastern EconomyEdition
- Wehmeier, Sally.*Oxford Advanced Learner's Dictionary*. OxfordUP.2005
- Ghosh, BN. Managing Soft Skills for Personality Development.Tata McGraw-Hill 2012
- Rizvi, M Ashraf. *Effective Technical Communication*. Tata McGraw-Hill.2005
- Bretag, Crossman and Bordia.Communication Skills. Tata McGraw-Hill.2009
- Sites: Youtube and Wikipedia ingeneral.

Higher Engineering Mathematics(OEC-20)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT 1. Fourier transforms of integrals, Convolution theorem. application of fourier transform to solve standard equations/boundary value problems. Applications of fourier transform for solution of standard equations/boundary value problems.

UNIT2.Functions of Complex Variable : Definition, Exponential function,Trigonometricand Hyperbolic functions, Logarithmic functions, Limit and Continuity ofafunction, Differentiability and Analyticity. Cauchy-Riemann equations, necessary and sufficient conditions for a functionto be analytic, polar form oftheCauchy-Riemannequations. Harmonic functions,Milne Thomson Method to find harmonic conjugate of a function. application to flow problems. Integration of complexfunctions.

Cauchy- Integral theorem and formula.Powerseries,radius and circle of convergence, Taylor's, Maclaurin's and Laurent's series.Zeroes and singularities of complex functions, Residues. Cauchy's residue theorem,Evaluation of real integrals using residues (around unit and semi circle only).

UNIT 3.Probability Distributions : Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

Unit 4: Linear Programming: Linear programming problems formulation, solving linear programming problems using (i) Graphical method(corner point,iso cost/iso profit) (ii) Simplex method (iii) BIG M method (iv) Duality concept and Dual simplex method.

TEXT BOOKS :

1. Higher Engg. Mathematics : B.S.Grewal.

2. Advance Engg. Mathematics : R.K. Jain,S.R.K.Iyenger

REFERENCE BOOK

1. Advanced Engg. Mathematics : FKreyszig.

2. Advanced Engg. Mathematics : Michael D. Greenberg.

3. Operation Research : H.A.Taha.

4. Probability and statistics for Engineers : Johnson.PHI

Human Resource Management(OEC-21)

No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT I : Human Resource Management: concept and scope; Roles, responsibilities and competencies of HR manager; Challenges to HR professionals; Human Resource Planning & Forecasting: significance and process.

UNIT II :HR Sourcing: Recruitment, Selection and Induction. Job Analysis: job Description and job Specification; Job Design: concept and methods; JobEvaluation-concept &methods; Performance appraisal andcounselling.

UNIT III :Training: training process and methods; Career planning and Development; Succession planning; Employee Compensation: basic concepts & determinants;

UNIT IV: Industrial Relations and Grievance Handling; Employee welfare; Dispute Resolution; International Human Resource Management; Contemporary Issues in HRM. HR Audit &Accounting, ethics & corporate social responsibility.

Suggested Readings:

1. K.Aswathapa Human resource Management: Text and cases, 6th edition, Tata McGraw Hill, New Delhi,2012
2. Uday Kumar Haldar&JuthikaSarkar(2012) Human resource Management New Delhi, Oxford UniversityPress.
3. De Cenvo, Da & Robbins S.P.(2010) Fundamentals of Human Resource Management, 9th edition, New York, John Wiley &Sons.
4. Gary Dessler (2008) Human Resource Management, 11th edition New Delhi: Pearson PrenticeHall.
5. TanujaAgarwala, Strategic Human resource Management, Oxford University Press 2007.

Financial Management(OEC-22)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT-I :Financial management-scope finance functions and its organisation, objectives of financial management; time value of money; sources of long term finance.

UNIT-II Investment decisions: importance, difficulties, determining cash flows, methods of capital budgeting; cost of different sources of raising capital; weighted average cost of capital.

UNIT-III:Capital structure: Meaning, importance, determinants and Theories. Financial and operating leverage; EBIT/EPS Analysis, determinants of dividend policy and dividend models -Walter, Gordon & M.M. models.

UNIT-IV:Working Capital- meaning, need, determinants; estimation of working capital need; management of cash, inventory and receivables.

Suggested Readings:

1.Pandey, I.M., Financial Management, Vikas Publishing House, New Delhi 10th edition

2010
2. Khan M.Y, and Jain P.K., Financial Management, Tata McGraw Hill, NewDelhi
3. Keown, Arthur J., Martin, John D., Petty, J. William and Scott, David F, FinancialManagement, PearsonEducation
4. Chandra, Prasanna, Financial Management, TMH, NewDelhi
5. Van Horne, James C., Financial Management and Policy, Prentice Hall ofIndia
6. Brigham & Houston, Fundamentals of Financial Management, Thomson Learning, Bombay.
7. Kishore, R., Financial Management, Taxman's Publishing House, NewDelhi

Marketing Management(OEC-23)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT-I:Nature and scope of marketing; Philosophies of marketing management; marketing environment; marketing research and marketing information system; Ethical issues in marketing

UNIT-II: Understanding consumer behaviour; factors influencing consumer buying behaviour and organizational buying behaviour; market segmentation, targeting and positioning; marketing strategies in the different stage of the product life cycle; new product developmentprocess

UNIT-III: Introduction to Product mix and product line decisions; branding and packaging decisions; Pricing strategies and practices; factors affecting selection of marketing channels; Introduction to wholesaling and retailing; Introduction to Promotion Mix: Advertising, sales promotion, public relations, personal selling

UNIT-IV :Sales Forecasting Methods; Introduction: Green Marketing; Event Marketing; Direct marketing; Network Marketing; Holistic Marketing; Permission Marketing; Social

Marketing
Suggested Readings: 1. Kotler and Armstrong,Principles of Marketing; PHI, NewDelhi 2. Kotler, Philip, Kevin Keller, A. Koshy and M. Jha, Marketing Management in South Asian Perspective , Pearson Education, NewDelhi 3 .Kerin, Hartley, Berkowtz and Rudelius, Marketing, TMH, New Delhi 4. Etzel, Michael J, Marketing: Concepts and Cases, TMH, New Delhi 5. Kumar,Arun and Meenakshi,N. ,Marketing Management, VikasPublication

Entrepreneur Development(OEC-24)	
No. of Credits: 3 L T P Total 3 0 0 3	Total :100 Duration of Exams: 3Hours

UNIT I : Concept of Entrepreneur, Characteristics, qualities and pre-requisites of entrepreneur, entrepreneurship and intrapreneur, Entrepreneur vs. Manager; Economic, social and psychological need forentrepreneurship;

UNIT II :Environmental Factors affecting success of a new business, Formulation of business plan, Contents and significance of business plan

UNIT III: Feasibility Understand -Preparation of Feasibility Reports: Economic, Technical, Financial and Managerial Feasibility of Project, Methods and procedures to start and expand one's own business

UNIT IV: Role of Government and Promotional agencies in entrepreneurship development, Entrepreneurship Development Programmes

Reference Books:

- Khanka S.S., “Entrepreneurship Development”.S.Chand.
- Desai, A N. "Entrepreneur & Environment". 1990. Ashish, NewDelhi.
- Drucker, Peter. "Innovation and Entrepreneurship". 1985. Heinemann,London.
- Jain Rajiv. "Planning a Small Scale Industry: A Guide to Entrepreneurs". 1984. S.S. Books,Delhi.
- Kumar, S A. "Entrepreneurship in Small Industry". 1990, Discovery, NewDelhi.
- McClelland, D C and Winter, W G. "Motivating Economic Achievement". 1969. Free Press, NewYork.
- Pareek, Udai and VenkateswaraRao, T. "Developing Entrepreneurship -A Handbook on Learning Systems". 1978, Learning Systems,Delhi.

Principal of Marketing andManagement(OEC-25)	
No. of Credits: 3	Total :100

L T P Total 3 0 0 3	Duration of Exams: 3Hours

UNIT-I :Introduction: concept, nature and significance of management; Functions of management, Levels of management and Managerial skills required at various levels, concept and process of human resource management, concept of marketing management and marketing mix, concept and major decisions of financialmanagement.

UNIT-II: Process and types of planning, decision making process, basic issues in organizing types of organisation structure, delegation of authority and responsibility, departmentalisation, decentralization, span of management, line and staffrelationship.

UNIT-III: Leadership styles/behaviours, leadership vs management; personal characteristics of effective leaders, theories of motivation; Maslow's Theory, Theory X and Y, Herzberg theory. management control – concept and process, managerial ethics and social responsibility

UNIT IV: Introduction to economics: micro vs macro economics. Relationship between science, engineering, technology and economic development. Meaning of Demand, Law of Demand, Elasticity of Demand. Law of Supply, Price equilibrium.

UNIT-V: Types of costs. Production function, Laws of production. Economies and diseconomies of scale. Market; types of market. Price equilibrium in perfect competition, monopoly, monopolistic competition, oligopoly.

AUDIT COURSES

MCCEFAE03:Environmental Sciences

MC CEFAE03: Environmental Science (Audit non-credit course)

We as human being are not an entity separate from the environment around us rather we are a constituent seamlessly integrated and co-exist with the environment around us. We are not an entity so separate from the environment that we can think of mastering and controlling it rather we must understand that each and every action of ours reflects on the environment and vice versa. Ancient wisdom drawn from Vedas about environment and its sustenance reflects these ethos. There is a direct application of this wisdom even in modern times. Idea ofan activity based course on environment protection is to sensitize the students on the above issues through following two type ofactivities.

(a) ***AwarenessActivities:***

i) Small group meetings about water management, promotion of recycle use, generation of less waste, avoidingelectricitywaste
ii) Sloganmakingevent
iii) Poster makingevent
iv) Cyclerally
v) Lectures fromexperts

(b) ***ActualActivities:***

i) Plantation
ii) Giftingatreetoseeitsfullgrowth
iii) Cleanlinessdrive
iv) Drive for segregation ofwaste
v) Tolivesomebigenvironmentalistforaweekorsotounderstandhiswork
vi) To work in kitchen gardenformess
vii) Toknowaboutthedifferentvarietiesofplants
viii) ShuttingdownthefansandACsofthecampusforanhourorso

MC 01: Constitution of India – Basic features and fundamental principles

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" ofthe constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United KingdomandAmerica.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporateourown

ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and itgraduallymade it "as one of the strongest court intheworld".

Course content

1. Meaning of the constitution law andconstitutionalism
2. Historical perspective of the ConstitutionofIndia
3. SalientfeaturesandcharacteristicsoftheConstitutionofIndia
4. Scheme of thefundamentalrights
5. TheschemeoftheFundamentalDutiesanditslegalstatus
6. The Directive Principles of State Policy – Its importance andimplementation
7. Federal structure and distribution of legislative andfinancial

powers between the Union and theStates

8. Parliamentary Form of Government in India – The constitution powers and status of the PresidentofIndia
9. Amendment of the Constitutional PowersandProcedure
10. The historical perspectives of the constitutional amendmentsinIndia
11. Emergency Provisions : National Emergency, PresidentRule, FinancialEmergency
12. LocalSelfGovernment–ConstitutionalSchemeinIndia
13. Scheme of the Fundamental RighttoEquality
14. SchemeoftheFundamentalRighttocertainFreedomunderArticle19
15. Scope of the Right to Life and Personal Liberty underArticle21