

**Regulation,
R23
Scheme of Instruction, Examination and Syllabi
(AICTE)
of
Eight Semester B.Tech. (Textile Technology)
for
The Batch Admitted in Academic Year 2023-24**



**University College of Technology (A)
Osmania University, Hyderabad,TS**

Induction program	3 Weeks duration
Induction program for students to be offered right at the start of the first year.	<ul style="list-style-type: none"> Physical activity Creative Arts Universal Human Values Literary Proficiency Modules Lectures by Eminent People Visits to local Areas Familiarization to Dept./Branch & Innovations

SCHEME OF INSTRUCTION AND EXAMINATION (AICTE)

B. Tech . (Textile Technology)

(For the Batch admitted in Academic Year 2023-24)

I Semester

S.NO.	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
1.	BS 101 M-1	Mathematics-I	3	-	-	3	40	60	3
2.	BS102CHEM1 /BS202 PHY	Chemistry 1/ Physics	3	-	-	3	40	60	3
3.	BS103 EBIO/ ES 203 EM	Eng. Biology/ Engg Mechanics	3	-	-	3	40	60	3
4.	ES 104 EME/ ES 204 EEE	Elements of Mechanical Engg/ Electrical & Electronics Engg	3	-	-	3	40	60	3
5.	ES 105 CP / HS205 CE (HASS-1)	Computer Progr. (Programming for problem solving)/ Communicative English (HASS-1)	2	-	-	2	40	60	2
Practicals									
6.	ESC151 CP/ HS401 CE	Computer Progr Lab (P) / Communicative English Lab (P)	-	-	2	4	40	60	1
7.	ESC 152 EW / ESC 402 EG	Engg Workshop/ Engg Graphics (P)	1	-	3	4	40	60	2.5
8.	BS153CHEM /BS403 PHY	Chemistry Lab(P) / Physics Lab (P)	-	-	3	4	40	60	1.5
9.	ES 154 EME /ES 404 EEE	Elements of Mechanical Engg Lab (P) / Electrical & Electronics Engg Lab (P)	-	-	3	4	40	60	1.5
		Total	15	-	11		360	540	20.5

CIE: Continuous Internal Evaluation; SEE: Semester End Examination

University College of Technology, OU, HYD-7
R-23 B.Tech(TT) Approved in Academic Council meeting held on 16 th July ., 2024
SCHEME OF INSTRUCTION AND EXAMINATION (AICTE) ,
B.TECH. (Textile Technology)
(For the Batch Admitted in Academic Year 2023-24)

II Semester

S.NO.	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
1.	BS 201 M-2	Mathematics-II	3	-	-	3	40	60	3
2.	BS 202 PHY / BS 102CHEM1	Physics / Chemistry -1	3	-	-	3	40	60	3
3.	ES 203 EM/ BS 103 EBIO	Engg Mechanics/ Eng. Biology/	3	-	-	3	40	60	3
4.	ES 204 EEE/ ES 104 EME	Electrical & Electronics Engg/ Elements of Mechanical Engg	3	-	-	3	40	60	3
5.	HS 205 CE (HASS-1)/ ES 105 CP	Communicative English (HASS-1) / Computer Progr. (Programming for problem solving)	2	-	-	2	40	60	2
Practicals									
6.	HS 401 CE / ES 151 CP	Communicative English Lab (P)/Computer Progr Lab (P) /	-	-	2	4	40	60	1
7.	ES 402 EG/ ES 152 EW	Engg Graphics (P)/ Engg Workshop	1	-	3	4	40	60	2.5
8.	BS 403 PHY/ BS153CHEM	Physics Lab (P)/ Chemistry Lab(P) /	-	-	3	4	40	60	1.5
9.	ES 404 EEE/ ES 154 EME	Electrical & Electro- nics Engg Lab (P)/ Elements of Mecha- nical Engg Lab (P)	-	-	3	4	40	60	1.5
		Total	15	-	11		360	540	20.5

CIE: Continuous Internal Evaluation; SEE: Semester End Examination

University College of Technology, ,OU,HYD-7
R-23 B.Tech(TT) Approved in Academic Council meeting held on 16 th July .,2024
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B. Tech. (Textile Technology)
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III Semester

S.NO.	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
1.	PC301 GTT	General Textile Technology	3	-	-	3	40	60	3
2.	PC 302 YM	Yarn Manufacture	3	-	-	3	40	60	3
3.	PC 303 FYT	Fibre & Yarn Testing	3	1	--	3	40	60	4
4.	PC 304 FM-I	Fabric Manufacture- I	3	1	-	3	40	60	4
5.	PC 305 MMFT	Man Made Fibre Technology	3	-	-	3	40	60	3
6.	PC306 FSD	Fabric Structure & Design	3	-	-	3	40	60	3
Practicals									
7.	PC 351 YM	Yarn Manufacture Lab	-	-	3	4	40	60	1.5
8.	PC 352 FYT	Fibre & Yarn Testing Lab	-	-	3	4	40	60	1.5
9.	ES 353 PP/ ES 453 IOT	Python Progr / IOT Lab	1	-	2	4	40	60	2.0
		Total	19	2	8		360	540	25

*Exam will be conducted and pass result will be satisfactory

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IV Semester

S.NO.	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
1.	PC401 KT	Knitting Technology	3	-	-	3	40	60	3
2.	PC 402 FM-II	Fabric Manufacture-II	3	1	-	3	40	60	4
3.	PC403 FT	Fabric Testing	3	1	-	3	40	60	4
4.	PC404 MTM	Mechanics of Textile Machinery	3	1	-	3	40	60	4
5.	PC405 ATM	Advanced Textile Manufacture	3	-	-	3	40	60	3
6.	MC 406 ES	Environmental Science	3	-	-	3	40	60	*
Practicals									
7.	PC 451 FM	Fabric Manufacture Lab	-	-	3	4	40	60	1.5
8.	PC452 FT	Fabric Testing Lab	-	-	3	4	40	60	1.5
9.	ES453 IOT/ ES353 PP	IOT /Python Progr Lab	1	-	2	4	40	60	2.0
		Total	19	3	8		360	540	23

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V-Semester

S.NO	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
1.	PC 601 TWP	Textile Wet Processing	3	-	-	3	40	60	3
2.	PC602 TNF	Technology of Nonwoven Fabrics	3	-	-	3	40	60	3
3.	PC 603 APT	Apparel Production Technology	3	-	-	3	40	60	3
4.	PC604 PCE-1	Professional Core Elective-I	3	-	-	3	40	60	3
5.	PO605 POE-I	Professional Open Elective-I	3	-	-	3	40	60	3
6.	MC606	Mandatory Course	3	-	-	3	40	60	*
7.	HASS 607 HASS2	HASS-II	3	-	-	3	40	60	3
Practicals									
8.	PC551 TWP	Textile Wet Processing Lab	-	-	3	4	40	60	1.5
9.	PC552 FSD	Fabric Structure & Design Lab	-	-	3	4	40	60	1.5
		Total	21	-	6		360	540	21

*Exam will be conducted and pass result will be satisfactory

Professional Core Elective-I: A. Textile Mill Planning B. Process and Quality Control in Textiles.
C Technical Fibres. D. Specialty Yarns E Handloom and Traditional Textiles.
F. Millennium Fibres

Professional Open Elective -I : : 1 Biochemical Engineering (Chem. Eng.) 2.Membrane Technology (Chem. Eng.) ,3. instrumentation for process Engineers(FT), 4. Industrial Microbiology (FT)
5.Statistical Analysis and Design of Experiments (TT) ,6. Marketing and Merchandising Management (TT)

Mandatory Course: 1). Indian Constitution, 2).Essence of Indian Knowledge Tradition
HASS-II : 1)Values and Ethics, 2) Ethics and Holistic Life, 3) Universal Human Conduct,
4) Gender Culture and Development

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B. Tech . (Textile Technology)
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VI Semester

S.NO	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Durati on Hrs	CIE	SEE	
1.	PC 601 APD	Apparel Pattern Designing	3	-	-	3	40	60	3
2.	PC602 PTFA	Printing and Finishing of Textile & Apparel	3	-	-	3	40	60	3
3.	PC603 TCFA	Textile Costing and Financial Analysis	3	1	-	3	40	60	4
4.	PC604 AQCMI	Apparel Quality Control & Merchandizing	3	-	-	3	40	60	3
5.	PC605 PCE-II	Professional Core Elective-II	3	-	-	3	40	60	3
6.	PO 606 POE-II	Professional Open Elective-II	3	-	-	3	40	60	3
Practicals									
7.	PC651 APD	Apparel Pattern Designing Lab	-	-	3	4	40	60	1.5
8.	PC652 PFTA	Printing & Finishing of Textile & Apparel Lab	-	-	3	4	40	60	1.5
9.	PC 653 II	Industrial Internship	-	-	4 weeks		100	-	2
		Total	18	1	6		420	480	24

Professional Core Elective-II: . A. Compliance Standards for Apparel Industry B. Exim Management for Textiles and Apparel Units C. Apparel Product Development Production Planning & Control D. Speciality Fabrics E. Technology of Denim Production F. Sports and Automobile Textiles

Professional Open Elective II : 1. Corrosion and Corrosion control (Chem. Eng.) 2. Simulation and Computer Aided Design(Chem. Eng.) 3. Industrial Hygiene and Health (FT) 4. Solar Energy Utilization,(FT) 5. Six Sigma and Lean Methodologies (TT) 6. Industrial Climatology & Relations (TT)

SCHEME OF INSTRUCTION, EXAMINATION AND SYLLABI (AICTE)

B. Tech . (Textile Technology)

(For the Batch admitted in Academic Year 2023-24)

VII -Semester

S.NO	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Durati on Hrs	CIE	SEE	
1.	PC 701 IETA	Industrial Engineering for Textile & Apparel	3	1	-	3	40	60	4
2.	PC702 TT	Technical Textiles	3	-	-	3	40	60	3
3.	PC703 RBA	Retailing & Branding of Apparel	3	0	-	3	40	60	3
4.	PC704 PCE-III	Professional Core Elective-III	3	-	-	3	40	60	3
5	PC705 PCE-IV	Professional Core Elective-IV	3	-	-	3	40	60	3
6	PO706 POE-III	Professional Open Elective-III	3	-	-	3	40	60	3
Practicals									
7.	PC 601 GA	Garment Analysis Lab	-	-	3	4	40	60	1.5
8.	PC 602 APP	Apparel Production Planning Lab	-	-	3	4	40	60	1.5
9.	PC 603 PROJECT	Project Seminar (Part-A)	-	-	4		100 P=50 R=50	-	2
		Total	18	1	10		420	480	24

R- Report; P-Presentation and Viva-Voce

Professional Core Elective-III : . **A.** Yarn and Fabric Engineering **B.** Coated Textiles **C.** Advances in Textile and Apparel Wet Processing. **D.** Automation in Apparel Manufacture **E.** Advances in Technical Textiles **F.** Medical Textiles

Professional Core Elective-IV: **A .** Sourcing and Supply management for Textile & Apparel **B. C.** Entrepreneurship for Textile and Apparel Units **D.** Visual Merchandizing **E.** Protective Garments **F.** Artificial Intelligence for Textile and Apparel Units

Professional Open Elective-III : 1).Pollution Control in Process Industries (Chem. Eng.) 2. Safety & Hazard Analysis (Chem. Eng.) 3). Intellectual Property Rights (FT) 4) Human Nutrition and Health (FT) 5). Operations Research for Engineers (TT), 6)Human Resource Management (TT)

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B. Tech . (Textile Technology)
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VIII Semester

S.NO	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
Practicals									
4	PC 851 PROJECT	Project work (Part-B)	-		16		40 Internal R-20 P-20	60 R-30 P-30	8
		Total	-	-	16		100	300	8

R- Report; P-Presentation and Viva-Voce

CREDIT SUMMARY

SEMESTER	I	II	III	IV	V	VI	VII	VIII	Total
CREDITS	20.5	20.5	40	23	21	24	24	8	166

Scheme of Instruction, Examination and
Syllabi
(AICTE)
of
B.Tech. (Textile Technology)
I Sem & II Sem
(For the Batch Admitted in Academic Year 2023-24)



University College of Technology (A)
Osmania University, Hyderabad, TS

SCHEME OF INSTRUCTION, EXAMINATION AND SYLLABI (AICTE)
B. Tech . (Textile Technology)
(For the Batch admitted in Academic Year 2023-24)

I Semester

S.NO.	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
1.	BS 101 M-1	Mathematics-I	3	-	-	3	40	60	3
2.	BS102CHEM1/ BS202 PHY	Chemistry 1/ Physics	3	-	-	3	40	60	3
3.	BS103 EBIO/ ES 203 EM	Eng. Biology/ Engg Mechanics	3	-	-	3	40	60	3
4.	ES 104 EME/ ES 204 EEE	Elements of Mechanical Engg/ Electrical & Electronics Engg	3	-	-	3	40	60	3
5.	ES 105 CP / HS205 CE (HASS-1)	Computer Progr. (Programming for problem solving)/ Communicative English (HASS-1)	2	-	-	2	40	60	2
Practicals									
6.	ESC151 CP/ HS401 CE	Computer Progr Lab (P) / Communicative English Lab (P)	-	-	2	4	40	60	1
7.	ES 152 EW / ES 402 EG	Engg Workshop/ Engg Graphics (P)	1	-	3	4	40	60	2.5
8.	BS153CHEM/ BS403 PHY	Chemistry Lab(P)/ Physics Lab (P)	-	-	3	4	40	60	1.5
9.	ES 154 EME /ES 404 EEE	Elements of Mecha- nical Engg Lab (P) / Electrical & Electro- nics Engg Lab (P)	-	-	3	4	40	60	1.5
		Total	15	-	11		360	540	20.5

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SCHEME OF INSTRUCTION, EXAMINATION AND SYLLABI (AICTE)
B. Tech . (Textile Technology)
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II Semester

S.NO.	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
1.	BS 201 M-2	Mathematics-II	3	-	-	3	40	60	3
2.	BS 202 PHY / BS 102CHEM1	Physics / Chemistry -1	3	-	-	3	40	60	3
3.	ES 203 EM/ BS 103 EBIO	Engg Mechanics/ Eng. Biology/	3	-	-	3	40	60	3
4.	ES 204 EEE/ ES 104 EME	Electrical & Electronics Engg/ Elements of Mechanical Engg	3	-	-	3	40	60	3
5.	HS 205 CE (HASS-1)/ ES 105 COMPP	Communicative English (HASS-1) / Computer Progr. (Programming for problem solving)	2	-	-	2	40	60	2
Practicals									
6.	HS 401 CE / ES 151 CP	Communicative English Lab (P)/Computer Progr Lab (P) /	-	-	2	4	40	60	1
7.	ES 402 EG/ ES 152 EW	Engg Graphics (P)/ Engg Workshop	1	-	3	4	40	60	2.5
8.	BS 403 PHY/ BS 153 CHEM	Physics Lab (P)/ Chemistry Lab(P) /	-	-	3	4	40	60	1.5
9.	ES 404 EEE/ ES 154 EME	Electrical & Electro-nics Engg Lab (P)/ Elements of Mechanical Engg Lab (P)	-	-	3	4	40	60	1.5
		Total	15	-	11		360	540	20.5

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BS 101 M-1

MATHEMATICS – I

(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week: [L-3, T -0] 3Hours

CIE: 40 Marks

Duration of SEE: 3 Hours

SEE: 60 Marks

Credits : 3

Course Objectives:

1. To learn Matrix theory in a comprehensive manner
2. To learn orthogonal and congruent transformations to a quadratic form
3. To learn the tool of infinite series for learning advanced Engineering Mathematics
4. To learn Functions of several real variables that are essential in most branches of engineering
5. To learn to find the maxima and minima of multivariable functions
6. To learn to solve ordinary linear differential equations with constant coefficients and concepts in solving physical problems arising in engineering

Unit-I

Matrix Theory: Rank of Matrix, Linear Independence and Dependence of Vectors, Consistency of the system of linear equations , Eigen Values and Eigen vectors, ; Caley-Hamilton theorem and its applications , Reduction to diagonal form; Quadratic Forms, Reduction of quadratic form to canonical form, Properties of complex matrices - Hermitian, skew-Hermitian and Unitary matrices.

Unit - II

Infinite Series: Tests for Convergence, Comparison Test, Limit Comparison Test, D' Alemberts Ratio Test, Rabee's Test, and Cauchy's nth root test, Alternating Series, Absolutely Convergent Series, Conditionally Convergent Series.

Unit - III

Differential Calculus: Taylor's theorem with remainders; Taylor's and Maclaurin's expansions; Asymptotes; Curvature; Curve tracing;

Unit - IV

Functions of several variables - partial differentiation; total differentiation; Euler's theorem and generalization; Change of variables - Jacobians; maxima and minima of functions of several variables (2 and 3 variables) - Lagrange's method of multipliers.

Unit - V

Ordinary Differential Equations: Geometric interpretation of solutions of first order ODE $\frac{dy}{dx} = f(x, y)$; Exact differential equations; integrating factors; orthogonal trajectories; Higher order linear differential equations with constant coefficients - homogeneous and non-homogeneous; Euler and Cauchy's differential equations; Method of variation of parameters; System of linear differential equations.

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory)& Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting at least one from each Unit)

Text Book:

1. R.K. Jain and S.R.K. Iyengar, "Advanced Engineering Mathematics" Fourth Edition, Narosa Publications, 2005.

Reference Books:

1. Ervin Kreyszig, "Advanced Engineering Mathematics", Eighth Edition, John Wiley & Sons Ltd., 2006.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
3. B.V. Ramana, "Higher Engineering Mathematics", Core Engineering Series Tata Mc.Graw -Hill Publishing Company Ltd., 2007
4. G.B. Thomas and R.L.Finney, Calculus and Analytical geometry, 9th Edition, Pearson, Reprint, 2002.

Course outcomes:

At the end of the course, student will be

CO1	apply Matrix theory in a comprehensive manner
CO2	apply orthogonal and congruent transformations to a quadratic form
CO3	apply the tool of infinite series for learning advanced Engineering Mathematics
CO4	deal with Functions of several real variables that are essential in most branches of engineering
CO5	find the maxima and minima of multivariable functions
CO6	solve ordinary linear differential equations with constant coefficients and apply the concepts in solving physical problems arising in engineering

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓							✓
CO2	✓	✓		✓	✓							✓
CO3	✓	✓		✓	✓							✓
CO4	✓	✓		✓	✓							✓
CO5	✓	✓		✓	✓							✓
CO6	✓	✓		✓	✓							✓

BS102 CHEM-I

CHEMISTRY – I
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-3, T -0] 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

Course Objectives :

1. To learn molecular orbital theory and Chemical bonding,
2. To learn the metallic properties of metals
3. To learn Stereochemistry and Isomerism
4. To learn Reactive intermediates and Molecular rearrangements:
5. To learn Electrochemistry – I
6. To learn Chemical Kinetics

Unit I

Introduction to molecular orbital theory. Linear combination of atomic orbitals (LCAO) method. Rule for linear combination of atomic orbitals (LCAO), molecular orbital diagrams for simple diatomic molecules of H_2 , N_2 , O_2 , O_2^- ion, F_2 , NO and CO bond order.

Metallic bond: Properties of metals, Theories of bonding in metals - Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors and insulators. Formation of alloys, Hume-Rothery rules.

Unit II

Structural isomerism: Chain, Positional and functional isomerism-examples. Stereoisomerism: Conformational isomerism-conformations of ethane and n-butane. Representation of saw-horse formulae and Newman projection formulae. Configurational isomerism: Cis-trans (E&Z) isomerism. Sequence rules for E&Z configurations.

Optical isomerism: Optical activity- Plane polarized light, Enantiomers, diastereomers, meso structures and racemic mixture. Plane of symmetry-examples. Asymmetry or chirality. Relative (D&L) configurations and Absolute (R&S) Configurations, Sequence rules for assigning R and Configurations. Examples - Glyceraldehyde, alanine, lactic acid and 2-butanol. Isomerism in cycloalkanes: Configurational (cis-trans) isomers.

Stability of rings in cycloalkanes-Bayer's strain theory, Sachse-Mohr theory, Puckered rings and conformational isomers of cycloalkanes-conformations of cyclohexane, axial and equatorial bonds in cyclohexane.

Unit III

Reactive Intermediates: Generation, stability and reactions of carbocations, carbanions, carbenes, nitrenes and free radicals.

Molecular rearrangements: Definition and classification. Molecular rearrangements involving 1) electron deficient carbon: Wagner- Meerwein, Pinacol-Pinacolone 2) electron deficient Nitrogen: Hofmann, Schmidt and Beckmann rearrangements 3) electron deficient Oxygen: Baeyer-Villiger oxidation. 4) Base catalysed rearrangements: Benzilic acid, Favorski rearrangement

Unit IV

Electrochemistry – I : Review of Faraday's laws of electrolysis – their significance. Validity of Ohm's law, Specific conductance (κ), equivalent conductance (Λ), measurement of equivalent conductance. Variation of equivalent conductance with dilution. Equivalent conductance at infinite dilution. Ionic mobility and transport number. Hittorf's method of determination of transport number of ions. Kohlrausch's law of independent migration of ions and its application to determine: (i) Λ° of weak electrolytes, (ii) degree of dissociation of weak electrolytes, (iii) ionic mobilities, (iv) solubility and solubility product of sparingly soluble salts, and (v) ionic product of water. Conductometric titrations

Unit V

Chemical Kinetics : Scope, terminology - rate, rate constant, rate law, order, molecularity and half life time of chemical reaction. Derivation of integrated form of rate equation of first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy (E_a). Theories of reaction rates- collision and activated complex theories. Activation parameters (ΔG^\ddagger , ΔS^\ddagger & ΔH^\ddagger) – determination.

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Book:

1. Puri, Sharma & Kalia, Principles of Inorganic chemistry, Milestone Publishers, Delhi, 33rd Ed. 2016

Reference Books:

1. C. Parameswara Murthy, C.V. Agarwal & A. Naidu, Engineering Chemistry, B.S. Publications, Hyderabad, 2006
2. J.D. Lee, Concise inorganic chemistry, ELBS publication, 3rd edition.
3. A.I. Vogel, Quantitative inorganic analysis, ELBS – 4th Edition, 1991
4. Satyaprakash, Bahl & Tuli, Inorganic Chemistry, Chand Publishers, 8th Ed, 2014
5. Jain and Jain, Engineering chemistry, Dhanpathrai publications, 1991

Course outcome:

At the end of the course, student will be

CO1	Able to Apply molecular orbital theory and Chemical bonding,
CO2	Able to Apply metallic properties of metals
CO3	Able to Apply Stereochemistry and Isomerism
CO4	Able to Apply Reactive intermediates and Molecular rearrangements:
CO5	Able to Apply Electrochemistry – I
CO6	Able to Apply Chemical Kinetics

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	✓	✓		✓	✓							✓
C02	✓	✓		✓	✓							✓
C03	✓	✓		✓	✓							✓
C04	✓	✓		✓	✓							✓
C05	✓	✓		✓	✓							✓
C06	✓	✓		✓	✓							✓

BS 103 EBIO

ENGINEERING BIOLOGY
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-3, T -0] 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

Course Objectives :

1. To learn the basics of life cell
2. To learn the Biochemistry metabolism
3. To learn the basic principles of Genetics ,
4. To learn the structure of cell biology
5. To learn the Microbiology physiology
6. To learn Ecology, diversity and virology

Unit-I

Basics: Diversity of life, prokaryotes and eukaryotes, basic cell constituents.

Unit-II

Biochemistry: Metabolism (Catabolism and Anabolism) and Bioenergetics.

Unit-III

Genetics: Basic principles of Mendelian inheritance, molecular genetics, structure and function of genes and chromosomes, Transcription and Translation, gene expression and regulation.

Unit-IV

Cell Biology: Macromolecules, membranes, organelles, cytoskeleton, signalling, cell death along with division and Differentiation.

Unit-V

Microbiology: host-microbe interactions, physiology, ecology, diversity, and virology

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Books:

1. Biology for Engineers by Dr.J.L. Prameera Sheeja, Shine Publications and Distributors, Chennai.
2. Biotechnology by U.Satyanarayana, Allied publishers Ltd.

Reference Books :

1. Biochemical Engineering fundamentals by James, E Bailey and david F Ollis, McGraw Hill International Ed.

Course outcome:

At the end of the course, student will be

CO1	Able to apply the Basics of Biology in industrial applications
CO2	Able to apply Biochemistry metabolism
CO3	Able to apply basic principles of Genetics
CO4	Able to apply structure of Cell Biology
CO5	Able to apply Microbiology
CO6	Able to apply Ecology, diversity and virology

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓							✓
CO2	✓	✓		✓	✓							✓
CO3	✓	✓		✓	✓							✓
CO4	✓	✓		✓	✓							✓
CO5	✓	✓		✓	✓							✓
CO6	✓	✓		✓	✓							✓

ES 104 EME

ELEMENTS OF MECHANICAL ENGINEERING
Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-3, T -0] 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

Course objectives :

1. To learn the concepts of Simple Stress and Strains
2. To learn the concepts of Stresses in Thin Cylindrical shells stress
3. To learn the Classification of Boilers
4. To learn the types of Internal Combustion Engines
5. To learn Belts drives
6. To learn Gear drives

Unit-I : Simple Stress and Strains: Elasticity, Stress, Strain, types of stresses, elastic limit, Hook's law, modulus Of elasticity, deformation of body due to force acting on it. Principle of Super Position, Stresses due to change in temperature, Primary or linear strain, Secondary or lateral strain, Poisson Ratio, Volumetric strain, bulk modulus, relation between bulk modulus and young's modulus and modulus of rigidity, relation among all three modulus.

Unit - II : Thin Cylindrical shells: Stresses in cylindrical shell due to internal pressures circumferential stress, longitudinal stress, design of a thin cylindrical shell, spherical shells, change in dimension of the shell due to internal pressure, change in volume of the shell due to internal pressure

Unit- III : Shafts and Springs in Torsion: Torsional stresses and strain, strength of shaft, H.P transmitted by the shaft, strength of hollow shaft, simple problems, Closely coiled helical springs with an axial load.

Boilers: Classification of Boilers, essentials of boilers, selection of boilers, study of boilers, Cochran Boiler, Locomotive Boilers, Lancashire Boiler, Bob-Cook and Wilcox Boiler. Study of mountings and accessories.

Unit - IV : Internal Combustion Engines: Classification of I.C. Engines. Working of Four stroke and two stroke petrol and Oil engines. Comparison of petrol and Diesel engines, brake thermal efficiency and mechanical efficiency. Working Principle of Refrigeration & Air Conditioning, Components & Functions of Refrigeration, Refrigerants & Air Conditioners

Unit - V : Belts drives : Velocity ratio, effect of slip, belt thickness and creep. Length of open and cross belts. Ratio of tensions, centrifugal tension and its effect on power transmission. Gear drives- types of gears. Problems on simple, compound and epicyclic gear trains. Governors: Working of Watt, porter and Hartnell governors.

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Book:

1. S.Ramamurtam-Strength of Materials, Dhanpat Rai & Sons, 10 th Edition, New Delhi.
2. B.C.Punmia-Strength of Materials and Mechanics and Structures, Standard Publications and Distributors, 9 th Edition, New Delhi
3. R.Yadav, "thermodynamics and heat Engines", Volumr -II, Central Publishing house, 2004
4. S.S.Ratan-Theory of Machines, Tata Mc-Graw Hill Publication, New Delhi

Course outcomes:

At the end of the course, student will be

CO1	Able to understand the Simple Stress and Strains
CO2	Able to find the Stresses in Thin Cylindrical shells stress
CO3	Able to understand the Classification of Boilers
CO4	Able to understand Types of Internal Combustion Engines
CO5	Able to Apply the Belts drives
CO6	Able to Apply the Gear drives

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓	✓						✓	✓
CO2	✓		✓	✓								✓
CO3	✓	✓	✓	✓	✓							
CO4	✓	✓	✓									
CO5	✓	✓	✓	✓	✓						✓	✓
CO6	✓	✓	✓		✓						✓	

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ES 105 CP

COMPUTER PROGRAMMING (PROGRAMMING FOR PROBLEM SOLVING)
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-2, T -0] 2 Hrs

CIE :40 marks

Duration of SEE: 2 Hrs

SEE: 60 marks

Credits : 2

Course Objectives

1. To learn basic concepts of computer architecture and functioning
2. To learn flow chart and algorithm to the problems
3. To learn looping concepts to the problems
4. To learn pointers to access the memory
5. To learn different data structures to organize the data
6. To learn MATLAB programming to solve the problems

Unit-I

Introduction to computers : Components, Block diagram, Operating Systems, Programming Languages, Assembler, Interpreter, Compiler, Loader, Linkers, Number Systems (Binary, Octal, Decimal and Hexa), Representation of numbers (fixed and floating point), Problem Solving: Algorithm, Flow Charts. Types, Operators and Expressions : Variable Names, Data Types and Sizes, Constants, Declarations, Type Conversions, Operators, Precedence and Order of Evaluation.

Unit-II

Control Flow and Behavior Flow Charts: Statements and Blocks, If-Else, Switch, Loops: While, For, Do-While Break, Continue, Go to and Labels.

Unit-III

Functions: Basic of Functions, Parameter Passing Techniques, Functions Returning Non-integers. Storage Classes, External Variables, Scope Rules, Header Files, Static and auto Variables, Register Variable, Block Structure, Initialization. Recursion, The C Preprocessor. Arrays : One Two and Multi-dimensional arrays. Linear and Binary Search, Selection and Bubble Sort. Pointers : Pointers and Addresses, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, Command line arguments.

Unit-IV

Structures and Unions : Basics, Structure and functions, array of structures, pointers to structures, Self referential structure, Union. Files : Basics and File Handling functions: Copy file and display file.

Unit-V

MATLABC Programming, built-in functions, Creating Arrays, mathematical operations with Arrays, Two and three dimensional plots, user defined functions and function files, Relational and logical operators, Conditional statements-if-end, if-else-end, if – else if-else-end. Loops: for-end loop and while-end loop. Nested loops and nested conditional statements, Break and continue commands.

EXAMINATION: Part-A for 20 Marks (with 10 Questions-Compulsory) & Part -B for 30 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Book:

1. Kernighan B.W. and Ritchie D.M., "The C Programming Language" 2nd Edition, Prentice-Hall of India, 2006.

2. Amos Gilat, MATLAB : An Introduction with Application, 3rd Edition, John Wiley & Sons.

Reference books :

1. Forouzan E. B.A., Gilberg F, "A Structured Programming Approach Using C" . 2nd Edition, Thompson, 2003.

3. Rajaraman V. "The Fundamentals of Computers" 4th Edition, Prentice - Hall of India, 2006

Course outcomes:

At the end of the course, student will be

CO1	Able to understand basic concepts of computer architecture, functioning
CO2	Able to develop flow chart and algorithm to the problems
CO3	Able to explain looping concepts to the problems
CO4	Able to explain pointers to access the memory
CO5	Able to explain different data structures to organize the data
CO6	Able to apply MATLAB programming to solve the problems

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓	✓			✓			✓
CO2	✓	✓	✓		✓	✓			✓			✓
CO3	✓	✓	✓		✓	✓			✓			✓
CO4	✓	✓	✓		✓	✓			✓			✓
CO5	✓	✓	✓		✓	✓			✓			✓
CO6	✓	✓	✓		✓	✓			✓			✓

ES 151 CP(P)

COMPUTER PROGRAMMING LAB
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [P-2] 2 Hours
SEE : 4 Hours

CIE : 40 Marks Duration of
SEE : 60 Marks Credits : 1

Course Objectives : Practice skills of Computer Programming

1. To find maximum and minimum of given set of numbers
2. To find Roots of a Quadratic Equation
3. To find trigonometric functions
4. To find Factorial, Fibonacci, GCD.
5. To find solutions using MATLAB software
6. To find No. of characters, words and lines of given text file.

C-PROGRAMMING

1. Finding the maximum and minimum of given set of numbers.
2. Finding Roots of a Quadratic Equation.
3. Sin x and Cos x values using series expansion.
4. Conversion of Binary to Decimal, Octal, Hexa and Vice versa.
5. Generating a Pascal triangle.
6. Recursion: Factorial, Fibonacci, GCD.
7. Matrix addition and multiplication using arrays.
8. Bubble Sort, Selection Sort.
9. Linear Search and Binary; Search.
10. Functions for string manipulations.
11. Finding the No. of characters, words and lines of given text file.
12. File Handling programs.

MATLAB COMPUTING :

1. Roots of a polynomial, 2.curve fitting using polyfit function, 3.Solving equation with one variable, and 4. Finding minimum and maximum of a function

Course Outcomes:

At the end of the course, student will be

C01	Able to find maximum and minimum of given set of numbers
C02	Able to find Roots of a Quadratic Equation
C03	Able to find trigonometric functions
C04	Able to find Factorial, Fibonacci, GCD.
C05	Able to find solutions using MATLAB software
C06	Able to find No. of characters, words and lines of given text file.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓				✓			✓
CO2	✓	✓	✓		✓				✓			✓
CO3	✓	✓	✓		✓				✓			✓
CO4	✓	✓	✓		✓				✓			✓
CO5	✓	✓	✓		✓				✓			✓
CO6	✓	✓	✓		✓				✓			✓

ES 152 EW (P)

ENGINEERING WORKSHOP
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-1, P -3] 4 Hours
Duration of SEE : 4 Hours
Credits : 2.5

CIE: 40 Marks
SEE : 60 Marks

Course Objectives : To practice skills of workshop like Fitting, House wiring, Carpentry, Smithy, Welding, Lathe machine operations, Plumbing and sheet metal works.

LIST OF EXERCISES

FITTING

1. Marking and Punching
2. Cutting & Filling
3. Matching of two parts Including Scrapping
4. Drilling and Tapping

HOUSE WIRING

1. Single Lamp Controlled by Single Switch
2. Two Lamps Series Connection
3. Two Lamps Parallel Connection
4. Stairs Case Wiring Connection

CARPENTRY

1. Half lap Joint
2. Dove Tail Joint
3. Bridle Joint
4. Bridle Dove Tail Joint
5. Wood Turning Operating

SMITHY

1. Flattening Operation
2. Bending Operation
3. Upsetting Operation
4. Fullering Operation

WELDING

1. Demonstration of Arc and Gas Welding
2. Bead formation on a plate
3. Lap Joint and Butt Joint
4. Brazing and Soldering

LATHE MACHINE OPERATIONS

1. Plain Turning and step turning and knurling operation.
2. Taper turning Operation
3. Thread Cutting Operation

PLUMBING (Demonstration Only)

1. Single Joint with Coupling
2. Making 90 Pipe using Elbow and Bend
3. Making T-Pipe joint
4. Making Pipe with 3/4" X 1/2" Reducer
5. Making a 4-Way Joint.

SHEET METAL WORKS (Demonstration Only)

1. Making a Funnel with G.I Sheet
2. Making a tray With G.I Sheet
3. Making L- Joint
4. Making T - Joint with Metal tubes
5. Making a Cylindrical Jug with Riveted Handle.

Course Outcomes:

At the end of the course, student will be

CO1	Able to apply fitting
CO2	Able to apply welding
CO3	Able to apply house wiring
CO4	Able to apply carpentry
CO5	Able to apply smithy
CO6	Able to apply plumbing

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓			✓			✓			✓
CO2	✓	✓	✓			✓			✓			✓
CO3	✓	✓	✓			✓			✓			✓
CO4	✓	✓	✓			✓			✓			✓
CO5	✓	✓	✓			✓			✓			✓
CO6	✓	✓	✓			✓			✓			✓

BS153 CHEM(P)

CHEMISTRY LAB
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [P -3] 3 Hours
Duration of SEE : 4 Hours
Credits : 1.5

CIE: 40 Marks
SEE : 60 Marks

Course Objectives :

1. To conduct the experiment to determine the Volumetry
2. To conduct the experiment to Synthesis the Organic Compounds
3. To conduct the experiment to Identify the organic compounds through group detection
4. To conduct the experiment for Distribution law
5. To conduct the experiment to determine Chemical kinetics
6. To conduct the experiment to learn Electrochemistry & Colorimetry

Note : About 10 -12 experiments to illustrate the concepts learnt in theory
Suitable number of experiments from the following

I. Volumetry

- i. Determination of carbonate and bicarbonate in a mixture
- ii. Determination of Fe(II) using KMnO_4 with oxalic acid as primary standard.
- iii. Determination of hardness of water

II. Synthesis of Organic Compounds

- i. m-dinitrobenzene
- ii. Aspirin
- iii. Preparation of benzoic acid from benzoyl chloride
- iv. Preparation of benzilidine aniline

III. Identification of organic compounds through group detection

IV. Distribution law

- i. Determination of molecular state of acetic acid by studying the distribution of acetic acid between n-butanol and water.
- ii. Determination of molecular state of benzoic acid by studying the distribution of benzoic acid between benzene and water.

V. Chemical kinetics

- i. Determination of order of the reaction of hydrolysis of methyl acetate in dilute hydrochloric acid.
- ii. Determination of order of the reaction between potassium persulphate and potassium iodide.

VI. Electrochemistry

- i. Determination of concentration of HCl conductometrically using standard NaOH solution.
- ii. Determination of concentration of acetic acid conductometrically using standard NaOH solution.

- iii. Potentiometric reduction titration of Fe^{2+} and $\text{K}_2\text{Cr}_2\text{O}_7$
- iv. Titration of HCl against NaOH using pH meter

VII. Colorimetry

- i. Verification of Beer-Lambert law
- ii. Determination of concentration of the given $\text{K}_2\text{Cr}_2\text{O}_7$ or KMnO_4 solution.

Course outcomes:

At the end of the course, student will be

CO1	Able to determine the Volumetry
CO2	Able to Synthesis the Organic Compounds
CO3	Able to Identify the organic compounds through group detection
CO4	Able to apply Distribution law
CO5	Able to determine Chemical kinetics
CO6	Able to use Electrochemistry & Colorimetry

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓							✓
CO2	✓	✓		✓	✓							✓
CO3	✓	✓		✓	✓							✓
CO4	✓	✓		✓	✓							✓
CO5	✓	✓		✓	✓							✓
CO6	✓	✓		✓	✓							✓

ES 154 EME

ELEMENTS OF MECHANICAL ENGINEERING LAB
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [P-3] 3 Hours

Duration of SEE : 4 Hours

Credits : 1.5

CIE: 40 Marks

SEE : 60 Marks

Course objectives : Conduct the experiments

1. To learn Direct tension test and Transverse test,
2. To learn Compression test and Bending test
3. To learn Shear Force and bending moment tests
4. To learn Spring test and Valve time diagram
5. To learn Study of Boilers and Torsion test
6. To learn to use Bending test on simply supported beam

Cycle-I

1. Direct tension test on M.S. Rods
2. Transverse test on a wooden beam with Central loading
3. Transverse test on wooden beam with Non-Central loading
4. Compression test on bricks
5. Bending test on Continuous beam
6. Shear Force and bending moment tests

Cycle – II

7. Spring test (compression test)
8. Spring test (Tensile test)
9. Valve time diagram for a four stroke vertical diesel Engine
10. Study of Boilers- Water tube and Fire tube Boiler
11. Torsion test
12. Bending test on simply supported beam

Course Outcomes:

At the end of the course, student will be

C01	Able to use Direct tension test and Transverse test,
C02	Able to use Compression test and Bending test
C03	Able to use Shear Force and bending moment tests
C04	Able to use Spring test and Valve time diagram
C05	Able to use Study of Boilers and Torsion test
C06	Able to use Bending test on simply supported beam

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	✓			✓	✓						✓	✓
C02	✓		✓	✓								✓
C03	✓	✓	✓	✓	✓							
C04	✓	✓	✓									
C05	✓	✓	✓	✓	✓						✓	✓
C06	✓	✓	✓		✓						✓	

BS 201 M-2

MATHEMATICS – II
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-3, T -0] 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

Course Objectives ::

1. To learn the improper integrals
2. To learn the multiple integrals in various coordinate systems
3. To learn the concepts of gradient, divergence and curl to formulate eng. problems
4. To learn to convert line integrals into surface integrals and surface integrals into volume integrals
5. To learn the Laplace transforms to solve physical problems arising in engineering
6. To learn the series solutions for ordinary differential equations

Unit-I

Integral Calculus: Convergence of improper integrals; Beta and Gamma integrals: Gamma function, Some Identities of Gamma function, Beta function, Some Identities of Beta function, Error Function.

Unit-II:

Multiple Integrals: Double and Triple integrals - computation of surface areas and volumes; change of variables in double and triple integrals.

Unit-III:

Vector Calculus: Scalar and vector fields; vector differentiation; level surfaces; directional derivative; gradient of a scalar field; divergence and curl of a vector field; Line and Surface integrals; Green's theorem in a plane; Stoke's theorem; Gauss Divergence theorem.

Unit-IV:

Laplace Transforms: Laplace transforms; inverse Laplace transforms; Properties of Laplace transforms; Laplace transforms of unit step function, impulse function, periodic function; Convolution theorem; Applications of Laplace transforms - solving certain initial value problems, solving system of linear differential equations.

Unit-V:

Series Solution of differential equations: Ordinary and Singular points of an equation, Power series solution, Series solution about a Regular Singular point, Frobenius Method.

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory)& Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Book:

1. R.K. Jain & S R.K. Iyengar, "Advanced Engineering Mathematics", Narosa Publications, 2nd Ed., 2003.

Reference Books

1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Ervin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Ltd, Eight Edition, 2006.
3. B.V. Ramana, Higher Engineering Mathematics, Core Engineering Series Tata Mc. Graw - Hill Publishing Company Ltd., 2007.

Course outcomes:

At the end of the course, student will be

CO1	analyze improper integrals
CO2	evaluate multiple integrals in various coordinate systems
CO3	apply the concepts of gradient, divergence and curl to formulate engineering problems
CO4	convert line integrals into surface integrals and surface integrals into volume integrals
CO5	apply Laplace transforms to solve physical problems arising in engineering
CO6	Obtain the series solutions for ordinary differential equations

Mapping of Course Outcomes with Programme Outcomes

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓			✓	✓			✓
CO2	✓	✓		✓	✓			✓	✓			✓
CO3	✓	✓		✓	✓			✓	✓			✓
CO4	✓	✓		✓	✓			✓	✓			✓
CO5	✓	✓		✓	✓			✓	✓			✓
CO6	✓	✓		✓	✓			✓	✓			

BS 202 PHY

PHYSICS

(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-3, T -0] 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

Course objectives :

- 1.To learn about characteristics and applications of lasers, Crystallography
- 2.To learn quantum mechanics
3. To learn Magnetic materials and Super Conductors,
4. To learn Thin films
- 5.To learn Nano Materials
6. To learn Characterization techniques; XRD, UV SEM, TEM etc.

Unit-I

Lasers :Characteristics of lasers – Spontaneous and Stimulated Emission of radiation – Einstein's Coefficients – Population Inversion – Ruby laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers Fibre Optics: Introduction, Propagation of light through optical fiber – acceptance angle – numerical aperture – types of optical fibres – refractive index profiles – fibre drawing process (Double Crucible method) – applications of optical fibres.

Unit-II

Quantum Mechanics : Black body radiation – Explanation using the photon concept – Photoelectric effect, Compton effect, De-broglie hypothesis, Wave particle duality- Born interpretation of wave function – verification of matter waves – uncertainty principle, Schrodinger particle in a box, quantum harmonic oscillator.

Unit-III

Magnetic Materials : Classification of magnetic materials – Dia, Para, Ferromagnetic, Anti Ferromagnetic and Ferri magnetic materials – Weiss Molecular field theory of Ferromagnetic magnetism – magnetic domains – hysteresis curve – Soft and Hard magnetic materials – Ferrites – Applications of Ferrites.

Super Conductivity :General properties of super conductors – Meissner effect – Type -1 and Type-2 super conductors – BCS theory (qualitative) – Introduction to High T_c super conductors – applications of superconductors.

Unit-IV

Thin films : Distinction between bulk and thin films – preparation of thin films by thermal deposition – RF sputtering – CVD process – Pulsed laser deposition – application of thin films – gas sensors, solar cells.

Nano materials : Introduction – properties of materials at reduced size – surface to volume ratio at nano scale – classification of nano materials – preparation of nano materials ; bottom-up method (sol gel, CVD), Top-down method (ball milling) – basic idea of carbon nanotubes, application of nano materials and their health hazards.

Unit-V

Characterization Techniques : XRD technique, UV, Visible spectroscopic techniques, Electron Spin Resonance spectroscopy, NMR Spectroscopic techniques, IR and Raman Spectroscopy, SEM and TEM spectroscopic techniques.

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Books:

- 1.Arumugam. M, Material Science, Anuradha Agencies Publishers.

Reference Books :

- 1.Bandopadhyay. A.K., Nanomaterials, New Age international publications.
- 2.Goswamy. A., Thin films, New Age International publications.
3. Kittel. C., Introduction to Solid state physics, Wiley Eastern Ltd.
4. Tayal, D.C., Electricity and Magnetism.
- 5.Characterization Techniques by Cengage Publications.
- 6.Loud, B.B., Lasers and Non-linear

Course Outcomes:

At the end of the course, student will be

CO1	Able to describe the concepts of Crystallography.
CO2	Able to Describe magnetic materials.
CO3	Able to Explain superconductivity
CO4	Able to Explain about vacuum science and thin film preparation
CO5	Able to Explain characterization of materials by XRD, UV SEM, TEM
CO6	Able to use nanomaterial phenomena and preparation methods

Mapping of Course Outcomes with Programme Outcomes

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓			✓	✓			✓
CO2	✓	✓		✓	✓			✓	✓			✓
CO3	✓	✓		✓	✓			✓	✓			✓
CO4	✓	✓		✓	✓			✓	✓			✓
CO5	✓	✓		✓	✓			✓	✓			✓
CO6	✓	✓		✓	✓			✓	✓			✓

ES 203 EM

ENGINEERING MECHANICS
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-3, T -0] 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

Course Objectives:

1. To learn principles of Force systems
2. To learn Equilibrium of forces
3. To learn Analysis of structures,
4. To learn Friction and
5. To learn Centroid moment of inertia.

Unit-I

Force systems: Resultant of coplanar concurrent forces, Components of force in space, Moment of force and its applications, Couples and resultant of force systems.

Unit-II

Equilibrium of Force Systems: Free body diagram, Equations of equilibrium, Equilibrium of planar and spatial system.

Unit-III

Analysis of Structures: Analysis of trusses by method of joints and method of sections, Analysis of frames by method of members.

Unit-IV

Friction : Laws of friction. Application to simple systems. Connected systems and belt friction. Wedge friction.

Unit-V

Centroid and Moment of Inertia: Centroids of lines, areas and composite areas, Moment of inertia for areas, Composite areas, Polar moment of inertia, Radius of gyration.

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Book:

1. Ferdinand L. Singer, "Engineering Mechanics", Harper & Collins, Singapore, 1960.
2. S.P. Timoshenko and D.H. Young, "Engineering Mechanics", McGraw-Hill International Edition, 1983.
3. S. Rajasekharam and G. Sankarasubrahmanyam, "Engineering mechanics", Vikas Publications, 2002
4. S.B. Junarkar and H.J. Shah, "Applied Mechanics", Charotar Publishers, 2001
5. I.H. Shames, "Engineering Mechanics", Prentice Hall of India, 1987.

Course Outcomes:

At the end of the course, student will be

CO1	Able to apply basics of force systems
CO2	Able to solve the equilibrium of planar and spatial system
CO3	Able to analyze the analysis of structures
CO4	Able to analyze the analysis of methods of joints and frames
CO5	Able to find the friction occurring with load and wedge friction
CO6	Able to solve the moment of inertia and centroids of different shapes

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓			✓			✓			✓
CO2	✓	✓	✓			✓			✓			✓
CO3	✓	✓	✓			✓			✓			✓
CO4	✓	✓	✓			✓			✓			✓
CO5	✓	✓	✓			✓			✓			✓
CO6	✓	✓	✓			✓			✓			✓

ES 204 EEE

ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-3, T -0] 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

Course Objectives :

1. To learn the concepts of basic Networks(KVL,KCL and maximum power transfer theorem)
2. To learn the Speed control of dc motor (speed proportion to back EMF and inversely proportion to flux)
3. To learn to Construct Transformers equivalent circuit and find the losses
4. To learn Energy meter calculation
5. To learn to Calculate Power factor of R-L series circuit
6. To learn to Draw various circuit diagrams

UNIT I

Introduction to Electrical Engineering: Essence of Electricity, Conductors, semiconductors and Insulators (Elementary Treatment Only)

D.C. Circuits : Kirchhoff's laws-Types of elements, types of sources, Series and parallel circuits, star and delta conversions- superposition theorem – thevenin's theorem – Norton's theorem ,Simple Numerical Examples

UNIT II

Electromagnetic induction: Faraday's law of electromagnetic induction, Lenz's Law, Flemings Right hand and Left Hand Rule

DC Machines: Principle of operation of DC machines ,Construction, Armature Winding-emf equation-torque production-Operation of DC machine as Generators and motor-Characteristics, Armature reaction losses and efficiency-Applications

UNIT III

AC circuits: Production of sinusoidal voltage, Phasor representation of sinusoidal quantities- Average & RMS values, Form Factor, RLC circuits excited by sinusoidal input ,calculation of Active and Reactive Power, Power factor

Single phase transformer: Features, Principle of Operation, Constructional details, Ideal transformer-Transformer on no-load and on Load, losses –efficiency and regulation-OC, SC tests-Applications.

UNIT-IV

Three phase induction motors : Production of rotating magnetic field, Principle of Operation – slip and rotor frequency , torque, losses and efficiency, Torque Slip Characteristics, Application

Fractional –Kilowatt Motors: Principle of Operations of Stepper motors, Universal Motors, Applications

UNIT V

Introduction to Electronics: P-N junction – semiconductor diode –V-I characteristics of diode – Zener diode, Rectifiers – half wave , full wave rectifier – Filters.

Transistor –Transistor symbols, Transistor action, Transistor currents, Current amplifier factor, Relation between α and β – CB, CC,CE Configurations, Transistor as Amplifier

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. V.K.Mehta, Principles of Electrical Engineering and Electronics-,28 th Edition,Sultan Chand & Co.2008
2. Naidu and Kamakshaiah, Introduction to Electrical Engineering,11th Edition,TataMc.Graw Hill, New Delhi,2005

REFERENCE BOOKS:

1. B. L. Teraja, Electrical Technology Volume II -, 26 th Edition, S.Chand & Co., New Delhi,2008
2. Hughes, Electrical Technology-,VII editon, ELBS, New York,2000
3. Fitzerlad, Basic Electrical Engineering-,ELBS,7 th Edition,2000

Course Outcomes : At the end of the course, student will be

C01	Able to Explain the concepts of basic Networks(KVL,KCL and maximum power transfer theorem)
C02	Able to apply Speed control of dc motor (speed proportion to back EMF and inversely proportion to flux)
C03	Able to Construct Transformers equivalent circuit and find the losses
C04	Able to Perform Energy meter calculation
C05	Able to Calculate Power factor of R-L series circuit
C06	Able to Draw various circuit diagrams

Mapping of Course Outcomes with Programme Outcomes:

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	✓			✓	✓						✓	✓
C02	✓		✓									✓
C03	✓	✓	✓	✓	✓							
C04	✓	✓	✓									
C05	✓	✓	✓	✓	✓						✓	✓
C06	✓	✓	✓		✓							

HS 205 CE

COMMUNICATIVE ENGLISH (HASS-1)
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-2, T -0] 2 Hours

CIE: 40 Marks

Duration of SEE : 2 Hours

SEE : 60 Marks

Credits : 2

Course Objectives :

1. To learn role and importance of communication
2. To learn Vocabulary Building and Usage
3. To learn Remedial English grammar
4. To learn Comprehensive reading strategies
5. To learn Writing Skills
6. To learn writing skills of Email Etiquette and Quiz.

Unit - I

Role and importance of communication: Verbal and non-verbal communication; Interpersonal communication; the importance of Listening skills; Introducing oneself and others; Greetings; Expressing thanks, apologies, agreement and disagreement; Interactive skills, Situational dialogues; Language as a stimulation and motivation for ideas; English Language learning environment, the attitudes and strategies.

Unit - II

Vocabulary Building and Usage: Dictionary and Thesaurus skills; Word formation; Prefixes and suffixes; Synonyms and Antonyms; One-word substitutes; Situational Vocabulary and Idiomatic usage.

Unit - III

Remedial English Grammar: Common errors; Words often confused; Concord (Subject and Verb agreement); Tense and aspect (Verb patterns); Use of articles and prepositions and other parts of speech; Connectives with examples; Voice; Reported Speech (Direct and Indirect Speech)

Unit - IV

Developing reading comprehension: Reading strategies.

The following four essays are prescribed:*

1. Our Own Civilization, C.E.M. Joad
2. Andrew Carnegie, E.H. Carter
3. The Secret of Work, Swami Vivekananda
4. The Generation Gap, Benjamin Spock

Unit - V

Writing Skills: Punctuation and Writing; Paragraphs, Reports; Essays, Technical, Resumes, Letters; Official and Personal - complaint, enquiry, invitation, responses etc. Memos, Circulars and Notices; Minutes of meetings; Email Etiquette and Quiz.

- * Note: 1) Items of grammar and comprehension prescribed in Unit III & IV may be taught alongside the teaching of the prose lessons prescribed in Unit I & II.
2) Some relevant extracts can be used from the following books:

EXAMINATION: Part-A for 20 Marks (with 4 Questions-Compulsory) & Part -B for 30 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Books:

1. E. Suresh Kumar and P. Sreehari, Communicative English, Orient Longman, 2007.
2. John Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, 2004.

Reference Books :

1. M. Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hill, 2005.
2. Raymond Murphy, Murphy's English Grammar, Cambridge University Press, 2005.
3. Krishna Mohan and Meenakshi Raman, Effective English communication, Tata McGraw Hill, 2005.
4. T. Venkat Rajaiah, A Situational English for Effective Communication, Sri Aurobindo and the Mother Aura Publications, Hyderabad.

Course outcomes:

At the end of the course, student will be

CO1	Able to Improve interpersonal communication and LRSW skills
CO2	Able to Use appropriate vocabulary at various situation
CO3	Able to Speak and write grammatically appropriate sentences
CO4	Able to Understand reading comprehension
CO5	Able to Learn presentation skills ,technical writing skills and email etiquette
CO6	Able to Improve communication skills using appropriate vocabulary and grammar, comprehend different types of texts, develop presentation skills and technical writing skills

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							✓	✓	✓	✓		
CO2							✓	✓	✓	✓		
CO3							✓	✓	✓	✓		
CO4							✓	✓	✓	✓		
CO5							✓	✓	✓	✓		
CO6							✓	✓	✓	✓		

HS 401 CE(P)

COMMUNICATIVE ENGLISH LABORATORY
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [P -2] 2 Hours

CIE: 40 Marks

Duration of SEE : 4 Hours

SEE : 60 Marks

Credits : 1

Course Objectives : To practice skills of Communicative English

1. Introduction to English Phonetics; Organs of Speech - the respiratory, phonatory and articulatory systems; Introduction to International Phonetic Alphabet; Energising speech organs, Oral Hygiene, Vocal Strength through Pranayama and Mukhayoga; Swara Yoga.
2. Sound system of English: The classification and description of vowels and consonants in detail, consonant clusters.
3. Aspects of connected speech: Syllabic division and word accent; Weak forms; Intonation: Falling, Rising and Fall-Rise; Rhythm, Intonation; strong and weak forms, falling tone, rising tone, fall & rise tone.
4. emptying the MTI (Mother Tongue Influence): Accent Neutralisation: Shedding Complexities (Superiority / Inferiority) in terms of Medium (English / Non English), Nativity (Urban / Rural) and Personality (Dynamic / Dull) and Confidence Building: Aurals and Orals, Obstructions and Remedies in Swara Yoga way, Concentration and Mediation. Interpersonal Skills: Peer learning, Electronic Gadgets: Radiation minimization.
5. Rhythm and Intonation- Model poems : 05 (Some relevant extracts can be used as model poems).

Text Book:

1. E. Suresh Kumar and Sreehari, A Handbook for English Language Laboratories, Cambridge University Press India Pvt. Ltd., 2007.
2. Mark Hancock, English Pronunciation in Use, Cambridge University Press, 2003.
3. Edgar Thorpe, Winning at Interviews, Pearson Education, 2006.
4. Hari Mohan Prasad, How to prepare for Group Discussion and Interview (with audio cassette), Tata McGraw Hill, 2006.
5. Suzy Siddonn, Presentation Skills, Universities Press, 2004.
6. Swamy Mukthabodhananda, Swara Yoga, Bihar School of Yoga, 2004.
7. Sri Aurobindo and the Mother, Health and Healing through Yoga, Sri Aurobindo Society, Pondicherry.
8. Sri Aurobindo and the Mother, Powers within, Sri Aurobindo Society, Pudicherry.
9. CCMT, Bombay, Self-Discovery, Central Chinmaya Mission Trust, Bombay, 2002.

II Dictionaries Recommended:

1. Cambridge Advanced Learner's Dictionary (with CD) Cambridge University Press, 2005.
2. Longman Dictionary of Contemporary English (with CD) Longman, 2006.
3. Oxford Advanced Learners' Dictionary (with CD), A.S. Hornby, Oxford University press, 2006.
4. English Pronunciation Dictionary (with CD), Daniel Jones, Cambridge University Press, 2003.

Course outcomes:

At the end of the course, student will be

CO1	Able to understand the English Phonetics
CO2	Able to understand Sound system of English
CO3	Able to understand Aspects of connected speech
CO4	Able to understand Emptying the MTI(Mother tongue Influence):
CO5	Able to understand Personality (Dynamic/Dull) and Confidence building
CO6	Able to understand Rhythm and Intonation –Model poems

Map

ping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							✓	✓	✓	✓		
CO2							✓	✓	✓	✓		
CO3							✓	✓	✓	✓		
CO4							✓	✓	✓	✓		
CO5							✓	✓	✓	✓		
CO6							✓	✓	✓	✓		

ENGINEERING GRAPHICS (Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [L-1 P-3] : 4 Hours

CIE: 40 Marks

Duration of SEE : 4 Hours

SEE : 60 Marks

Credits : 2.5

Course Objectives :

1. To learn about types of scales
2. To learn projection of points, straight lines and planes
3. To learn Projection of solids
4. To learn intersection of surfaces
5. To learn Isometric projections
6. To learn 3d view by isometric projections

Unit-I

Scales: Instruments and their uses, Reduced and Enlarged scales, Representative fraction, Scales - plain, diagonal and vernier

Simple Geometric Construction: Regular polygons inscribed in a circle given the side of the polygon, Engineering curves - ellipse, parabola, hyperbola, cycloid and epicycloids.

Unit-II

Projection of Points and Straight Lines: Projection of points placed in different quadrants. Projection of straight lines inclined to one and two reference planes. Traces of the lines, Projection of straight lines inclined to both the reference planes.

Projection of Planes: Projections of perpendicular planes, Oblique planes. Auxiliary planes, Traces of planes.

Unit - III

Projections of Solids: Polyhedra, Solids of revolution, Projections of solids with axis inclined to one or both the reference planes.

Sections of Solids: True shape of solids, sections of prisms, pyramids, cylinders and cones.

Unit – IV

Intersection of Surfaces: Intersection of cylinder and cylinder and cone.

Development of Surfaces: Basic concepts of development of surfaces. Methods of development - Parallel line development and radial line development. Development of prisms, pyramids, Cylinders and cones

Unit-V

Isometric Projections Isometric scale, Isometric projections of prisms, pyramids, cylinders, cones and spheres, and Combinations of two or three solids

Perspective views: Perspective views of straight lines, plane figures (triangle, square, pentagon, hexagon, circle), and simple solids (cylinder, cone, regular prism, regular pyramid) using visual ray method and vanishing point method.

Introduction to CAD (For Internal Evaluation Weightage Only)

Introduction to Auto Cad software package commands, drawing 2D and 3D sketches for simple objects by using Auto Cad software package

Text Book:

- 1.N.D. Bhatt, "Elementary Engineering Drawing", Charotar Publishers, 1998.
- 2.K.L. Narayana and P. Kannaiah, "Text Book on Engineering Drawing", Scitech Publications, 2001
- 3.T.E. French et al, "Engineering Drawing and Graphic Technology", McGraw-Hill Int. Editions, 1993.
- 4.K. Venugopal, "Engineering Drawing and Graphics + Autocad", New Age International (P) Ltd., New Delhi, 1998.
- 5.A.N. Siddiquee et al, "Engineering Drawing with a Primer on Autocad", Prentice Hall of India Ltd., New Delhi, 2004.

Course outcomes :

At the end of the course, student will be

CO1	Able to use basics of instruments and their uses
CO2	Able to draw the scales and simple geometric construction
CO3	Able to draw the projections of points, straight lines and planes
CO4	Able to draw the projections of solids, sections of solids
CO5	Able to do the drawing of intersection of surfaces and development of surfaces
CO6	Able to use 3d view by isometric projections and perspective views

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓			✓			✓
CO2	✓	✓				✓			✓			✓
CO3	✓	✓				✓			✓			✓
CO4	✓	✓				✓			✓			✓
CO5	✓	✓				✓			✓			✓
CO6	✓	✓				✓			✓			✓

BS 403 PHY(P)

PHYSICS LAB
(Common to Chem. Eng., Food Tech., and Textile Tech.)

Instruction per week : [P-3] 3 Hours

CIE: 40 Marks

Duration of SEE : 4 Hours

SEE : 60 Marks

Credits : 1.5

Course objectives : Conduct the experiments

1. To estimate the dielectric constant of the system
2. To find The concept of B-H curve
3. To understand The role of solar cell and its working
4. To find the knowledge of electron spin resonance
5. To understand the Principle of hall effect
6. To Working principle of photocell

Lab Experiments:

1. Determination of Dielectric Constant and Phase transition temperature of PZT material.
2. To trace the BH – Curve (Hysteresis) of Ferromagnetic specimen using CRO and measurement of Area of BH loop, evaluate energy loss in the specimen.
3. Determination of carrier concentration, mobility and Hall Coefficient of Ge crystal using Hall Effect experiment.
4. To draw the I-V characteristic of Solar Cell and to calculate i) Fill factor ii) Efficiency iii) Series resistance of the solar cell.
5. To determine the Landé g factor (spectroscopic splitting factor) using Electron Spin Resonance spectrometer for the DPPH sample.
6. To determine Planck's Constant and work function of Photo metal.
7. To determine Temperature characteristics of Thermistor and to find the constants.
8. Determination of the numerical aperture and acceptance angle of the given optical Fiber Optics
9. Determination of wavelength of Laser source by using Diffraction grating.
10. To find the values of electrical conductivity and energy gap of Ge crystal by Four Probe method.

Course outcomes :

At the end of the course, student will be

C01	Able to estimate the dielectric constant of the system
C02	Able to find The concept of B-H curve understood
C03	Able to understand The role of solar cell and its working is acquired
C04	Able to use the knowledge of electron spin resonance
C05	Able to understand the Principle of hall effect
C06	Able to use Working principle of photocell

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	✓	✓		✓	✓							✓
C02	✓	✓		✓	✓							✓
C03	✓	✓		✓	✓							✓
C04	✓	✓		✓	✓							✓
C05	✓	✓		✓	✓							✓
C06	✓	✓		✓	✓							✓

ES 404 EEE

ELECTRICAL AND ELECTRONICS ENGINEERING LAB

Instruction per week : [P-3]3 Hours

CIE: 40 Marks

Duration of SEE : 4 Hours

SEE : 60 Marks

Credits : 1.5

Course Objectives :

1. To practice basic Networks(KVL,KCL and maximum power transfer theorem)
2. To practice the Speed control of dc motor (speed proportion to back EMF and inversely proportion to flux)
3. To practice the Construct Transformers equivalent circuit and find the losses
4. To practice Performance of Energy meter calculation
5. To practice Calculation of Power factor of R-L series circuit
6. To practice to Draw various circuit diagrams

List of experiments

(Minimum of 8 experiments in the list are to be performed)

1. Verification of the Venin's & Notron's theorems
2. Verification of maximum power transfer theorem & superposition theorem
3. Power factor measurement of and R-L series circuits
4. Calibration of single phase energy meter
5. Magnetization characteristics of separately excited generator
6. Load characteristics of shunt generator
7. Swinburnes test on D.C shunt motor
8. Seed control DC shunt motor
9. Brake test on DC shunt motor
10. Brake test on induction motor
11. Open circuit & short circuit tests on single phase transformer
12. Static characteristics of junction diode
13. Static characteristics of a common base and common emitter transistor circuit
14. Brake test on D series motor
15. Three – phase power measurement by two watt meter method
16. Regulation of single phase alternator

Course outcomes: At the end of the course, student will be

CO1	Able to Explain the concepts of basic Networks(KVL,KCL and maximum power transfer theorem)
CO2	Able to Speed control of dc motor (speed proportion to back EMF and inversely proportion to flux)
CO3	Able to Construct Transformers equivalent circuit and find the losses
CO4	Able to Perform Energy meter calculation

CO5	Able to Calculate Power factor of R-L series circuit
CO6	Able to Draw various circuit diagrams

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓	✓						✓	✓
CO2	✓		✓	✓								✓
CO3	✓	✓	✓	✓	✓							
CO4	✓	✓	✓									
CO5	✓	✓	✓	✓	✓						✓	✓
CO6	✓	✓	✓		✓						✓	

SCHEME OF INSTRUCTION AND EXAMINATION (AICTE) ,
B.TECH. (Textile Technology)
(For the Batch Admitted in Academic Year 2023-24)

III Semester

S.NO.	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
1	PC301 GTT	General Textile Technology	3	-	-	3	40	60	3
2	PC 302 YM	Yarn Manufacture	3	-	-	3	40	60	3
3	PC 303 FYT	Fibre & Yarn Testing	3	-	--	3	40	60	3
4	PC 304 FM-I	Fabric Manufacture-I	3	1	-	3	40	60	4
5	PC 305 MMFT	Man Made Fibre Technology	3	-	-	3	40	60	3
6	PC306 FSD	Fabric Structure & Design	3	1	-	3	40	60	4
Practicals									
7	PC 351 YM	Yarn Manufacture Lab	-	-	3	4	40	60	1.5
8	PC 352 FYT	Fibre & Yarn Testing Lab	-	-	3	4	40	60	1.5
9	ES 353 PP/ ES 453 IOT	Python Progr / IOT Lab	1	-	2	4	40	60	2.0
		Total	19	2	8		360	540	25

PC 301 GTT

GENERAL TEXTILE TECHNOLOGY

Instruction per week : [L-3, T -0] : 3 Hrs
Duration of SEE 3 Hrs
Credits :3

CIE: 40Marks
SEE: 60Marks

Course Objectives

- 1.To learn about the classification and properties of natural textile fibres
- 2.To know the conversion of different textile fibers from fiber to yarn/fabric
3. To understand the properties of Cotton, Jute and Wool
- 4.To learn about Silk and Silk Technology
5. To Identify different fibres and learn about unconventional fibres
6. To learn about the new unconventional natural fibres

UNIT - I.

Introduction to textiles – textile elements defined. - textile institute's classification of textile fibers – Introduction to count systems – conversion within and between different count systems - physical and chemical properties of textile fibers.

UNIT - II.

A brief note on classification of yarns: spun yarn, balanced yarn, filament yarn, simple yarn, novelty yarn – stretch yarn and textured yarn

Cotton: A brief note on different varieties of cotton – morphology and properties of cotton – conversion of cotton fibre to fabric. A Brief note on Kapok, Organic , GM or Bt, Never Dried Cotton.

UNIT - III.

Bast fibres: JUTE-Retting methods, Properties of Jute, stages in conversion of fibre to fabric-A Brief note on Flax, Linen, Hemp, Sisal, Banana, PALF

Wool: Brief note on types of wool – Morphology and properties of wool – Brief study on friction properties of wool, heat of wetting, warmth of wool – conversion of wool fibre to woolen and worsted yarns

UNIT - IV.

Silk Technology : A brief note on different varieties of silk – Life cycle of silk worm – Mulberry cultivation, Quality of Mulberry leaves, Introduction to rearing of silk, cocoon sorting, stifling, cooking and drying, brushing, reeling, degumming and weighting – Morphology and properties of silk – A brief study on types of silk fabrics – Flow sheet of the manufacture of spun silk.

UNIT - V.

Identification of Textile Fibres: By Microscopic Examination , Physical and Chemical Means- Comparison of Cotton, Wool, Silk ,Linen and Jute for common properties

Introduction to Unconventional Natural fibres : fibers from bacteria, deodorant fiber, fiber from Spider silk, Alginate, Paper/bamboo, Starch fibre, Maize fibre, Coir fibre,

Course Outcomes: (Graduates have an ability)

- 1.To apply the knowledge of count of fibres or yarns.
- 2.To Identify Cotton and other fibres
- 3.To analyse the fibre properties for yarn formation process.
- 4.To understand about the conversion of fibre to fabric

5.To evaluate the quality of Silk and its types

6.To design the specific end use in relation to fibre structure and properties

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. Textile Fibers – Dr. H.V. Sreenivasa Murthy, Woodhead Publishers, New Delhi, 2017
2. Fibre Science & Technology – S.P.Mishra, New Age India International Ltd. New Delhi (2015).
3. Textile Fibres – V.A Shenai, , Sevak Publication, Bombay., 2012

SUGGESTED REFERENCE:

1. Textile Fiber to fabric – Bernard P. Corbmann, Mc Graw-Hill International Education
2. Textile Fibres – Gorden Cook, CRC Publications, 2017
3. Textile Science – Gohl and Vilensky, Sara Publication House, New Delhi, 2014
4. Kadoh S J (2013) Textiles: Pearson New International Edition, Pearson Education Ltd, Asia

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓		✓		✓							
CO3	✓	✓	✓	✓								
CO4	✓	✓										
CO5	✓	✓	✓		✓							
CO6	✓	✓	✓		✓							

PC 302YM

YARN MANUFACTURE

Instruction per week : [L-3, T -0] : 3 Hrs
Duration of SEE 3 Hrs
Credits :3

CIE: 40 Marks
SEE: 60Marks

Course Objectives

- 1.. To understand the working of different openers and cleaners at Blowroom
2. To study the process of Carding
3. To understand the principles of Drawframe
- 4.To study the process of Simplex
5. To understand all aspects of Ring spinning
6. To know about the post spinning technology

UNIT – I

Ginning & Blow Room: Fibre properties for spinning, types of Gins, Bale management, Principles of Opening and Cleaning , Objectives of Blow room and passage of material thro various machines like Modern Bale openers, Blending equipments, Mono Cylinder, ERM cleaner, Hopper fed Scutcher , Autoleveller at Blowroom, Chute feeding, Quality control aspects, Production planning , maintenance schedules and calculations of Blow room

UNIT- II

Carding : Objectives of Carding, Passage of material , various zones, working of each zone, setting for different fibres, Grinding and stripping, Modern High production Card, Quality control aspects, Production planning , maintenance and calculations - Autoleveller at Card

UNIT- III

DrawFrame: Objectives , passage of material, principle of Drawing , pre and post drawing , various types of drafting systems, setting , Quality control studies , Production planning , maintenance and calculations - Autoleveller at Draw frame – Modern Draw frame

Preparatory process to Comber : selection of Machines, Pre comber draft, Passage of material thro comber preparatory machines , Hook theory

UNIT – IV

Comber : Objectives, Need , degrees of Combing- Passage of material and Zones in comber, construction and function of all elements , Modern comber , Quality control studies , Production planning , maintenance and calculations

Speed Frame: Objectives and principles , passage of material, types of drafts and drafting systems, Production calculations, Quality control studies, Modern speed frame – Auto feed to Ring frame

UNIT- V

Ring Frame : Objectives & principles, types of drafts and drafting systems, twist calculation and types of twists, Quality control studies, Production planning , maintenance and calculations – Auto feed to Cone winder .

Post Ring Frame : Doubling objectives and machines , Doubling twist, Role of TFO, Reeling machine and types of Reeling – Bundling, Baling , A brief note on Waste spinning.

Course Outcomes: Graduates have an ability to

- 1.To estimate the clearing efficiency of each machine in Blowroom
- 2.To plan for the production of fibres at Carding
- 3.To Design the passage of material thro all spinning machines

- 4.To Analyse the quality of Drawn and Combed sliver
- 5.To apply the knowledge of production of each machinery and prepare spin plan accordingly.
- 6.To describe the requirements for processing different fibres in spinning.

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Books:

- 1.Spun Yarn Technology – Eric Oxtoby, Textile Institute, Macnhester , 2006
- 2.Spun Yarn Technology – Venkat Subramani, SSM institute of Technology , Komarapalyam, 2008
- 3.Short staple spinning process – Opening and Cleaning, Carding , Drawframe, Speed frame and Ring Frame – W.Klein, The Textile Institute, Manchester 2007

REFEERENCE BOOKS:

- 1.Essential facts of cotton spinning – T.K.Pattabhiraman, Mahajan Book Publishers, Ahmedabad, Revised edition, 2008.
2. Textile Processing – Opening and cleaning, – Opening and Cleaning, Carding , Drawframe, Speed frame and Ring Frame – by Szaloski, Institute of Textile Technology, Chezeslovakia 2007.
- 3.BTRA Monograph series on Blow room and Carding, BTRA Publications, Bombay 2008.
4. Tablets on : Blowrrom, Carding, m, Comber , Speed frame, Ring frame , Doubling , Textile Association of India, 2014

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓					✓	✓	✓
CO2	✓	✓		✓	✓							✓
CO3	✓	✓		✓	✓							✓
CO4	✓	✓		✓	✓							✓
CO5	✓	✓		✓	✓							✓
CO6	✓	✓		✓	✓							✓

PC303 FYT

FIBRE & YARN TESTING

Instruction per week : [L-3, T -0] : 3 Hrs

CIE: 40

Duration of SEE 3 Hrs

SEE: 60,

Credits:3

Course Objectives:

1. To provide the knowledge of testing of fibers, Yarns using different types of instruments
2. To understand the relations between the fibre properties and structures for specific end-use
3. To understand the importance of testing related to different processes in a plant w.r.t product.
4. To develop the new methods of testing fibers, yarns
5. To learn about the yarn evenness
6. To understand the concept of analyzing Spectrographs

UNIT - I.

Introduction to textile testing and quality control – objectives of testing – Sampling: The random sample, the biased sample, Length and extent biased samples, Squaring technique, Cut squaring, Zoning techniques for raw cotton, Sampling methods for wool- Yarn and Fabric sampling methods – Sampling errors.

Fibre Trash: Shirley analyzer – Measurement of Fibre Trash: Working and principle of Shirley trash analyzer

UNIT - II.

Moisture Relations: Significance in Textiles, Role of Moisture in different operations of Textile Processing, Relations between Regain and moisture content, Corrections for regains(Numerical simple examples), Hygrometers and their working – recent developments in Moisture meters

Fiber length: Significance of Measurement, Cotton fiber length measurement by Fibre sorter methods, Analysis of Sorter diagrams, Shirley Photoelectric model stapler, Fibrograph: Digital Fibrograph (span lengths and their significance).

UNIT - II.

Fiber fineness: Significance, conventional methods , Optical methods, Airflow methods: Principle, WIRA Fineness meter for cotton and wool, Sheffield Micronaire

Maturity of cotton: Significance, Maturity ratio, Maturity count, and Measurement of maturity of cotton fibers. The relation between Fineness and Maturity.

Fiber strength: Principle of Tensile Testing: Fibre strength and elongation. -Measurement by Uster Tenso Rapid tester, recent developments in tensile testing of yarns

UNIT - III

Yarn Hairiness: Reasons for **Hairiness**, Measurement methods and expression of results

Yarn dimensions: Measurement of yarn count: Warp reel, Knowles balance,– quadrant balance&– Beesley's yarn balance, Corrections to Yarn Count concerning Moisture Regain of Cotton Significance of CSP, CCSP and Corrections to them concerning Moisture Regain of Cotton.Yarn twist and its importance: Study of various twist Measuring instruments

UNIT - IV.

Yarn evenness – Different variations – Index of irregularity – limit irregularity – the addition of irregularities – variance length curves – methods of measurements of evenness – visual examination – cutting and weighing methods – WIRA roving levelness tester – The fielden Walker yarn evenness tester – Uster evenness tester – Photoelectric tester – variometer – analysis of spectrograph – The causes and effects of irregularity. Uster classimat and Uster Quali Circle its interpretation

UNIT - V.

Advancements in fibre properties measurement by AFIS, HVI- Sample Size, Interpretation of test results using tests of significance , ANOVA, measures of central tendency and importance of dispersion , Significance of Quartiles , Box and Whisker plot, Stem and leaf plot .- Role of Indian Standards – Reference of Testing methods standards like DIN, AATCC, ASTM for fibre & yarn

Course Outcome: (Graduate to have)

1. An ability to test different types of fibers, Yarns using different types of instruments
2. An ability to understand the relations between the conditions of testing and substrates about the method of Testing and instruments
3. An ability to understand different fiber properties and relate them.
4. An ability to use fibers according to their end uses applications
5. An ability to assess the yarn evenness
6. An ability to decide the fiber and yarn parameters for production and applications

EXAMINATION: Part-A for 40 Marks (with 10 Questions-**Compulsory**) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting at least one from each Unit)

TEXTBOOKS:

1. Physical Testing Vol.- I & II Angappan, SSMITT Publications Komarapalyam, 2008
2. Textile Testing – Arindam Basu, SITRA, 2006.

REFERENCE BOOKS:

1. Principles of Textile Testing – J.E. Booth, Butterworths, London – 2007.
2. Physical properties of Textile Fibres – W.E. Morton and J.W.S. Hearle, The Textile Institute, Manchester, 2008.

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓		✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓			✓								
CO5	✓	✓	✓	✓	✓							
CO6		✓		✓								

PC304FM-I

FABRIC MANUFACTURE – I

Instruction per week : [L-3, T -1] : 4 Hrs
Duration of SEE 3 Hrs
Credits :4

CIE: 40
SEE: 60,

COURSE OBJECTIVES:

- 1.To learn the basic principles of Warp and Weft Winding
- 2.To understand the role of Tensioners and Yarn clearers in Winding
- 3.To learn about the process of Winding, Warping and Sizing
- 4.To learn about the selection of Size recipe for sizing of different fibres
- 5.To learn about the loom and its functions
- 6.To understand the timing and working Primary motions

UNIT - I.

Yarn Preparatory – Demerits of Ring yarn – Need for Yarn preparation- Introduction, systems of yarn preparation – classification of winding machines – principles of warp winding- study of high speed and super speed cone winding machines – special features such as splicing, auto doffing, electronic slub catcher, ribbon breaker etc., - special features of Murata Auto coner, production calculations – winding faults and remedies.-Quality Control Aspects

UNIT - II.

Pirn winding: Introduction, systems of Weft Preparation, objectives, spindle and spindless pirn winders, constructional features of super speed pirn winder, bunch building motion, pirn elements, production calculation. Quality Control Aspects.

Warping: objectives, classification, Different types of Creels and their selection, planning for patterned warps, calculations, anti-bound let off in beam warping, Working principle of conventional and modern beam warper, Production calculation in beam and Sectional warping . Quality Control aspects in Warping .

UNIT – III.

Introduction to sizing: Objectives, Types of forms and degrees of sizing, different zones,

Creel zone: elements, different types of creels, Positive and negative creels, brake system , Lapper formation and recording

Wet Zone : Elements and construction of Sow box, controls in sow box , modern sow box, stretch control .

Dry Zone : Methods of Drying Concept of drying, Construction of Drying cylinders, Drying efficiency calculation , Stretch Control, Construction of Cylinders Wet splitting

UNIT – IV:

Head Stock: Cut mark motion, moisture control , after waxing in sizing – dry splitting – Migratory behavior of warp ends in sizing – ATIRA Method of recoding –Sheeting rollers , Types of combs – Motion for combs – Brief note on Beam winding & Beam press- Sizing faults and remedies – Calculations in sizing – Post sizing operations.- Quality control aspects in Sizing .

UNIT – V.

Weaving: Introduction, Loom Specification, types and classification, loom motions ,comparison of tappet, Dobby and jacquard shedding ,Principles of Shedding : positive and negative tappet shedding, kinds of sheds, heald reversing motions, early and late shedding.- Principles of picking: cone under Vs over picking, intensity of picking, setting and timing of picking mechanisms, early and late picking, shuttle checking, Picking elements – Beat up: Eccentricity of sley, Significance-loom production problems.

COURSE OUTCOME :(Graduate to have)

- 1.An ability to decide the suitable yarn preparation system based on the supply and end packages
- 2.An ability to select the tensioning and yarn clearing levels for processing a specific fibre /yarn
- 3.An ability to detect the package defects
- 4.An ability to plan for a size recipe for a specific set
- 5.An ability to test the wound package, warp beam, pirn and sized yarn for required parameters
- 6.An ability to adjust and set the timings and setting of primary motions in a loom for weaving a sort.

EXAMINATION: Part-A for 40 Marks (with 10 Questions-**Compulsory**) & Part -B for 60 Marks
(5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

- 1.Sizing Methods, Materials and Machines – D.B.Ajgaonkar, Mahajan Publishers, Ahmedabad,2006
- 2.Introduction to Winding & Warping – M.K.Talukdar, Mahajan publishers, Ahmedabad,2004

REFERENCE BOOK:

- 1.Modern Yarn Preparation & Weaving Machinery- ormerod, Butterworths, London,2006
- 2.Conversion of Yarn to Fabric – P.R.Lord & M.H.Mohammed, Marrow Publishers, London, 2008.
- 3.Weaving ,Technology, Management – Azagaonker, Sriramulu,Mahajan ,Ahmedabad, 2007

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓					✓	✓	✓
CO2	✓	✓		✓	✓							✓
CO3	✓	✓		✓	✓							✓
CO4	✓	✓		✓	✓							✓
CO5	✓	✓		✓	✓							✓
CO6	✓	✓		✓	✓							✓

PC 305MMFT

MAN-MADE FIBRE TECHNOLOGY

Instruction per week : [L-3, T -0] : 3 Hrs

Duration of SEE 3 Hrs

Credits:3

CIE: 40Marks

SEE: 60Marks

Course Objectives:

1. To provide the knowledge of the principle involved in fiber-forming polymers, and also the process involved in various spinning processes.
2. To understand the manufacturing aspects, properties, and the application of different synthetic fibers.
3. To provide the knowledge on the spin finishes, selection criterion, and also the technology involved in the regenerated fiber manufacturing process
4. To understand the manufacturing techniques, properties, and applications of microfiber and nanofibers
5. To provide the knowledge on the manufacturing processes of polyester and nylon fiber and their surface treatments techniques
6. To understand the cleaning methods of spinnerette

UNIT - I.

Introduction to manmade fibers – Distinction between Natural and Man-Made Fibers for Production, Properties & End Uses. important operations in the production of synthetic fibers – fibers varying substrate and geometry – Principles of fiber-forming polymers, parameters influencing the quality – glass transition temperature

Manufacturing of Manmade fibers- Methods: Solution spinning – salient features of solution spinning – principles of wet and dry spinning-Rheology of Wet& Dry Spinning – comparison – a brief note on dry jet wet spinning

UNIT - II.

Melt spinning – detailed note on elements on melt spin equipment – various zones in extruders – design of extruder – types of extruders – the characteristic feature of extruder – types of spin pack assemblies – construction of spinnerets – spinneret cleaning methods – Rheology of melt spinning – variables of melt spinning High-speed spinning concept (integrated spin drop process, H4 S and FDY Process) - Stretching and drawing – drawing condition phenomena of necking –the influence of drawing on structure and property.

UNIT – III:

Spin finishes – Objectives, –types of spin finish- application methods – problems of application – Ideal spin finish — constitution of spin finish –problems in removal of spin finish-Manufacture of Rayons - viscose rayon, manufacturing process– physical and chemical properties.- A brief note on Recent developments in modal fiber manufacturing (Lyocell fibre).

UNIT-IV

Manufacture of acrylics, mode acrylics, polypropylene fibers – properties and applications of acrylic and mode acrylic, PP Fibres.

Microfibres– methods of production – bi-component technology – melt-blown process properties and applications of microfibres – problems in the processing of micro fibres in weaving

Nanofiber- methods of production –properties- applications

UNIT - V.

Polyester manufacture – transesterification, polycondensation – technical details - chemical reactions – side reactions – properties and applications

Manufacture of Polyamide: Nylon – classification of polyamides – manufacture nylon 6, nylon 66, (manufacture monomers various routes for PET and nylon).

Surface modification of Synthetic fibers: Need, polyester cause, and effect – recent developments in polyesters like CDP, EDP, CFDP, APP, etc

Course Outcome:

1. An ability to distinguish the natural and synthetic fibers in terms of the structure and the properties.
2. An ability to understand the process and the machinery requirements of the different types of the spinning process.
3. An ability to understand the need, types, and the application of the spin finishes.
4. An ability to study the manufacturing and the properties of various types of synthetic fibers used in vogue
5. An ability to understand the process, the technological requirement for polyester and Nylon fiber production
6. To describe the polymerization process and the requirements thereof

EXAMINATION: Part-A for 40 Marks (with 10 Questions-**Compulsory**) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting at least one from each Unit)

TEXTBOOKS:

1. Technology of Manufactured Fibres– Prof. V. B. Gupta, Chapman and Hall, Newyork, 2004
2. Textile fibers – Dr. H.V.Srinivasmurthy, Woodhead Publishers, New Delhi, 2016.
3. Production of synthetic fibers A.A.Vaidya, Prentice Hall of India, New Delhi, 2005

REFERENCE BOOK:

1. Man-made fibers – R.W. Moncrieff, Batterworth& Co., Manchester, 1980.
2. High-performance Fibers – Textile Progress, Textile Institute, 1995.
3. Man-Made Fibres- NCUTE Pilot Programme, IIT, New Delhi, 2006

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓		✓		✓							
CO3	✓	✓	✓	✓								
CO4	✓	✓										
CO5	✓	✓	✓		✓							
CO6	✓	✓	✓		✓							

PC 306 FSD

FABRIC STRUCTURE & DESIGN

Instruction per week : [L-3, T -1] : 4 Hrs
Duration of SEE 3 Hrs
Credits :4

CIE: 40Marks
SEE: 60Marks

COURSE OBJECTIVES

- 1.To educate the students in understanding the plain weave and fabrics.
- 2.To educate the students about the commercial fabrics and production planning
- 3.To provide the knowledge about the toweling fabrics production
4. To educate the students about the complex fabrics
- 5.To plan for the requirements of the fabrics for a particular application
- 6.To understand the loom particulars for different weaves

UNIT- I.

Introduction to fabric structure : method of weave notation – elements of fabric structure – Fabric Structure & Texture compared- Warp faced ,weft faced , equi faced weaves, fabrics, constructions Selection of Reed and its importance-design, draft, denting and peg plan – their inter relation – classification of weaves – modification of plain: as warp rib, weft rib, matt, fancy matte, stitched hopsack – classification of plain cloths

UNIT - II.

Introduction to twills – Characteristics of Twills ,twill angle, twist and twill interaction, Twill modification: wavy, herringbone, combined, broken, steep, flat, skip twills, sateen and satin, modification of Floating weaves – fancy weaves: honey comb-Huck-A-Back-Mock-leno: Basic designs, distorted thread effects (warp and weft way).

UNIT -III.

Crepe weaves: different methods of construction – colour and weave effects – classification of advanced fabrics – extra thread figuring - bed fords and welts or piques -- backed cloths: reversible and wadded backed cloths.

UNIT IV.

Double clothes: principles of stitching, reversible, wadded, inter changeable double cloths - treble cloths: principle of stitching - weft piles: plushes & corduroys. Warp plies (A brief Note): Velvets,

UNIT V.

Terry piles: terry motion, Terry ornamentation, Dobby striped & Check effects in Terry-Gauze & Leno: principle, Sheds formed in Leno, Designs for simple leno - Damasks and brocades : twilling jacquard , method of developing a design for Damask (Planning for Loom production).

COURSE OUTCOME (Graduate to have)

- 1.An ability to understand the basic elements of fabric structure and their interrelations
- 2.An ability to understand the different types of weaves and the yarn and loom requirements to produce the weaves on the loom.
3. An ability to decide the suitability of weaves for specific applications
4. An ability to understand the structures of Advanced fabrics
- 5.An ability to design new set of repeats for specific purpose
- 6.An ability to suggest the loom particulars for a specific design

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weight age selecting at least one from each Unit

TEXT BOOKS:

1. Fabric Structure & Design – Prof. J. Hayavadana, Sci-Tech Publishers, New Delhi, 2013
2. Woven Fabric Design and Production Planning- Prof. J. Hayavadana, Woodhead Publishers, New Delhi, 2016
3. Woven cloth construction – Robinson and Marks. M/S Butterworths, London , 1976

REFERENCE BOOKS:

1. Watson's Textile design and colour – Z. Grosicki, Newness – Butter & worths, M/s Mahajan Book publishers, Ahmedabad, Gujarat, 2006
2. Watson's Advanced Textile Design – Z.Grosicki, M/s Mahajan Book publishers, Ahmedabad, Gujarat 2006
3. Fabric structure and design – Kibbe, E.L.B.S.Publications, Moscow, 2008.

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓		✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓			✓								
CO5	✓	✓	✓	✓	✓							
CO6		✓		✓								

PC 351YM

YARN MANUFACTURE LAB

Instruction per week : [P-3] : 3 Hrs

Duration of SEE 4 Hrs

Credits :1.5

CIE: 40Marks

SEE: 60 Marks

Course Objectives:

- 1.To provide the Knowledge of basic machinery of Blended Scutcher and Blowroom
- 2.To understand the principles involved in processing fibres thro Carding
- 3.To analyse the process of Drawing
4. To provide the knowledge about Speed frame process.
5. To Educate and understand the importance of spinning of fibres
6. To provide the knowledge for selection machinery with respect to the material

List of Experiments (Minimum of 8 Experiments have to be Performed)

1. Passage of material and calculation of drafts, speeds and production calculation of Production in Blended Scutcher
2. Passage of material and calculation of drafts, speeds and production calculation of Production in Carding.
3. Material passage through Draw frame and functions of important parts in Draw frame
4. Calculations of speeds of various parts like drafting rollers, coiler calendar roller,
5. feed roller ,drafts and production etc.
6. Calculations of Break Draft constant, Draft constants change pinion for different range of drafts.
7. Material passage through speed frame and functions of important parts
8. Calculations of speeds of various rotating parts in fly frame
9. Calculations of Total Draft, zonal Draft, Break draft, twist constant, production constant in speed frame
10. Study of Builder mechanisms and calculation of Bobbin Rail movement, No.of layers on the bobbing, coils/inch in speed frame.
11. Passage of material through Ring frame with the help of line diagram.
12. Calculation of speeds of drafting rollers of ring frame with the help of diagram and draft calculation in Ring Frame.
13. .Calculation of spindle speed with the help of gearing diagram and calculation of twist per inch, traveller speed.
14. .Calculation of draft constant, twist constant with the help of gearing diagram and problems pertaining to draft constant and twist constant in Ring Frame
15. .Spin plan and production calculation.
16. Quality Control Aspects of Blow room , Carding , Draw frame, Speed frame and Ring frame

Course Outcomes: Graduates have

1. An ability to understand the material flow through various machines thro Blow Room and quality control aspects of product produced
- 2.An ability to select the Process parameters in Carding for specific fibre
- 3.An ability to understand the different parameters which affect the process, production and quality of yarn
- 4.An ability to understand the Production calculations in Draw Frame and Speed frame
- 5.An ability to select process and machinery parameters in Ring frame based on the type of fibre and Roving characteristics.
6. An ability to set the machinery for different types of fibres used for the specific quality products

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓	✓	✓		✓							✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓							✓
CO6	✓	✓	✓	✓	✓							✓

PC 352 FYT

FIBRE AND YARN TESTING LAB

Instruction per week : [P-3] : 3 Hrs

Duration of SEE 4 Hrs

Credits :1.5

CIE: 40Marks

SEE: 60Marks

COURSE OBJECTIVES:

- 1.To provide the knowledge about the machinery used in testing of fibers
- 2.To educate and understand the need, principle, setting of the fiber, yarn samples.
- 3.To provide the knowledge of fiber characteristics needed for specific applications
- 4.To educate the students about testing of fibre strength
- 5.To understand the testing of Yarn count
- 6.To develop knowledge about the assessment of yarns for specific purpose

List of Experiments (Minimum of 8 Experiments have to be Performed)

1. Determination of Ginning Percentage and Lint Index
2. Determination of Fibre Length by Halo and Butterfly Method
3. Determination of Fibre Fineness by ATIRA Fineness Tester
4. Determination of Fibre Maturity by Sodium Hydroxide Swelling Method
5. Determination of Fibre Length by Baer Sorter Method
6. Determination of Yarn Count by Wrap Reel and Beesley Balance
7. Determination of Count Strength Product of Yarn using LEA Method
8. Determination of Single Thread Strength using Single Strength Tester
9. Determination of Single Yarn Twist
- 10.Determination of Double Yarn Twist
- 11.Determination of Fibre Strength by Stelometer
- 12.Identification of Textile Fibres under Microscope

COURSE OUTCOME(Graduate to have)

1. An ability to test different types of fibres , Yarns using different types of instruments
- 2.An ability to understand the relations between the conditions of testing and substrates in relation to method of Testing and instruments
3. An ability to understand different fibre properties and relate them.
- 4.An ability to use fibres according to their end uses applications
- 5.An ability to judge the fibre properties
- 6.An ability to select the fibre for spinning based on fibre properties

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓	✓	✓		✓							✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓							✓
CO6	✓	✓	✓	✓	✓							✓

PC 353 PP(P)

PYTHON PROGRAMMING LAB

Instruction per week : [L-1, T -0 P-2]3 Hours

Duration of SEE : 4Hours

Credits : 2

CIE: 40 Marks

SEE : 60 Marks

Course Objectives

1	To learn basic concepts of python programming
1.	To develop the simple python programs using conditionals and loops
2.	To learn about python functions and use function calls
3.	To use python data structures -lists, tuples, Dictionaries and sets
4.	To learn different data structures to organize the data
5.	To learn class design and file handling in python

Introduction to Python Programming : Arithmetic Operations :Built-in Functions, Loops, Data Types, Strings, Classes and Objects. Built-in Modules, Constructors and Inheritance, File Operators, GUI Application

1. Develop algorithmic solutions to simple computational problems
2. Develop and execute Python programs using simple expressions and statements.
3. Implementing programs in Python using conditionals and loops for solving problems..
4. Deploying functions to decompose a Python program.
5. Processing compound data using Python data structures.
6. Implementing real-time/technical applications using Lists, Tuples.
7. Develop programs to implement the concept of constructors and inheritance
8. Develop programs on file operations
9. Implementing programs using written modules and Python Standard Libraries (pandas, numpy, Matplotlib, scipy)

Text Book:

1. ReemaThareja, “Python Programming using Problem Solving Approach”, Oxford University Press, 2017.
2. Fundamentals of Python Programming, Richard L. Halterman, Southern Adventist University

Reference books :

1. Guido van Rossum, Fred L. Drake Jr., “An Introduction to Python – Revised and Updated for Python 3.2”, Network Theory Ltd., 2011.
2. Charles Dierbach, “Introduction to Computer Science using Python”, Wiley India Edition, 2016.
3. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.
4. url : <https://www.python.org>
5. url: <https://python-iitk.vlabs.ac.in>
6. url: <https://www.programiz.com/python-programming/methods>

4. Jain, Prof. Satish, Singh, Shashi, *Internet of Things and its Applications*, 1st Edition, BPB, 2020
5. Shriram K Vasudevan, Abhishek SN and Sundaram RMD. *Internet of Things*, First Edition, Wiley India; 2019\
6. Raj P, Raman AC. *The Internet of things: Enabling Technologies, Platforms, and Use-cases*. Auerbach Publications; 2017.
7. Adrian McEwen. *Designing the Internet of Things*, Wiley; 2013.
8. Url : . <https://www.arduino.cc/reference/en>
9. Url : <https://create.arduino.cc/projecthub>

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓	✓	✓		✓							✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓							✓
CO6	✓	✓	✓	✓	✓							✓

SCHEME OF INSTRUCTION AND EXAMINATION (AICTE) ,
B.TECH. (Textile Technology)
(For the Batch Admitted in Academic Year 2023-24)

IV Semester

S.NO.	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
1	PC401 KT	Knitting Technology	3	-	-	3	40	60	3
2	PC 402 FM-II	Fabric Manufacture- II	3	1	-	3	40	60	4
3	PC403 FT	Fabric Testing	3	1	-	3	40	60	4
4	PC404 MTM	Mechanics of Textile Machinery	3	1	-	3	40	60	4
5	PC405 ATM	Advanced Textile Manufacture	3	-	-	3	40	60	3
6	MC 406 ES	Environmental Science	3	-	-	3	40	60	*
Practicals									
7	PC 451 FM	Fabric Manufacture Lab	-	-	3	4	40	60	1.5
8	PC452 FT	Fabric Testing	-	-	3	4	40	60	1.5
9	ESC	Python Progr / IOT Lab	1	-	2	4	40	60	2.0
		Total	19	3	8		360	540	23

PC 401KT

KNITTING TECHNOLOGY

Instruction per week : [L-3, T -0] : 3 Hrs

Duration of SEE 3 Hrs

Credits :3

CIE: 40 Marks

SEE: 60Marks

COURSE OBJECTIVES:

1. To provide the basic understanding of knitting, method of loop formation process and method of representing knit structures
2. To provide the knowledge of production of various knit structures.
3. To provide the knowledge of patterning in knitting and method representation of structures by using patterning.
4. To provide the knowledge about the knit geometry and knit machine dynamics
5. To provide the knowledge about the Warp Knitting and its machinery
6. To understand about the construction features of different makes of Knitting machines

UNIT- I.

Introduction to knitting : Comparison with Weaving for Technology , Production and Properties . A brief note on: Knit industry in India and Reasons for Popularity of Knitting. Basic terms in Knitting Technology, Requirements of hosiery yarn, Elements of Knitting Machine, Specification and types. Various zones in Knitting machine and their significance , Passage of material through knitting machine. Function of each element , Methods of representation of Knit structure .

UNIT -II.

Different types of Creeling arrangements (Wall & Over head), yarn feeding arrangements Driving arrangements in Circular Weft knitting machine. - Method of loop formation by Latch, Beard and Compound needle . -Classification and representation of Weft Knitting structures : Single jersey, Rib , Interlock and Purl.. Relation between gauge and count of yarn . Production aspects of Knitting machine(simple numerical examples). Types and selection of Tension devices and Positive Feeders and their role in Knitting, Stop motions in Knitting machines.

UNIT- III.

Patterning in weft knitting: Scope and need -Arrangements in cam for Knit ,Miss and Stitch – combination of any two to produce structures : Representation of 2 or more colour jacquard design (including needle layout, knitting sequence, and needle diagram) like Single pique, Cross miss, Piquette, Cortina, Jersey cord, Super roma, Poplin, Evermontee, Milano rib, French and Swiss pique, Ponte di roma on four and six feeders, Ottoman rib, Bourrlet, Pintuck, Taxi-Pique, Patterning and selection devices – pattern area calculation.

UNIT -IV.

Introduction to Knitting dynamics: A brief note on forces acting on the needle, linear and nonlinear cams, needle breakages, spirality angle, Geometry of Weft Knits, Tightness factor and its significance, relaxation and shrinkage, knit fabric dimensional stability, a brief note on star fish project.

Warp Knitting: Introduction- Warp and weft knitting compared , Elements of Warp knitting machine and structure, Classification of Warp knitting structures ,representation of common Warp knit structures, Loop formation by Beard, Latch and Compound Needles in Tricot and Raschel knitting machines,

UNIT-V

A brief note on driving arrangements for Guide-bars, Needle bars and Sinker bars, Basic Lapping movements in Warp knitting, methods to represent Lapping diagrams, Runner's ratio, estimation of runner's ratio, calculation of fabric density of knit fabrics.(simple numerical examples based on above concepts) A brief note on Yarn preparatory requirements for Warp knitting, and systems of Warp Let-off motion in Warp knitting. Patterning in Warp knitting, Brief note on : Fall plate patterning, full width insertion, Pile knitting and laying in . Quality Control in Weft knitting and a brief note on common defects in Weft and Warp knitting . Recent developments in the design of weft knitting machines.

COURSE OUTCOME (Graduate to have)

1. An ability to understand the basic method of manufacturing knitted fabric and relation between count and gauge of the machine.
2. An ability to produce the different knit structures and to under the method of loop formation process.
3. An ability to understand the patterning in weft knitting and cam design for knit, miss and tuck or combination of these for producing double jersey fabrics
4. An ability to understand the importance of quality control in weft knitting and knitting dynamics
5. An ability to understand method of manufacturing and loop formation process, working principle of different warp knitting machines
6. An ability to set up a knitting unit for production process

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. Knitting Technology-WB.Azagoankar, Mahajan Textile Publisers, 5 th Edition , 2006.
2. Knitting Technology – David J.Spencer, Wood Head Publishing Company, England, 2nd Edition,2008
3. Warp Knit Fabric Technology- Bharat J. Gajjar, Philidelphia University press, 2006

REFERENCE BOOKS:

1. Circular Knitting – Chandrashekar Iyyer, CRC Publications, 2 nd Edition, 2000
2. Warp Knitting – Smerifit, Marrow Publication, London, 2 nd Edition, 2000
3. Introduction to weft knitting – Smeriffit., Marrow Publication, London, 2 nd Edition, 2000
4. Warp knitting – Dr. Raz, CRC, Publications, 3 rd Edition, 2001
5. Knitting Dynamics – Textile progress and Journal of Textile Institute., 1970 to 1978

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓		✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓			✓								
CO5	✓	✓	✓	✓	✓							
CO6		✓		✓								

PC 402 FM- II

FABRIC MANUFACTURE- II

Instruction per week : [L-3, T -1] : 4 Hrs
Duration of SEE 3 Hrs
Credits :4

CIE: 40Marks
SEE: 60Marks

COURSE OBJECTIVES:

- 1.To Learn about the temples
- 2.To learn about the working of loom secondary motions
- 3.To understand the working of Dobby
- 4.To learn about the working and construction of Jacquard
- 5.To learn about the Autoloom and box motions
- 6.To learn about the setting of Box motions

UNIT I.

Classification of Loom secondary motions

Loom temples: Need ,types and selection., Temple mark, Temple specification and method of checking and setting on a loom for different warp width.

Take –Up Motion: Types ,Dividend calculations, Anti-crack device, cloth wind-up systems., Settings

Let-off motions: Need, types, working of positive let-off ,recent developments

Auxiliary motions: Types ,selection, settings and working of :Warp protector motions (Fast & Loose Reed),. Weft stop and warp stop mechanisms

UNIT II

Dobby Shedding: Introduction, need ,specification , types, selection and classification ,Pegging Process, working of Keighly, Climax, Cam, Paper dobbie (brief note on cross border dobbie),Pick finding: Need and methods., Dobby Setting

UNIT III

Jacquard Shedding: Need, Types, Selection, Specifications and Classification., Principle of a Jacquard, Working of SLJ, DLSC, DLDC & CBJ, Setting of Jacquard.

UNIT IV

Preparations to Jacquard Weaving: Card cutting: Need, Types, Selection and Process –Lacing: Need, Types and Process, Card Repeaters: Need -Casting out: Need, types, selection and Process - Arrangement of figures – Harness tie ups – methods to increase figuring capacity (Working of split harness)

UNIT V.

Box motions: Need, Types ,selection – Working of 4 X 1 and 4 X 4 box motions, Preparations box motion pattern chain card, Card saving device, Defects in box motion

Automatic Looms: Feelers, Need, Types, selection, Cop Change Mechanisms , Shuttle thread eye Cutter & Temple cutter – A brief note on filament weaving and Shuttle changing mechanism

COURSE OUTCOME: (Graduate to have)

- 1.An ability to set the Loom temples based on warp count
- 2.An ability to set the loom secondary motions
- 3.An ability to select the dobbie and set and time
- 4.An ability to set the Jacquard and weave different fibres /yarns
- 5.An ability to set and adjust the Autoloom for different sorts
- 6.An ability to prepare the patterning chain for box motions

EXAMINATION : Part-A for 40 Marks (with 10 Questions: -Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

- 1.Principles of Weaving – Robinson and Marks, Textile Instt. Manchester, 2004
- 2.Plain weaving Motions – Prof. K.T.Aswani, M/s Mahajan Book publishers, Ahmedabad, Gujarat, 2007
- 3.Fancy weaving mechanism – Prof. K.T.Aswani, M/s Mahajan Book publishers, Ahmedabad, Gujarat, 2008
- 4.Conversion of yarn to fabric – Lord and Mohammed, Butterworths, Manchester, 2000

REFERENCE BOOKS:

- 1.Weaving Mechanism Vol –I& II by Prof.N.N.Bannerjee, M/s T.Banerjee, New jute mills publications, Calcutta, 2002
- 2Automatic looms – TAIRO, Baroda Industrial Research Association publications, 2002
- 3Automatic Looms – Tablet by TAI. M/s Mahajan Book publishers, Ahmedabad, Gujarat, 2003

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓		✓					
CO2	✓	✓		✓								✓
CO3	✓	✓	✓	✓								✓
CO4	✓	✓		✓								
CO5	✓	✓	✓	✓	✓							✓
CO6	✓			✓							✓	✓

PC403 FT

FABRIC TESTING

Instruction per week : [L-3, T -1] : 4 Hrs

Duration of SEE 3 Hrs

Credits :4

CIE: 40Marks

SEE: 60Marks

Course Objectives

1. To provide the knowledge of testing of fabrics using different types of instruments
2. To understand the relations between the fabrics properties and structures for specific end uses
3. To educate the importance of fabric quality related to different processes during manufacturing and fabric processing.
4. To develop the new methods of testing fabrics in order to get accurate values and spontaneous results
5. To understand the properties of fabrics and construct various diagrammatic representations
6. To understand the role of production parameters on fabric properties

UNIT I.

Fabric Testing: Scope ,Classification of Fabric properties., selection of properties criterion followed , Standard conditions for test methods.

Measurement of Fabric Geometrical Properties

Fabric dimensions: Need for measurements of Fabric dimensions in general from the research point of view. Significance of measurement of length, width, Warp and Weft count, fabric weight and threads/inch in fabrics- Methods of measurement of length , Width, Count, Weight, Thread set., Use of Densimeters and the range of instruments available in Textile Industry. Fabric GSM cutters and their principle

Fabric Thickness : Need and Significance, measurement, Fabric compressibility at different loads, Calculation of EMC, Load Vs Recovery. Factors governing compressibility of fabrics.

Crimp: Need , Significance from properties and production of point of view , measurement, Measurement of Crimp from Stress and Strain Curve (as suggested by Hearle) Factors affecting crimp, Crimp Vs Take up.

UNIT II

Measurement of High Stress mechanical properties of fabrics

Tensile Properties: Role of Tensile property of a fabric, Crimp interchange , Criterion for measuring Tensile strength, Selection of suitable Tensile method of fabric testing , Conventional and Modern Instruments, Impact of Textile Wet Processing on Tensile strength , Factors affecting the Tensile strength results and their interpretation

Tear Strength : Need and Significance , Criterion for Tear Strength , Different modes for measuring Tear Strength, Relation between fabric Washing and Tear strength , Impact of Textile Wet Processing on Tear strength, Factors affecting the Tear strength results and their interpretation

Bursting Strength : Need and Significance , Criterion for Bursting strength , Conventional and modern instruments available ,Impact of Textile Wet Processing on Bursting strength, Factors affecting the Bursting strength results and their interpretation

Ballistic strength: Need and Significance , Criterion for Ballistic strength , Impact of Textile Wet Processing on Ballistic strength, Factors affecting the Ballistic strength results and their interpretation

UNIT III

Measurement of Fabric Aesthetic Properties

Flexural Rigidity: Need and Significance , Conventional and Modern methods of measuring Fabric bending and Overall Flexural rigidity, recent development in measuring fabric bending

, Impact of Textile Wet Processing on Bending , Factors affecting Bending behavior and Measurement results and their interpretation.

Fabric Drape: Need and Significance, Methods of measurement, Static Vs Dynamic Drape, Measurement of Static and Dynamic Drape, Review of Research carried out on Fabric Drape, Analysis of Drape contour, Relation between bending and Drape , Impact of Textile Wet Processing on Drape , Factors affecting Draping behavior and Measurement results and their interpretation.

Fabric Shear : Concept of Shear and Shear force , Analysis of Fabric Shear behavior, Need and significance of Shear measurement, Methods of Shear measurement, Impact of Textile Wet Processing on Shear , Factors affecting Shear behavior and Measurement, results and their interpretation.

Crease Recovery: Measurement , Factors affecting , Typical Textile Wet processing to improve the Crease Recovery of Fabrics, Results and Interpretation

Measurement of Serviceability: Abrasion resistance, Pilling of fabrics. Factors affecting these properties

UNIT-IV

Measurement of Fabric Comfort and Transmission properties

Air permeability: Need and Significance, factors affecting, measurement of Air Resistance, Rate of Air flow Vs Fabric Cover , Conventional and Modern Instruments available for testing . Impact of Textile Wet Processing on Air permeability, Factors affecting the Air permeability results and their interpretation

Moisture Management Properties : Need, scope, Instrument available and working of MMT. Factors affecting , Importance from Textile wet processing point of view

Wicking Behavior of Fabrics: Study of water penetration, Wicking height Vs Geometrical & other factors, Drop penetration test, Shower Proofness test, Shrinkage tests. Unconventional methods of estimating the moisture and wicking behavior of fabrics, Review of research

Thermal Properties: Need and Significance , measurement of Thermal Conductivity and

T I V , Conventional and Modern testing methods (Thermolobo and KES-F, Factors affecting thermal properties

Fabric Shrinkage measurement : Need, commercial processes, Economic interpretation, Laboratory methods , factors governing and Interpretation of results

UNIT V.

Fastness Properties: Need and Measurement of Wash, Light (Sun and Ultra Violet), Perspiration and Rubbing fastness, Governing factors. Evaluation as per the Grey scales, Interpretation of results.

Flammability : Introduction, terms related , Need and Significance , LOI, measurement methods(Vertical Vs Horizontal). Flammability finishes applied and their impact on fabric performance ,

Fabric Low Stress Mechanical Properties: Introduction, Objective Vs Subjective measurements, KES-F & FAST testers, Analysis of mechanical properties and their interrelations.-Fabric Response to pull out force, factors governing, Analysis of KESF-Data (16 mechanical properties) -Latest tools for Interpretation of Test results (brief Note), Use of Bi-Plot, Snake chart, Control chart and Polar chart,

Course Outcome (Graduate have)

1. An ability to test different types of fabrics properties, using different types of instruments
2. An ability to understand different fabric properties and relate them w.r.t comfort of apparels.

3. An ability to acquire good fundamentals in fabric testing and use fabrics according to their end applications
4. An ability to assess the physical properties of fabrics with different weaves
5. An ability to assess the thermal properties
6. An ability to assess the low stress mechanical properties

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit

TEXT BOOKS:

1. Principle of Textile Testing – J.E.Booth, Butterworths London 2003
2. Textile Testing – Arindam Basu, SITRA, 2010.
3. Physical Testing Vol- I & II – Keshavan and Angappan, SSMITT Publications, Komarapalyam, 1993.

REFERENCE BOOKS:

1. I S I Hand book of Textile testing –Indian standard Institution, N. Delhi 1981.
2. Hand book of testing methods – CIRCOT
3. Fabric assessment by mechanical sensing methods – Textile Progress, Edited by Bishop, Vol – 28, 1996
4. Hand book of Textile Testing – Grower and Hamby, Universal Book Corporation, Mumbai, 2010

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓		✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓			✓								
CO5	✓	✓	✓	✓	✓							
CO6		✓		✓								

PC 404MTM

MECHANICS OF TEXTILE MACHINES

Instruction per week : [L-3, T-1] = 4 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 4

COURSE OBJECTIVES

1. To study the pieces of power transmission.
2. To understand the applications of law of motion in textile production
3. To understand the kinetics of weaving preparatory
4. To study the designing of cams and Tappets
5. To know about the role of displacement diagrams in Textile production
6. To understand the mechanics of Let off

UNIT I

Introduction to Mechanics of Textile machineries : Need , Scope , Significance

Transmission of Motion by Belt , Chain, & Rope Drives: Introduction, Need, types, Applications in Textile machines , Numerical examples from Textile filed, Selection criterion of belt ,Chain & Rope drives in Textile machines with reasons

Transmission of motion by Wheel gearing: Need and scope of Types of gears, selection and applications in Textiles- **Epicyclic Gears**: introduction, need ,applications in Textiles.

Balancing of Revolving Masses: concept , Need and application (A brief note)

UNIT-II

Laws of Motion : Significance of Laws of motion and application to Textile production

Linear and Circular motion : simple numerical examples from Yarn formation, Fabric formation and Wet processing fields

Feed regulation motion in Scutcher: Need and types of Knock-Off motions and their selection

Cone drums: Role played , Designing for blow room and speed frame

Breaks and Clutches : Need ,Types and selection for Textile machineries, simple numerical examples, Applications of clutch and break in weaving preparatory, loom shed and other Textile machines.

UNIT III

Kinetics of Fabric Forming: Scope

Kinetics of Warp Winding: Derivation for rate of winding, relation between the elements in Drum and Precision winding, Role of Gain and its calculation.

Kinetics of Shedding :Expression for Shed depth,

Kinetic of Picking : Power for picking, picking as an elastic mechanism,

Kinetics of Beat up: Significance of Eccentricity of slay, derivation for 'e', displacement, velocity and acceleration of slay.

UNIT-IV

Mechanics of Fabric Take up: Stress relaxation and Pick spacing, Excess Tension theory, Bumping conditions , Selection of right Picks per unit area in Take up

Kinetics of Let-Off

Mechanics of Negative let-off motion: derivation to show that the frictional force 'F' is directly Proportional to the distance of weight from the fulcrum,– Backrest mechanisms – Expression for angular velocity of warp beam

Stepped pulleys : Need, applications in Textiles and designing method

Displacement, Velocity & Acceleration diagrams: Need , Principle of construction , methods of construction, Examples from Textile field.

UNIT V.

Cams & Tappets: Need ,scope, Types of Cams and Tappets , Types of followers , selection, Terminology of Cam and Tappet construction, Displacement diagram construction for Cams and Tappets, Construction of Textile Cams(Heart shaped, 3 leaved & combined build) and Tappets (Plain& Twill)

COURSE OUTCOME: (Graduate to have)

1. An ability to select the right type of power transmission pieces in Textile production
2. An ability to understand the applications of motion in a line and circular directions
3. An ability to design the weaving preparatory machines like winding
4. An ability to know the motion of shuttle in loom
5. An ability to design a right type of Tappet or Cam for Textile production
6. An ability to select the right type clutch and brake for a machine

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit

TEXT BOOKS:

1. Textile Mechanics Vol – I & II - K.Slater, Ellis Horwood Limited, New York 2000.
2. Theory of Machines –R.S Kurmi, Dhanpat Rai & sons, New Delhi, 2008.
3. Structural Mechanics of Fibers, Yarns and Fabrics, Vol – I – Hearle, Grosberg and Backer, Wiley – Inter-science, New York 1987.

REFERENCE BOOK:

Textile Mathematics Vol. I, II, & III – J.E.Booth, The Textile Institute, Manchester ,2000.

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓		✓							
CO2	✓		✓		✓							✓
CO3	✓	✓	✓	✓	✓							
CO4	✓	✓		✓	✓							
CO5	✓	✓	✓		✓							✓
CO6	✓	✓	✓	✓	✓							

PC 405ATM

ADVANCED TEXTILE MANUFACTURE

Instruction per week : [L-3, T -0] : 3 Hrs
Duration of SEE 3 Hrs

CIE: 40Marks
SEE: 60, Credits :3

Course Objectives

1. To provide the fundamental knowledge of manufacturing of yarn through different systems.
2. To provide different machineries used for manufacturing and testing of crimped yarns
3. To develop the understanding of filament yarns crimping parameters with respect to properties
4. To provide the knowledge of different principles and the mechanisms involved in the shuttleless weaving machines like rapier, projectile multiphase weaving.
5. To educate the students about the manufacturing, properties and the applications of the Tri axial fabrics.
6. To train the students to plan for the large scale production on modern looms

UNIT - I.

Limitations of ring spinning – principles of open end spinning – Classification of Open End Spinning ,Principles ,passage of material , Technical parameters, machine construction and elements and arrangements, yarn properties and applications of Rotor Spinning, Twist less Spinning , Self Twist spinning ,Air Jet Spinning , DREF Spinning and SIRO spinning. Comparison between Ring, rotor, Air-jet and friction yarns - comparison between siro yarn and double yarn

UNIT - II.

Texturing: concept , need, types of Texturing , textured filament and spun yarns comparison – methods of texturing , mechanism of texturing ,Principles , working , construction , properties and applications of Draw Textured Yarns, Stuffer Box Crimping, Gear Crimping, Air Texturing , Knit-de-knit texturing .Effect of machine parameters of Draw Texturing on yarn properties . Texturamat and Dynafil M., Thermal stress tester, quality control in texturing ,textured yarn defects , texturing problems.

UNIT-III

Shuttleless Weaving : Introduction to Shuttleless weaving , Demerits of Shuttle looms, comparison between Shuttle and Shuttleless weaving , Shedding , Picking , Beat-up, Takeup , Letoff , and Temple mechanisms of conventional and modern compared., Yarn preparatory requirement for shuttles weaving Techno-economics of conventional and modern methods of weaving .Selvedges: Types, mechanisms , selection and requirement .

UNIT-IV

Cloth wind up systems : various Batching methods , Cyclops and their use,

Weft Accumulators : Concept , principle , types and Selection

Principles of weft insertion in Shuttleless weaving : Various principles, Weft insertion rates , applications , Index wheel, Cross rod , Electromechanical Warp stop motion,

Gripper Projectile Loom : Salient features, various elements, working elements and weft insertion stages – torsion bar picking , tuck in selvedge formation . Recent developments.

UNIT V

Rapier Weaving : concept, types , principles of tip to tip transfer , weft insertion cycles, rapier drives , Recent developments

Air Jet Weaving : principle of weft insertion ,machine elements, functions ,weft insertion cycles , Recent developments

Water jet Weaving: principles of weft insertion ,

Multiphase weaving: concept, shedding , weft winding & beat up arrangements

Circular weaving: Passage of material, Shedding , picking and beat up arrangements

Triaxial weaving: concept, arrangement , types of sheds formed, applications.

3-D Weaving : Basic Concepts and Applications

Course Outcome (Graduate have)

1. An ability to understand the modern concept of yarn formation
2. An ability to examine the role of process parameters on yarn quality for a given modern spinning system
3. An ability to understand the need and objectives of shuttleless weaving machines
4. An ability to understand the principles and the mechanisms involved in the modern shuttleless machines.
5. An ability to understand and apply the knowledge of weaving for new fabrics for industrial application
6. An ability to estimate the requirements of weaving preparatory and weaving of new fabrics

EXAMINATION: Part-A for 40 Marks (with 10 Questions-**Compulsory**) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Technology of Yarn Production- C.W.Lawrence, Wood Head Publishers,London,2004
2. Weaving Technology, Management & Machinery-Talukdar, Mahaja publications,2008

REFERENCE BOOKS

1. Theory of Yarn Production-P.R.Lord & Cherian Iype,Wood Head Publishers,Wales,U.K, 2005
2. Modern Methods of Yarn production – W.Klein, Textile Institute Manchester, 1990.
3. Recent Developments in Yarn production – K.R.Salhotra, Textile Association, Bombay 1983.
4. Conversion of yarn to fabric – P.R.Lord and Mohammed, Marrow, Publishers, Manchester, 2004.
5. Principles of Weaving – Robinson and Marks, The Textile Institute, Manchester, 2003.

6. Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓		✓							
CO2	✓		✓		✓							✓
CO3	✓	✓	✓	✓	✓							
CO4	✓	✓		✓	✓							
CO5	✓	✓	✓		✓							✓
CO6	✓	✓	✓	✓	✓							

MC406ES

ENVIRONMENTAL SCIENCE

Instruction per week : [L-3, T -0] : 3 Hrs

CIE: 40Marks

Duration of SEE : 3hours

SEE: 60Marks

Credits : Nil

Course Objectives:

- 1.To create an awareness on the various environmental pollution aspects and issues.
- 2.To give a comprehensive insight into natural resources, ecosystem and biodiversity.
- 3.To educate the ways and means to protect the environment from various types of pollution.
- 4.To impart some fundamental knowledge on human welfare measures and environmental acts.
- 5.Demonstrate the environmental problems like global warming, ozone layer depletion and acid rains.
6. Demonstrate the environmental problems like acid rains.

UNIT-I

Environmental studies : Definition, scope and importance, need for public awareness. Natural resources: Water resources, use and over utilization of surface and ground water, floods, drought, conflicts over water, dams - benefits and problems. Effects of modern agriculture, fertilizer-pesticide problems, water logging salinity.

UNIT-II

Ecosystems : Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).

Energy Resources : Growing energy needs, renewable and non-renewable energy sources. Land Resources, land as a resource, land degradation, soil erosion and desertification.

UNIT-III

Biodiversity : Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-IV

Environmental Pollution : Causes, effects and control measures of air pollution, water pollution, soil pollutions, noise pollution, thermal pollution and solid waste management.

Environment protection act : Air, Water, forest and wild life acts, enforcement of environmental legislation.

UNIT-V

Social Issues and the Environment: Water conservation, watershed management, and environmental ethics. Climate change, global warming, acid, rain, ozone layer depletion.

Disaster management : Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology, disaster management cycle, and disaster management in India

Course Outcome:

- 1.Define and explain the basic issues concerning the ability of the human community to interact in a sustainable way with the environment.
- 2.Describe and discuss the environmental implications of the cycles of biologically important materials through the ecosystem.
- 3.Discuss the benefits of sustaining each of the following types of resources; food, health, habitats, energy, water, air, soil and minerals.
- 4.Understand the causes, effects and controlling measures of different types of environmental pollutions with some case studies
- 5.To assess the nature of disasters and to plan for necessary action
- 6.To create the requirements to overcome problems like water crisis, global warming, pollution etc.,

TEXT BOOKS:

- 1.A Text Book of Environmental Studies for U.G. Course, Erach Bharucha, Universities Press, 2005.
- 2.E.P. Odum, Fundamentals of Ecology, W.B. Saunders Co., USA.
- 3.M.N. Rao and A.K. Datta, Waste Water Treatment, Oxford and IBH Publications
- 4.Benny Joseph, Environmental Studies, Tata McGraw-Hill, 2005
- 5.V.K. Sharma, Disaster Management, National Centre for Disaster Management, HPE, Delhi, 1999.

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓		✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓			✓								
CO5	✓	✓	✓	✓	✓							
CO6		✓		✓								

PC 451 FM

FABRIC MANUFACTURING LAB

Instruction per week : [P-3] : 3 Hrs
Duration of SEE 4 Hrs
Credits :1.5

CIE: 40Marks
SEE: 60Marks

Course Objectives

1. To understand the concept of winding , Warping, Pirn winding
2. To learn about the Sizing and Post sizing process
3. To learn about Tappet Loom, Dobby Loom and Jacquated Mechanisms
4. To learn about the setting and working of all motions of a loom
5. To understand about the dismantling, assembling , setting and timing of Primary and secondary motions
6. To understand about the Designing for Jacquard and Box motions

List of Experiments (Minimum of 8 is to planned)

1. Speed calculations in precision winder , cone winder , Semi Auto Pirn winder
2. Speed and production calculations in Sectional warper
3. Speed calculations in semi –automatic pirn winder
4. Planning for Patterned warps
5. Dismantling, assembling , setting and timing of Cone Over / Under picking motions
6. Dismantling, assembling , setting and timing of Beat up motion
7. Demonstration of working of Dobby & Jacquard loom
8. Dismantling, assembling, setting and timing of 7 – Wheel take up motion.
9. Calculation of dividend examination of relation between dividend and Train of Wheels
10. Dismantling, assembling, setting and timing of Loose reed motion and setting for weaving of different types of warp and weft
11. Working of fast reed motion & Flat spring
12. Dismantling, assembling, setting and timing of Side weft fork mechanism and arrangements for weaving different types of weft yarns
13. Dismantling, assembling, setting and timing of Centre Weft fork motion (Demonstration)
14. Practice of pegging and lagging of Dobby chains.
15. Preparation of Weft patterns using Box motion chains for 4 X 1 Box motion
16. Demonstration of Cop change mechanism.
17. Speed calculation, Casting out and Card cutting calculations in all types of Jacquard for a design under consideration

Course Outcomes: (Graduate to have)

- 1.. An ability to calculate the speeds of precision winders , Pirn winders
- 2.. An ability process the packages on weaving preparatory
3. An ability to set and time all motions in a loom
- 4.An ability to understand the design and plan for peg plan and pegging for dobby and for box motions
- 5.An ability to decide about the type of jacquard and its harness
- 6.An ability to set and time Autocop change mechanism

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓	✓	✓		✓							✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓							✓
CO6	✓	✓	✓	✓	✓							✓

PC452 FT

FABRIC TESTING LAB

Instruction per week : [P-3] : 3 Hrs

Duration of SEE 4 Hrs

CIE: 40

SEE: 60,

Credits : 1.5

COURSE OBJECTIVES

1. To Educate the student for standard testing conditions for different fabric properties.
2. To develop an understanding of scope, principle behind testing of fabric samples w.r.t end uses applications.
3. To train the students for understanding the result and interpret the conclusion.
4. To provide student with technical knowledge of fabric testing
5. To understand the total physical properties of fabrics
6. To educate the students about various fabric standard test methods followed in vogue

LIST OF EXPERIMENTS (Minimum of 8 is to be performed)

1. Determination of Geometrical Properties
2. Determination of Drape Co-efficient for Textile Fabrics
3. Determination of Air Permeability of Woven Fabrics
4. Determination of Crease Recovery Angle of Fabrics
5. Determination of Bending Length of Fabrics
6. Determination of Bursting Strength of Fabrics
7. Determination of Abrasion Resistance of Fabrics
8. Determination of Tearing Strength of Fabrics
9. Determination of Tensile Strength of Fabrics
10. Determination of Water Repellency of Fabrics
11. Testing of Fabrics for Pilling Test
12. Determination of Tear Strength by Ballistic Tester

COURSE OUTCOME (Graduate to have)

1. An ability to understand the fabric properties & relate them with standards.
2. An ability to improve the fabric testing procedures.
3. An ability of giving conclusions for different applications
4. An ability to design a specific fabric based on the end use.
5. An ability to standardize the process parameters in relation to end product quality
6. An ability to evaluate the test results of the fabric properties following testing.

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓	✓	✓		✓							✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓							✓
CO6	✓	✓	✓	✓	✓							✓

ES 453 IOT

INTERNET OF THINGS LABORATORY

Instruction per week : [L-1 P-2]3 Hours

CIE: 40 Marks

Duration of SEE : 4 Hours

SEE : 60 Marks

Credits : 2

Introduction to IoT - IoT definition - Characteristics - Things in IoT - IoT Complete Architectural Stack - IoT enabling Technologies - IoT Challenges - IoT Levels - A Case Study to realize the stack. Sensors and Hardware for IoT - Accelerometer, Proximity Sensor, IR sensor, Gas Sensor, Temperature Sensor, Chemical Sensor, Motion Detection Sensor. Hardware Kits - Arduino, Raspberry Pi, Node MCU. A Case study with any one of the boards and data acquisition from sensors.

Protocols for IoT - infrastructure protocol IPV4/V6(RPL), Identification (URLs), Transport (WiFi, LiFi, BLE), Discovery, Data Protocols, Device Management Protocols. - A Case Study with MQTT/CoAP usage.

Cloud and Data analytics- Types of Cloud - IoT with cloud challenges - Selection of cloud for IoT applications - Fog computing for IoT - Edge computing for IoT - Cloud security aspects for IoT applications -

List of experiments

IOT WITH ARDUINO: Introduction to the Arduino, Creating an Arduino programming Environment, Using the Arduino IDE, Creating an Arduino program, Using Libraries, Working with Digital Interfaces, Interfacing with Analog devices, Adding Interrupts, Communicating with devices, Using sensors, Working with Motors, Using an LCD.

1. show Arduino IDE installation.
2. apply three (write, upload, and execute) operations on basic Arduino programs.
3. demonstrate the prototypes using Arduino with external devices.
- 4 Experiments based on protocols
- 5 Experiments based on security
- 6 Uploading the sensor data on cloud
- 7 Web based device control
- 8 Mini projects on certain case studies:
IoT applications - Smart City - Smart Water - Smart Agriculture – Smart Energy - Smart Healthcare - Smart Transportation - Smart Retail -Smart waste management.

Text Books:

- 1.Sudip Misra, Chandana Roy, Anandarup Mukherjee, Introduction to Industrial Internet of Things and Industry 4.0, CRC Press
2. Vijay Madiseti and Arshdeep Bahga, *Internet of Things (A Hands-on-Approach)*, 1st Edition, VPT, 2016.
3. Richard Blum, *Arduino Programming in 24 Hours*, Sams Teach Yourself, Pearson Education, 2017.

University College of Technology, ,OU,HYD-7
R-23 B.Tech(TT) Approved in Academic Council meeting held on 16 th July .,2024
SCHEME OF INSTRUCTION, EXAMINATION AND SYLLABI (AICTE)

B. Tech. (Textile Technology)
(For the Batch admitted in Academic Year 2023-24)

V-Semester

S.NO	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
1	PC 501 TWP	Textile Wet Processing	3	-	-	3	40	60	3
2	PC502 TNF	Technology of Nonwoven Fabrics	3	-	-	3	40	60	3
3	PC 503 APT	Apparel Production Technology	3	-	-	3	40	60	3
4	PC504 PCE-1	Professional Core Elective-I	3	-	-	3	40	60	3
5	PO505 POE-I	Professional Open Elective-I	3	-	-	3	40	60	3
6	MC506	Mandatory Course	3	-	-	3	40	60	*
7	HASS 507 HASS2	HASS-II	3	-	-	3	40	60	3
Practicals									
8	PC551 TWP	Textile Wet Processing Lab	-	-	3	4	40	60	1.5
9	PC552 FSD	Fabric Structure & Design Lab	-	-	3	4	40	60	1.5
		Total	21	-	6		360	540	21

*Exam will be conducted and pass result will be satisfactory

Professional Core Elective-I: A. Textile Mill Planning B. Process and Quality Control in Textiles. C Technical Fibres. D. Specialty Yarns E Handloom and Traditional Textiles.
F. Millennium Fibres

Professional Open Elective -I : 1. Biochemical Engineering (Chem. Eng.) 2. Membrane Technology (Chem. Eng.) 3. Instrumentation for process Engineers(FT) 4. Industrial Microbiology (FT)
5. Statistical Analysis and Design of Experiments (TT) 6. Marketing and Merchandising Management (TT)

Mandatory Course: A) Indian Constitution B) Essence of Indian Knowledge Tradition

HASS-II : A)Values and Ethics B) Ethics and Holistic Life C) Universal Human Conduct
D) Gender Culture and Development

PC 501 TWP

TEXTILE WET PROCESSING

Instruction per week : [L-3, T -0] : 3 Hrs
Duration of SEE : 3 Hrs
Credits : 3

CIE: 40 Marks
SEE: 60 Marks

COURSE OBJECTIVES

1. To educate the students for the requirements of water and selection of the chemicals in the dye house.
2. To provide the knowledge involved in various processes involved in the dye.
3. To provide the students with sound knowledge about scouring, bleaching and dying processes.
4. To Educate the students for usage of solvents, enzymes & chemicals.
5. To train the students for understanding the processing parameters for fibres, yarns, fabrics.
6. To educate the students about developing of dyeing recipes

UNIT -I

Introduction to wet processing – Requirements of water for dye house ,calculation based on fabric G S M , Wetting, contact angle, detergency, types of surface active agents -**Singeing**: Objects, need, sorts signed ,methods, problems - **Desizing**: objects, methods: conventional and enzymatic

UNIT -II

Scouring: objects, scouring loss % and its effect on fabric properties, conventional and modern methods. Scope of quality control aspects in textile wet processing **Bleaching**: Need and sorts bleached ,objects, methods ,combined scouring and bleaching, machines & quality control ,Washing machines, recycling of water.

UNIT -III

Mercerization: Need and sorts mercerized., Parameters and their effect on the product changes in cellulose after mercerization, methods of mercerization. Liquid ammonia mercerization- quality control aspects

Introduction to Dyeing –Chemical constitution colour and its elements, Physical chemistry of dyeing ,parameters of dyeing, theories of dyeing, Kinetics of dyeing, Classification of dyes

UNIT -IV

Dyeing of Natural & Man made fibres: Dyeing of 100 % fibres and their blends, selection of dyes and dye shade, effect of parameters of dyeing on fabric properties, application of Direct, Basic, Acid ,metal complex . Dyeing with Disperse, Vat ,Sulphur dyes (brief description of dyeing procedures)

Processing of textile effluents: need for effluent treatment, Treatment methods, biological treatments, recovery and reuse of waste water.

UNIT -V

Dyeing machines –principle involved, fibre, yarn, hank, fabric dyeing, and problems involved in each case, Cheese, cop dyeing, beam dyeing, Jigger, winch, padding mangle and Jet dyeing, advantage and disadvantages, use of ultrasonic in dyeing (sonicator).Dyeing of blends, problems and solutions. Single bath and two bath methods, reuse of dye bath.

COURSE OUTCOME (Graduate to have)

1. An ability to understand the requirements of water.
2. An ability to understand the different processes involved in the chemical processing industry.
3. An ability to understand the role of Effluent Treatment for Dye house
4. An ability to decide the quantity of chemicals/ enzymes in the dye house
5. An ability to assess the quality of pre processed material
6. An ability to set up standards for wet processing

EXAMINATION: Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weight age selecting at least one from each Unit)

TEXT BOOKS

1. Introduction to Bleaching – J. T. Marsh, M/s Mahajan Books Publishers, Ahmedabad, Gujarat, 1997.
2. Technology of Mercerising – V. A. Shenai, M/s Mahajan Books Publishers, Ahmedabad, Gujarat, 1997.
3. Dyeing of Cotton, wool, and silk – R.S. Prayog, M/s Mahajan Books Publishers, Ahmedabad, Gujarat, 1997.
4. Technology of Dyeing – V. A. Shenai, M/s Mahajan Books Publishers, Ahmedabad, Gujarat, 1997.
5. Dyeing of Cotton, wool, and silk – R.S. Prayag, M/s Mahajan Books Publishers, Ahmedabad, Gujarat, 1997.
6. Coloration of Textiles – Chakravarthy, 2 nd Edition Woodhead publishers, New Delhi , 2018
7. Technology of textile printing – R.S.Prayag, Shree J.Printers,1999

REFERENCE BOOKS:

1. Textile printing edited by L.W.C.Miles, Dyers company publication trust,1998
2. Dyeing and Chemical Technology of Textile fibres – E.R.Trotman, SBT Bomboy, Ahmedabad, 1992.
3. Technology of Bleaching – V.A.Shenai, Sevak Publication, Bombay, 2002
4. Technology of finishing – V.A.Shenai Sevak Publication,1996
5. Technology of finishing – R.S.Prayag, Shree J.Printers,1998

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							✓
CO2	✓	✓		✓								✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓			✓								✓
CO5	✓	✓	✓	✓	✓							✓
CO6		✓		✓								✓

PC 502 TNF

TECHNOLOGY OF NONWOVEN FABRICS

Instruction per week : [L-3, T -0] : 3 Hrs
Duration of SEE: 3 Hrs
Credits:3

CIE: 40 Marks
SEE: 60 Marks

COURSE OBJECTIVES

1. To understand the role of fiber bonding in Nonwoven production.
2. To learn about the working of different types of machinery used for manufacturing Nonwovens
3. To develop an understanding of the production of Nonwoven fabrics bonding techniques.
4. Train the students in selecting the fiber specific method of bonding
5. To provide the knowledge on bonding and finishing of nonwoven fabrics
6. To understand the machinery settings for processing different fibres

UNIT - I

Introduction to Nonwovens: Definition of nonwoven, comparison of woven, knitted with the nonwoven, classification of NW, world scenario of nonwoven, fiber as raw material for (conventional natural, manmade and inorganic), the arrangement of fibers, selection of raw material. the potential of Nanofibres for NWF, physical and chemical properties

Production of Dry Web: Fiber selection, fiber preparation, web formation- web removal system, carding, online basis weight measurement, Arrangement of cards, cross and vertical lapper

UNIT - II

Air Laid Web: Principle of web formation, feeding systems, Rando – Webber, DOA, Fehrer system, Chicopee system, Laroche system, Spinnabau, developments in Air laying – integrated forming and bonding, star former, combined air lay and hydroentangled, roller draft air laying, Airflow and fiber dynamics in air laying, parameters controlling the quality, physical properties of webs

Wet Laid Web: Introduction to Wet laying, raw material selection, fiber preparation, web forming concept, bonding systems- hydrogen bonding, latex bonding, thermal bonding, hydroentanglement, parameters of Wet laying, application

UNIT - III

Polymer Laid Web: Introduction, resins for polymer laying, Spunbond fabric production, bonding methods, and parameters controlling the quality, applications
Meltblown technology, properties, and applications

Mechanical Bonding - Stitch Bonding: Malivlies, Malimo, Malipol, Multiknit stitch bonding systems, Recent developments in Stitch Bonding

UNIT - IV

Needle Punching: Introduction, batt formation, drafting, the passage of material, needle design, types and selection, parameters of needling, methods of needle punch technology, applications

Hydroentanglement Technology: Introduction, principles, fiber selection, process technology – Pre-wetting- injectors arrangements- and nozzles- dewatering- drying, Multilayer hydroentangled nonwovens, Quality control, applications.

Thermal Bonding: Introduction, Principles, raw materials, process parameters, methods of bonding - through –air and impingement bonding, thermal radiation / IR and Ultrasonic bonding, the structure of the thermally-bonded fabric, applications.

UNIT V

Chemical Bonding: Introduction, polymers for chemical bonding, mechanism of chemical bonding – wetting, binder polymer cohesion, methods of binder applications- Saturation, foam bonding, spray bonding, print bonding, coating bonding, solution bonding,

Drying- convection dryer, conduction dryer, and IR dryers, applications

Finishing of Nonwovens: Wet finishing, application of chemical finishes, Lamination, Mechanical finishes, surface finishes, emerging technologies

3D Nonwoven: Automotive trim applications

Course Outcome (Graduate to have)

1. An ability to apply the knowledge of the engineering concept of production of nonwoven from different fibers.
2. An ability to examine the role of process parameters of a nonwoven process on the performance of the end product.
3. An ability to design a typical nonwoven production process to suit the needs of Industrial or apparel applications.
4. An ability to understand the fiber selection and bonding methods
5. An ability to understand nonwoven finishing methods.
6. An ability to apply the basic knowledge of Nonwoven production for processing a specific fiber

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory)& Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting at least one from each Unit)

TEXTBOOKS:

1. Handbook of Nonwovens- S.J. Russell, CRC Publications, 2010
2. Wellington Handbook of Industrial Textiles – S. Adanur, CRC Publications, 2011

REFERENCE BOOKS:

1. The Nonwovens- Giovanni Tanchis, ITALIA Publications, Italy, 2009.
2. Nonwoven Fabrics- Wilhelm Albrecht, Hilmar Fuchs & Wlatter Kittlemann, Wiley- Vch Publications, Germany, 2012

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							✓
CO2	✓	✓		✓								✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓			✓								✓
CO5	✓	✓	✓	✓	✓							✓
CO6		✓		✓								✓

PC 503 APT

APPAREL PRODUCTION TECHNOLOGY

Instruction per week : [L-3, T-0] = 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

COURSE OBJECTIVES

1. To learn about the differences about the Textile and Apparel units
2. To understand the techniques and methods of Sourcing and Spreading
3. To learn the details of Marker planning , Efficiency
4. To plan for the right type of Cutting strategy
5. To learn about fusing, packing and care labeling
6. To understand the methods of vendor rating

UNIT – I

Introduction to apparel Technology - scope of apparel technology- Garment Production systems-raw materials and support materials for apparels, Flow of Material in apparel industry, Different Departments in apparel industry and its roles and responsibilities -Activities of buying house and buying agencies

Supplier selection, Rating and Development: Need, Types of Suppliers, Supply chain , methods of Supplier selection, evaluation , rating and development

Fabric Inspection: Need, methods of inspection, Machinery used for inspection

Markers & Marker Planning: Need and scope of Markers, types, Marker quality , Duplication of markers, Marker efficiency, Marker making Methods (Manual and Automated), constraints on fabric width, constraints on grain direction, contribution of human factors: marker planner, methods of optimizing marker planning in production.

UNIT-II

Fabric losses: outside the marker-analysis of direct losses and indirect losses, processing of fabric faults, framework of management control

Cut order planning: Introduction, issue of cutting instructions, economic cut quantities, factors affecting economic cut quantities, cut order plan, computerized cut order planning

Spreading : Objectives, Overview of Spreading process, Nature of fabric packages, Spreading quality, requirements of spreading process, methods of spreading, Selection of Spreading devices , Fabric Control devices, Spreading costs

Cutting: Objectives, requirements of cutting, methods of cutting, cutting quality, cutting machines (Operator and machine controlled) : Types of cutting machines and applications, Detailed study on straight knife, band knife and round knife cutting machines- Brief study on notchers, drills and thread markers, Specialised cutting machines, Safety measures

UNIT-III

Computer controlled cutting :Brief study on computer controlled cutting machine, Laser, water Jet and Plasma cutting, Sticking, Bundling, Dispatch

Sewing technology: Introduction to sewing machines, Classification of sewing machines, Parts and functions of SNLS, Flat lock and Over lock sewing machines, Formation of stitch by SNLS, Working/ Features of Bartack, Button hole, button attach, DNLS, Embroidery, FOA and pattern sewing machines

Needles: Types, parts and functions of needle

Sewing Feed Mechanisms: Types, drop feed, differential feed, variable top and bottom feed, compound feed, puller feed systems

Work Aids: significance, types

UNIT-IV

Sewing threads: types, manufacturing of sewing threads, sewing problems& Remedies

Sewing thread consumption ratio.

Stiches: classification of stitches

Seams: definition, types of seams, Seam Finishes

Operation Bulletin: Operation Breakdown for simple round neck T- shirt, Polo shirt, Evaluation of SMV, Capacity, Line Planning

Fusing technology: Need, Scope, methods & Equipments, Basic materials, resin coating, fusing process, fusing machinery. quality control in fusing.

Garment Accessories & Embellishments:

Role of Accessories - Buttons, Zipper, Labels, Lining. Interlining Labels Wadding, Lace, Braid & Elastic - Hook & Loop Fasteners -

UNIT – V

Finishing Process:

Stains: Identification of stains, selection of stain removers, methods of stain removal,

Garment Washing: importance of washing, methods of washing, Types of washing

Pressing technology: Types of garment pressing, Importance of pressing, Methods of pressing, elements of pressing, Tagging, Folding,

Packing: Types, Solid packing , ratio packing, considerations for packing

Documentation and control of material usage: Introduction, fabric usage control, issue of materials, spreading audit, fabric reconciliation, fabric faults and claims for poor quality, documentation and management function.

Management of commodities: Introduction, Purchase Vs Procurement, relevant purchasing techniques and methods, Purchase procedure , Credit and discount in purchasing, coordination with production schedules, progress chasing, usage of commodities.

COURSE OUTCOMES (Graduate to have)

1. An ability to understand the process, product knowledge completely from sourcing of raw material to product manufacturing.
2. An ability to co-ordinate and communicate with customer and production departments.
3. An ability to solve the problems associated with different products
4. An ability to select a suitable type of seam and stitch for a specific garment
5. An ability to rate the vendors
6. An ability to select a suitable sewing thread

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. Sewn Product Technology- Gerry Cooklin, 4th enlarged Edition Blackwell Publications, USA, 2010
2. Introduction to clothing manufacture –Gerry Cooklin, Marshall ,6th enlarged Edition Blackwell Publications, USA, 2007

REFERENCE BOOKS:

1. Materials Management in clothing production – David .T.Tyler, Blackwell Publications, USA, 2007
2. Introduction to Clothing Manufacture- Gerry Cooklin, 4th enlarged Edition Blackwell Publications, USA, 2010

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	✓	✓	✓	✓	✓							✓
C02	✓	✓		✓								✓
C03	✓	✓	✓	✓	✓							✓
C04	✓			✓								✓
C05	✓	✓	✓	✓	✓							✓
C06		✓		✓								✓

PC 504 PCE-I - A - TMP

TEXTILE MILL PLANNING

Instruction per week : [L-3, T-0] = 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

COURSE OBJECTIVES

1. To provide the knowledge on the types of textile industries and the activities involved in the industry.
2. To understand the schemes of the various textile bodies.
3. To provide the knowledge on preparation of spin plan, weave plan, material transport and project planning for the industry.
4. To plan for the project designing and control
5. To educate the students for issues like Textile policy about the synthetic yarn import , Technical Textile export etc.,
6. To understand the spindleage concept for a spinning mill

UNIT - I

Introduction to Mill Planning: Scope of Mill planning .Types of Textile Industries/ Activities. Role of Linear Programming Problem- Graphical Routine (Maximisation & Minimisation ,Profit types) in Spinning, Weaving, and Processing .

UNIT- II

Application of Simplex routine (Maximisation, Minimisation, profit type- Sequencing of Openers and Cleaners/Preparatory machines by Johnson's algorithm(n-jobs on two machines, m-jobs on n machines and 2-jobs on m machines)- Spin plan ,Weave plan , Spin plan for Cotton, P/V, P/C production-

UNIT- III

Application of Assignment model for Textile production (simple ,unbalanced, profit type , aircrew type , special type problems)

Replacement Model for Textile Industry : Need , Types , Failure mechanisms , Replacement of Items which deteriorate gradually(with and without time value of money). Queuing theory and its applications in Textile production

UNIT- IV

Decision theory in Textiles, Interference loss - Transportation model in Textile Industry (simple ,unbalanced, profit type , special type problems)

Inventory management: A typical Textile Stores as referred to a Composite Mill, different types of Inventories and types of Inventory decisions, Derivation of E O Q, Simple Problems- Examples on ABC and PARETO analysis.

UNIT-V

Project Planning in Mill Planning: Introduction, Project Identification, Appraisal, Financing, Feasibility and Project scheduling by PERT and CPM, crashing in networks - Interest formulas, Present, Future worth ,Rate of Return and Annual Equivalent methods
Depreciation: Various methods, Evaluation of Public alternatives-Make or Buy Decisions,

COURSE OUTCOME (Graduate to have)

- 1.An ability to understand about the Mill planning
- 2.An ability to estimate the requirement of machines based on feed material
- 3.An ability to formulate the LPP for a Textile problem'

4. an ability to plan for the Replacement model for Textile machine

5. an ability to plan for the Project

6. An ability to apply the concept of Depreciation for financial plans for Textile

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Textile Mill Planning – Purushotham.B., Mahajan Book Publishers, Ahmedabad, 2000
2. Quantitative Techniques for Decision Making –Roy, Chand Publishing Co, New Delhi, 2003
3. Management of Textile Industry- V.M.Dudeja, Mahajan Publishers, Ahmedabad, 2001
4. Dudeja V D “Management of Textile Industry”, Textile Trade Press – Ahmedabad 1990.
5. Operations Research- Kapoor, Sultan Chand & Co, New Delhi, 2009

REFERENCE BOOKS

1. Engineering Economics- B.Pannerselvam, PHI publications, New Delhi, 2004
2. BTRA monograph series in Textile Production- BTRA, Mumbai 2002
3. Ormenod A “Textile Product Management”, The Textile Institute, Manchester 1992

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							✓
CO2	✓	✓		✓								✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓			✓								✓
CO5	✓	✓	✓	✓	✓							✓
CO6		✓		✓								✓

PROCESS AND QUALITY CONTROL IN TEXTILES

Instruction per week : [L-3, T-0] = 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

Course Objectives

1. To provide the knowledge of Process control and Quality control in Spinning .
2. To Educate the students about importance of Process Control in Winding and Warping process.
3. To develop an understanding of various control of process and quality in Sizing
4. To understand the Quality Control procedures in Loom shed
5. To understand the scope of Process and Quality control in Textile Wet Processing
6. To train the students to understand and follow the NORMS of textile industry

UNIT - I

PQC in Spinning: Scope ,Control of mixing quality , control of yarn realization (Records and Accounting) , Control of waste and cleaning in Blow room and card, Process and Quality Control in Draw Frame -Control of comber waste. Measurement and analysis of productivity means to improve productivity – Process and Quality Control at Simplex- Process Control at Ring Frame: control of yarn quality, count, strength and their variability, yarn unevenness and imperfections, yarn faults and package defects, implementation of process control in cotton spinning.

UNIT - II

Introduction to Process control in Weaving:

Process control in winding: Scope, Optimizing of Yarn tensioning and clearing (settings for different kinds of yarns) Producing good package, Breakage and snap study in Autoconer (formats) Approach to control of productivity.

Process control in Warping: Scope, Effort to minimize the breakage rate, quality of warper beams, breakage study in warping (norms), productivity, warping defects and remedies. Process control in Pirn winding: Scope, Minimizing the end breaks, improving the build of the yarn, control of speed, productivity.

UNIT - III

Process control in Sizing: Scope, choice of size recipe and measurement of size pick up, control in size preparation, control of size pick up, controlling sizing conditions, stretch control in various zones, moisture control, quality of sized beams, positive feed to sow box, productivity, Dead loss and its control, hard waste and its control, testing of sized yarn. Selection of reeds and healds, care of reeds, effect of reed parameters on weaving performance.

UNIT-IV

Approach to process control in Loom shed:(Non– auto and Auto: scope, control of speed, breakage and snap study in loom shed, Norms for breakage rate, No. of looms/operative, control of efficiency (concept of calculated and expected efficiency), control of loom stoppages (due to warp and weft break, shuttle change etc.)

UNIT - V

Process control in Wet Processing: Scope, functions of control house, grey cloth inspection. Process control measures in Bleaching and mercerizing (method to estimate the concentration of caustic and silica in peroxide bleach, absorbency of bleached cloth, cuprammonium fluidity, ash content, barium activity no. luster no. fastness of bleaching). Process control in dye house: parameters for process control in different forms of dyeing (yarn and fabric), test method to determine the caustic and Hydros conc. In vat dye liquor. Process control in Printing and Finishing: Scope, Approach to process control, test for the suitability of thickener in the print paste formation, iodine absorption test for the evaluation of degree of resin cross linking, fastness properties of dyed and printed goods to wash, light perspiration and water. Fastness to rubbing, hot press. Optimal brightness test for the uniformity of cross linking, assessment of degree of heat setting in polyester by Iodine absorption method.

Course Outcomes

1. An ability to understand the control measures in Yarn formation process.
2. An ability to control the quality of Wound package and Warper's beam.
3. An ability to standardized the processes conditions in Yarn sizing
4. An ability to identify the key areas in process control of Loom shed.
5. An ability to plan for the production of quality finished fabric.
6. An ability to estimate the role of machine parameters on product quality

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS :

1. Process & Quality Control in Spinning – ATIRA, 2014
2. Process & Quality Control in Weaving – ATIRA, 2015
3. Process & Quality Control in Wet Processing – ATIRA, 2014

REFERENCE BOOKS:

1. Handbook of Quality Control and Testing – Grover & Hamby, Merrow Publishers, London, 2009
2. Norms for Textile Industries : ATIRA , BTRA , SITRA & NITRA

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							✓
CO2	✓	✓		✓								✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓			✓								✓
CO5	✓	✓	✓	✓	✓							✓
CO6		✓		✓								✓

PC 504 PCE-I – C - TF

TECHNICAL FIBRES

Instruction per week : [L-3, T-0] = 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

COURSE OBJECTIVES

1. To enable the students to learn about production of technical fibres
2. To understand about the , properties of technical fibres
3. To learn about the application of various technical fibres
4. To learn about the ceramic fibres
5. To understand the properties of Carbon fibres
6. To understand the role of Dyneema fibres

UNIT I

Introduction: Classification of textile fibres according to their nature and origin, essential and desirable properties of textile fibres, staple fibre and continuous filament, comparison of natural and manmade fibres.

UNIT II

Linear polymer fibres, polyaramide fibres, high modulus-high tenacity polyethylene and Glass fibres; their structure, properties and applications

UNIT III

Carbon fibres, classification – based on raw materials, heat treatment, strength and modulus; physical properties and applications glass fibres, classification, principle of fibre manufacturing, physical properties and applications

UNIT IV

Chemical resistance fibres- their structure, properties and applications; thermal resistance fibres, their structure, properties and applications

UNIT V

Ceramic fibres, classification, effect of heat treatment on properties, physical properties and applications; derivatives of ceramic fibres; hollow and profile fibres- properties and applications , Basalt fibres

COURSE OUTCOMES (Graduate to have)

- 1..An ability to exhibit knowledge on Technical fibre production
- 2.An ability to understand the Properties of technical fibres
- 3.An ability to estimate the role of technical fibres
- 4.An ability to plan for the application of technical fibres
- 5.An ability to design a technical fibre
- 6.an ability to create the new concept of technical fibre

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Kothari V.K., “Textile Fibres: Development and Innovations”, Progress in Textiles, Vol. 2, IAFL Publications, 2000.
2. Hearle J.W.S., “High Performance Fibres”, Woodhead Publishing Ltd, Cambridge, England, 2001

REFERENCE BOOKS.

1. Peebles L.H., “Carbon Fibres”, CRC Press, London, 1995.
2. Hongu T. and Phillips G.O., “New Fibres”, Woodhead Publishing Ltd., England, 1997

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	✓	✓	✓	✓	✓							✓
C02	✓	✓		✓								✓
C03	✓	✓	✓	✓	✓							✓
C04	✓			✓								✓
C05	✓	✓	✓	✓	✓							✓
C06		✓		✓								✓

PC 504 PCE-I – D - SY

SPECIALTY YARNS

Instruction per week : [L-3, T-0] = 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

COURSE OBJECTIVES

- 1.To provide an idea about the changes to be made in Ring frame to produce Fancy yarns
- 2.To educate the students about the production of yarns varying in cross section
3. To provide the education about the modifications in drafting system for speciality yarns.
- 4.To educate the students about the designing of new yarns for special applications
5. To suggest the manufacturing details for mass production.

UNIT-I

Fancy Yarns: Introduction, importance, need of specialty yarns , Necessary changes to be made in Ring frame in spinning , technical parameters , & applications, Classification of yarns

Elastane Yarns: End use application, spinning of lycra yarns on ring spinning necessary modification on machine, process parameters, production, yarn properties.

Cover & Core yarns: Principles of formation of yarn, constructional details of machine, process description, production of different types of cover & core yarn, yarn properties & end uses

Twisted Yarns: Filament twisting, different types of twisted yarns, manufacturing & yarn properties, Fancy twisted yarns. Structures & properties of different filament twisted yarn. Twist setting of yarn

UNIT-II

Melange Yarn: Concepts of producing mélange yarn. Process and sequence used for production of Melange yarn. Suitability of yarn in different end uses

Special Yarns on Unconventional Spinning Technologies: - Manufacture Properties & end uses of, Siro, Bobtex, Self-twist, Twistless, etc. Concepts of composite yarns

Metalized Yarns: - Concepts of Metallic and Metalized yarns, Characteristics of metalized yarn – Manufacture of metalized yarns , Applications of yarns.

Sewing Threads: - Introduction to thread construction, Characteristics of sewing threads, production methods, Types of thread packages.

UNIT-III

Ropes, Cordage, & Twines: - Requirements of initial fibres & yarns, Manufacturing process, structures & properties of yarns.

Embroidery Yarns, Laces & Braids: - Introduction, Process sequence, Manufacturing details & Machines required. Properties & application of embroidery yarns, Laces & Braids.

Neppy and fleck yarn: - Production, properties of yarn & applications.

UNIT-IV

Manufacture of some special purpose yarns like:– Slub, double twist, Knop yarn, Chenille yarn, Diamond yarn, Eccentric yarn, Boucle yarn, Thick 'n' Thin Yarns.

Compact Yarns: Definition, Importance of compact yarns. Different techniques, used for the production of compact yarns, Machines and parameters used to make of compact yarns in different end uses

Hosiery Yarns: Requirement of hosiery yarn. Raw material for hosiery yarn Process sequence & process parameters to make hosiery yarn from Cotton Polyester, viscose & their blends. Properties and end use applications of hosiery yarns

Dyed Yarns: Requirement of dyed yarns. Types of dyed yarns – Fibre dyed yarn, dope dyed yarn. Dyed yarns from cheese, yarn dyeing. Process sequence & machine required for production of above yarns. Yarn properties & applications

UNIT-V

Singed Yarn: Hairy yarn Vs hair free yarn. Methods of singeing of yarn Machine description & process parameters to produce singed yarns. Change in properties of yarn after singeing

Mercerised Yarn: - Necessity of mercerization of yarn, Machine & sequence for yarn mercerization, Prograde process. Yarn characteristics of mercerized yarn

Tyre Cords: Textiles in Tyres, Required properties of initial yarns. Structure of twisted cord yarns, Cord twisting, Cord fabric manufacturing. Properties of tyre

Film Yarns: Flat film yarns, fibrillated film yarn manufacture, Properties & applications

COURSE OUTCOMES (Graduate have)

- 1.An ability to apply the knowledge of yarns to fabrics
2. An ability understand the suitability of fancy yarn for a specific end use
- 3.An ability to modify the process in spinning for producing fancy yarns
4. An ability to assess the new spinning process for manufacturing parameters
- 5.An ability to test the quality of the specialty yarns produced
- 6.An ability to design the specialty yarn for a specific purpose

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

- 1..‘Sewing Threads’ Textile progress vol.30 no.3/4, by J.O. Ukponmwan, The Textile,2005
2. Fundamentals of staple yarn manufacture: Lawrence Carl, CRC , Publishers,2016

REFERENCE BOOKS:

- 1.Fancy Yarns – M.H. Gong & Mukhyopadhyaya, Textile Progress, Vol.32 ,2008
- 2.Textile Yarns – B.C.Goswamy, Wiley Easter International Publisher, 2001

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							✓
CO2	✓	✓		✓								✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓			✓								✓
CO5	✓	✓	✓	✓	✓							✓
CO6		✓		✓								✓

PC504 PCE-I-E-HATT

HANDLOOM AND TRADITIONAL TEXTILES

Instruction per week : [L-3, T-0] = 3 Hours
Duration of SEE : 3 Hours
Credits :3

CIE: 40 Marks
SEE : 60 Marks

Course Objectives

- 1.To understand about the ancient Indian art through designs
- 2.To understand about the various motifs
- 3.To learn about the Handloom and its parts
4. To learn about the various mechanisms of Handloom
- 5.To understand the concepts of Handloom Dobby and Jacquard

UNIT –I

History of Embroidered, hand woven, dyed, printed and painted textiles of India. Floor coverings – Carpets and Durries. Coloured Textiles – Bandhani, Patola, Ikat, Pocchampalli. Woven Textile – Brocades, Jamavar, Jamdani, Chanderi, Maheshwari, Kanjivaram, Kota, Baluchari. Printed Textiles – Sanganeri, Painted Textiles – Kalamkari, Shawls of Kashmir

UNIT - II

Symbolic motifs of various cultures. Study of Traditional Embroidery – History and types. Traditional and Commercial embroideries of India – Kutch, Kathiawarh, Sindhi, Phulkari, Kantha, Kasuti, Kashida, Chamba Rumal, Chikankari, Zardozi with their traditional influence, symbolism, basic fabrics, decorative stitches, techniques and colour combination.

UNIT –III

Evolution of Handlooms. Various parts of a handloom and their function. Type of handloom – Throw Shuttle handloom, Fly shuttle handloom – Pit loom & Frame loom. Passage of warp in a fly shuttle handloom. Motion of handloom – Definition of primary, Secondary & Auxiliary Motions. Different type of shed formations – Centre Close shed, Bottom Closed shed, Top close shed, Open- shed and Semi – open shed. Shedding mechanism of a handloom using treadles and Heald Reversing motions- Roller system, Pulley system and jack and lamrod system.

UNIT – IV

Picking mechanism of a handloom. Type of shuttles – Throw shuttle, Fly shuttle and Roller Shuttle- Design and Suitability. Beating up – Closed and beating and crossed shed beating. Different type of read – bamboo reed, pith bound steel reed and all metal steel reed- suitability for various fabrics. Let of Motion Handlooms- Ratchet and Pawl, rope and weight, rope and lever and weight. Take up motion in handlooms – Poker rod and ratchet & pawl. Auxiliary Motions of a handloom – Temple motion and terry motion.

UNIT- V

Handloom dobbies – lattice dobby, barrel dobby and bottom closed shed dobby – Mechanism, Working principles and suitability. Design and essential features of a pit loom – Structural Loom, Lay-out and relationship between the loom design and the product manufactured. Design and essential features of a frame loom – Structural Loom, Lay-out and relationship between the loom design and the product manufactured. Lay- out and design of an Industrial Handloom weaving unit.

Jacquards – Structure and function of different parts of a jacquard. Single lift Single Cylinder jacquard – Mechanism and working principle.. Double lift Single Cylinder jacquard – Mechanism and working principle. Double lift cylinder jacquard – Mechanism and working principle. Open shed jacquard - Mechanism and Working principle. . Inverted hook jacquard - Mechanism and Working principle. Cross Border jacquard - Mechanism and Working principle. Self – twilling jacquard - Mechanism and Working principle. Leno jacquard - Mechanism and Working principle.

COURSE OUTCOMES: (Graduate to have)

1. An ability to develop the designs based on Ancient Indian History
2. An ability to develop special designs based on the Indian art and culture
3. An ability to evaluate the requirements of Handloom
4. An ability to apply the knowledge of Handloom with various designs for specific end use.
5. An ability to select the right type of Dobby and Jacquard
6. An ability to process different types of fibres on Handloom

EXAMINATION : : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS"

1. Anand M.R., "Textiles & Embroideries of India " Marg Publication Bombay, 1965.
2. Naik Shailaja D, " Traditional Embroideries of India" APH Publisher Corporation, New Delhi, 1996.
3. Chattopadhyay K, " Indian Embroidery", Wiley Eastern Ltd., New Delhi, 1977.

REFERENCE BOOKS

1. Gosh G.K & Shukla Gosh (1993) Indian Textiles -Past and Present. APH, New Delhi.
2. Kamaladevi Chattopadhyay (1977) Indian Embroidery. Wiley Eastern, New Delhi.
3. Dhamija J. & Jain J. (1989) Handwoven Fabrics of India, Mapin Publishing
4. Veronika Murphy & Grill R. (1991) Tie dyed Textiles of India, Indian Art Series

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							✓
CO2	✓	✓		✓								✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓			✓								✓
CO5	✓	✓	✓	✓	✓							✓
CO6		✓		✓								✓

PC504 PCE-I-F-MF

MILLENNIUM FIBRES

Instruction per week : [L-3, T-0] = 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

COURSE OBJECTIVES

- 1.To provide an education about the role of Millennium fibres
- 2.To educate the students about the manufacturing of New fibres
3. To develop an strategy for designing the production system for Modern fibres
- 4.To learn the methods of testing the new fibres
- 5.To educate the students for designing of new fibers
- 6.To understand the concept of processing with other fibres

UNIT-I

Introduction to Millennium Fibres: Nomenclature, Need, scope Searching the root of fibers. Role of fiber in human life, high-tech fiber, Natural versus synthetic fiber, Artificial fiber by biomimetics, Geometry & Substrate of fibres and its significance on yarn properties .

The new frontier fibers: New fibers for the next generation, The distinction of high-tech fiber, frontier fiber and new frontier fiber, development of new application fields

UNIT-II

Superfibers: Description of superfibers Development of superfiber in world, Superfiber as a reinforcing material, Frontiers of superfiber applications, Nanofiber (carbon nanotube), High polyketone fiber

Carbon fiber expands towards the twenty-first century: PAN-based and pitch based carbon fiber lead the world, development of carbon fiber, future of PAN-based carbon fiber

UNIT-III :

High function fiber: Prospects of high function fiber development, Sportswear using the high function fiber, Comfort function fiber, Biomimetic and intelligent fiber, The new areas

Frontier of health and comfort fibers: Fiber for health, Development of medical care materials to learn from "smart fiber" , Development trend of comfortable fiber for health, Trend to seek for cleanliness and comfortableness, Fiber to guard environment and health, Technical concentration to achieve comfort

UNIT-IV

Polymer fibers for health and nutrition: The concept and effects of dietary fiber, Hydrocolloid fibers, The main hydrocolloids, Dietary fiber – in health and disease, The appropriate molecular features to achieve

Fibers in medical healthcare: Requirements of a textile as Meditech, Role of Nonwoven, Alginate fibers, Superabsorbent fibers, Wound healing and polysaccharide fibers, Hyaluronan – a new medical fiber, Other fibrous scaffolds for tissue engineering, Collagen: medical applications , Medical textiles

UNIT-V

Developments in nanofibers for the new millennium: Introduction, Need, Role of Nano Technology materials and nanofiber, Creation of new industries, Researches and global developments of nanofiber

COURSE OUTCOME (Graduate to have)

- 1.An ability to use the knowledge of new fibres for Technical Textiles
- 2.An ability to judge the suitability of a specific yarn for a particular end use
- 3.An ability to examine the role of Nano technology for Textile processing
- 4.An ability to interpret the results of testing of new fibres
- 5.An ability to design a special type of fibre for a specific application
- 6.An ability to plan for the mass production of new fibres.

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOK

Millennium fibres - Tatsuya Hongu, NEDO Working Group for Nano-fiber Technology Survey, 2008

REFERENCE BOOK

Machiko Takigami, Japan Atomic Energy Research Institute, Japan and Glyn O. Phillips, Phillips Hydrocolloid Research Ltd, UK Woodhead Publishing Series in Textiles No. 43

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							✓
CO2	✓	✓			✓							✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓				✓							✓
CO5	✓	✓	✓	✓	✓							✓
CO6		✓		✓	✓							✓

PO 505 POE- I (1) -BCE

BIO-CHEMICAL ENGINEERING (Chem. Eng.)

(Professional Open Elective –I(1))

Instruction per week : [L-3, T -0]3 Hours

Duration of SEE : 3 Hours

Credits : 3

CIE: 40 Marks

SEE : 60 Marks

Course Objectives

Students to learn

1.	molecular biology and metabolism
2.	important role of microbiology
3.	Engineer the enzyme technology
4.	concepts of bioreactors and downstream techniques
5.	concepts of bioprocess technology
6.	the biochemical engineering applications

UNIT - I: Introduction to Biochemical Engineering & Molecular Biology

Biochemical Engineering Principles, Biophysics and cell doctrine: Atomic Theory and Cell Theory, Important cell types, structure and functions of a typical cell and their components, Transport across cell membranes: Passive and facilitated diffusion, Active transport; Structure and functions of Bio Molecules: Carbohydrates, lipids, Nucleotides to Nucleic Acids - R N A and DNA, Amino acids to Proteins - the building blocks of biochemical life.; Biosynthesis and Metabolic Pathways: Biosynthesis of Small and Macro Molecules Introduction of metabolic pathways and end products of glucose metabolism.

UNIT - II: Introductory Microbiology

Introduction to Microbiology: Classification and Industrial uses of Microorganisms; Growth and Reproduction of Microbes: Growth cycle phases for batch cultivation. Monod's growth kinetics – Growth Rate dependant classification of Microorganisms; Microbial Genetics: Recombinant DNA technology and mutant populations; Multiple Interacting Microbial populations: Neutralism, Mutualism, Commensalism, Amensalism, Predatism and Parasitism

UNIT - III: Enzyme Technology

Enzymology: Enzymes as Biocatalysts - The enzyme substrate complex and enzyme action and Classification of Enzymes based on Functions; Kinetics of Enzyme Catalyzed Reactions: Simple enzyme kinetics with one and two substrates; determination of rate constants, substrate activation and inhibition, modulation and regulation of enzyme activity / effect of pH and temp on enzyme activity. Immobilized Enzyme Technology: Types of Enzyme immobilization, Immobilized enzymes in industrial processes, Cofactors, Apo-enzymes and Coenzymes utilization and regeneration

UNIT - IV: Bioreactors and Down Stream Techniques - Introduction

Design and Analysis of Biological Reactors: Batch and CSTR reactors, Enzyme reactors; Ideal Reactors for kinetic measurements: The ideal batch reactor / The ideal continuous flow stirred tank reactor - Alternate bio-reactor configurations; Separation Processes: Filtration, Centrifugation, Adsorption, Reverse osmosis, Dialysis, Electrophoresis, Sedimentation and Extraction; Purification Processes: Precipitation, Crystallization, and Chromatography

UNIT - V: Bioprocess Technology

Fermentation Technology: Types of Fermentation - Anaerobic and Aerobic Fermentation process. Surface and Submerged Fermentation process, Medium formulation and Culture Propagation: Media composition and Sterilization, Inoculum's culture development under aseptic conditions of transfer. Environmental biotechnology: Effluent treatment. Industrial Biotechnology: Commercial enzymes, Antibiotics and single cell protein

EXAMINATION: Part – A for 40 marks (with 10 questions: two question from each unit - Compulsory) and Part – B for 60 marks (5 questions to be answered out of 7 of equal weightage selecting at least one from each Unit).

TEXT BOOK

1. James, E. Bailey and David F Ollis, Biochemical Engineering Fundamentals, II Edition, 1986. McGraw-Hill Internal Edition.

Course outcome: At the end of the course, student will be

CO1	Provides information about molecular biology and metabolism
CO2	Explain how microbiology playing important role
CO3	Engineer the enzyme technology
CO4	Apply concepts of bioreactors and down stream techniques
CO5	Apply concepts of bioprocess technology
CO6	Engineer the biochemical engineering applications

Mapping of Course Outcomes with Programme Outcomes

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓					✓	✓
CO2	✓	✓	✓	✓		✓					✓	✓
CO3	✓	✓		✓		✓					✓	✓
CO4	✓	✓		✓		✓					✓	✓
CO5	✓	✓	✓								✓	
CO6	✓	✓	✓			✓					✓	✓

PO 505 POE- I (2)-MT

MEMBRANE TECHNOLOGY(Chemical Eng.)

(Professional Open Elective –I(2))

Instruction per week : [L-3, T -0] 3 Hours

Duration of SEE : 3 Hours

Credits : 3

CIE: 40 Marks

SEE : 60 Marks

Course Objectives	
1.	To learn membrane technology and characteristics of the species to be separated.
2.	To learn to select the right material and membrane structure according to the properties of the involved compounds.
3.	To learn to Evaluate the flux of water and solute through a membrane, under fixed operating conditions, from transport equations or supplier information
4.	To learn to Identify the membrane technology applications for energy efficient and environmental friendly operations.
5.	To learn to design Equipment for membrane processes
6.	To learn detailed membrane systems

UNIT - I

Introduction to Membrane Separation processes : Classification of separation processes – Separating agents – principles of gas permeation, reverse osmosis, ultra-filtration, perforation dialysis, Electro-dialysis.

UNIT- II

Applications of membrane separation processes : Applications of membranes for the separation of hydrogen or acid gases from O₂ – N₂ separation from air – stability of membrane processes for waste water treatment, applications in pulp and paper, electroplating and Electro-coating industries – Applications in food industry – denaturing of liquid foods, cheese making and whey processing.

UNIT- III

Ideal separation on capabilities of membrane processes : Separation factor, rejection factor, expressions for ideal separation factors in various membrane processes. Secondary Phenomena in Membrane processes : Secondary physical and transport phenomena in membrane processes, concentration polarization in membrane processes.

UNIT- IV

Equipment for membrane processes: Flat sheet, tubular, spiral wound and hollow fiber membrane modular designs for various membrane processes, single entry and double entry separating elements, separation stage. Flow configuration in membrane systems.

UNIT -V

Design of membrane systems: Design equations for perfect mixing and cross flow configuration, separation stages for gas permeation, reverse osmosis and ultra filtration. Design equations for perfect mixing and parallel flow dialyze. Simple design equations for Electro-dialytic stacks.

EXAMINATION: Part – A for 40 marks (with 10 questions: two question from each unit - Compulsory) and Part – B for 60 marks (5 questions to be answered out of 7 of equal

TEXT BOOKS

1. S.T. Hwang and K.Mammermeyer “Membranes in Separation” - , Wiley – Inter Science, New York, (1960).
2. “Membrane Technology” Winter School conducted at College of Technology, O.U. – December – 1987.

Course outcomes:

At the end of the course, student will be

CO1	Able to apply the membrane technology according to the characteristics of the species to be separated.
CO2	Able to select the right material and membrane structure according to the properties of the involved compounds.
CO3	Able to Evaluate the flux of water and solute through a membrane, under fixed operating conditions, from transport equations or supplier information
CO4	Able to Identify and understand the membranetechnology applications for energy efficient and environmental friendly operations.
CO5	Able to deign Equipment for membrane processes
CO6	Able to apply membrane systems

Mapping of Course Outcomes with Programme Outcomes

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓					✓	✓
CO2	✓	✓	✓	✓		✓					✓	✓
CO3	✓	✓		✓		✓					✓	✓
CO4	✓	✓		✓		✓					✓	✓
CO5	✓	✓	✓								✓	
CO6	✓	✓	✓			✓					✓	✓

INSTRUMENTATION IN PROCESS INDUSTRIES (FT)

(Professional Open Elective I(3))

Instruction per week : [L-3, T -0] 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

Course Objectives

1. To learn about all the elements of Instrumentation and Process Control and also about the Flow measurement meters.
2. To understand about assessment of all types of Temperature gauges
3. To assess about the suitable pressure gauge according to the industry requirement
4. To gain knowledge regarding spectroscopy to measure various Food components.
5. To understand and learn about testing various Physio-Chemical Properties of Food
6. To study the effect of Food qualities attributes and controlling of the process conditions.

UNIT- I

Introduction :- Measurement, Principles of Measurements, Elements of Instruments, Process control instruments and their classification.- Flow measurement: flow detectors, Orifice plate, Venture tube and Piton tubes, Advantages, Disadvantages and Applications of flow measuring instruments.

UNIT- II

Temperature measurement - Introduction, Basic terms, Definition.- Temperature measuring devices- Mercury in glass thermometer, Bimetallic, Pressure spring thermometer, Thermocouples (Thermo couple led wires and thermal wells), Resistance thermometers.- Pyrometers: Radiation, Photoelectric and Optical pyrometers.

UNIT- III

Pressure measurement: - Introduction, Definition Instruments to measure pressure: Gravitational transducers, Dead weight tester and Manometer- Electric transducers - Bourdon tube pressure gauge, and Bellows gauges- Thermal conductivity gauges :Pirani gauge and Thermocouple type conductivity gauge, Description, Operation, Applications, Advantages and Limitations of the pressure measuring instruments.

UNIT- IV

Methods of composite analysis:- Absorption, Spectroscopy, Emission Spectroscopy and Mass Spectroscopy.- Measurement of velocity: Introduction, Measurement of linear velocity: Electromagnetic transducers (Moving magnetic type velocity transducer, and moving coil type velocity transducers) - Principle, Description, Operation, Advantages, Disadvantages and Applications.- Digital transducers:Discription, Operation and Applications.

UNIT- V

Measurement of humidity: - Introduction, Definitions- Humidity measuring devices: Sling Psychrometer, Absorption Hygrometer and Dew Point meter, Description, Operations, Applications, and Limitations. Measurement of density:- Basic terms, Measuring instruments, Applications and considerations. - Measurement of viscosity:- Definition, Viscosity

EXAMINATION: Part – A for 40 marks (with 10 questions: two question from each unit - Compulsory) and Part – B for 60 marks (5 questions to be answered out of 7 of equal weightage selecting at least one from each Unit).

Course Outcomes

At the end of the course, Students will be

1. Able to Illustrate all the elements of Instrumentation and Process Control; also, about the Flow measurement meters.
2. Able to Get a assess of all types of Temperature gauges
3. Able to Recommend the suitable pressure gauge according to the industry requirement
4. Able to Use the gained knowledge regarding spectroscopy to measure various Food components.
5. Able to Test various Physio-Chemical Properties of Food
6. Able to Determine various Food qualities attributes and control the process conditions.

TEXT BOOKS

1. William.C. Dunn, Fundamentals of industrial instrumentation and process control , Mc gram-Hill, 2005.
2. Donald P. Eckman, Industrial Instrumentation , Willey – Eastern limited, 2002.

REFERANCE BOOKS

1. O Doeblin & Dhanesh Manik, Measurement systems by Ernest, Tata McGraw Hill Education, 2007.
2. Considine D.N. , Process Instruments and Controls, Handbook , 2nd Edition, by McGrawHill, 1974.

INDUSTRIAL MICROBIOLOGY (FT)

(Professional Open Elective I(4))

Instruction per week : [L-3, T -0] 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

COURSE OBJECTIVES

1. To Learn about the industrially important microorganisms and their metabolism
2. To learn about the Growth characteristics and bioreactors used of industrial microorganisms
3. To study about food fermentation (milk, Fruit, vegetables, meat, fish)
4. To learn about industrial production of secondary metabolites
5. To study about alcoholic beverage production
6. To study about microbial biomass production

UNIT I

History of microbiology and industrial microbiology, Microbial Taxonomy and metabolism- Microbial growth curve, Primary and secondary metabolites produced by the microorganisms Screening of microorganisms-Pure culture methods, Preservation of microorganisms and Sterilization ,Industrial fermentation-Industrially Important Microorganisms, Criteria for Selection of industrially important Microorganisms, Overview of strain improvement of industrially important microorganisms, Fermentation media selection and media for industrial fermentation

UNIT II

Fermenter: Bioreactor Design, Upstream and Downstream Processing, Batch and Continuous fermentation, Components of a fermenter, parts of fermenters, peripheral parts and accessories. Food Fermentation: Cheese and Other Dairy fermented products Lactic acid fermentation of vegetables, Pickle- Cabbage, Olives etc. Vinegar Fermented Sausages and fermented meat products

UNIT III

Alcoholic beverages: Wine Brandy and Beer, Distilled beverage alcohol, Bakery Foods Oriented fermented foods, Food Flavors, Organic acids, Synthesis of proteins, fats and Polysaccharides, Vitamins and Growth Factors

UNIT IV

Microbial Biomass cell products i.e. Mushroom, SCP, Baker's yeast, blue green algae and spirulina, Measures to improve yield of fermented products, Industrially important secondary metabolites and their products, Amino Acids, Citric acid, Production of alcohol as fuel source

UNIT V

Industrially important secondary metabolites; and microorganisms involved Probiotics, Biopesticides, Antibiotics, Exopolysaccharides, biopolymers, Steroids, Biomers, Bacteriocins and Nisin, Production of microbial enzymes, Cell disruption methods: Mechanical disruption methods and non-mechanical disruption methods; Extraction; Purification; Concentration; Product recovery.

COURSE OUTCOMES

At the end of the course, Students will be

1. Able to apply the industrially important microorganisms and their metabolism
2. Able to apply the Growth characteristics and bioreactors used of industrial microorganisms
3. Able to apply industrial food fermentation
4. Able to apply industrial production of secondary metabolites
5. Able to apply production of alcoholic beverages
6. Able to apply Importance of microbial biomass

TEXT BOOKS

1. Casida LE, Industrial Microbiology Wiley, 1968
2. Rajvaidya N. ,Industrial Applications of Microbiology APH Publishing, 2006
3. G. Reed ,Prescott & Dunn's Industrial Microbiology 4 th Ed. AVI Publishers, Connecticut, USA. 2004
4. Brewing Science and Practice. Dennis EB, Woodhead Publishing Ltd. Cambridge, England. 2004

REFERENCE BOOKS

1. Modern Industrial Microbiology and Biotechnology Nduka Oka for Science Publishers, Enfield, New Hampshire, USA. 2004
2. Handbook of Indigenous Fermented Foods Steinkraus KS Marcel Dekker, 1996

STATISTICAL ANALYSIS AND DESIGN OF EXPERIMENTS

Instruction per week : [L-3, T-0] = 3 Hours
Duration of SEE : 3 Hours
Credits :3

CIE: 40 Marks
SEE : 60 Marks

COURSE OBJECTIVES

- 1.To understand the concepts of statistics and its applications
2. To know the sampling methods and sample size
3. To learn the method of Testing the population
- 4.To learn the applications of Design of Experiments
5. To know the concepts of Online and Offline quality control methods.
- 6.To know the tools for statistical interference

UNIT-I

Introduction – Applications of Statistical Techniques in Process industries – Collection of Primary and Secondary data, Tabulation of data.

Construction of Frequency Distributions: Graphical representation of frequency distributions. (Histogram, Frequency polygon, Frequency Curve, Ogives)

Measures of central tendency : Mean by direct, Short cut methods ; Median and Mode Calculation in discrete, group data, graphical methods..

UNIT-II

Measures of dispersion : Range, Within and Between variations, PMR, Quartile Deviation, Box & Whisker Plots, Outliers, Mean deviation, standard deviation, variance and coefficient of variation. --**Probability Distributions** :Applications, Problems on Normal distribution , Binomial distribution and Poisson distribution .

UNIT - III.

Tests of significance: introduction, need, scope, One tailed and two tailed tests, Interpretation and limitation - 't' test , 'F' test & Chi-Square test

Control Charts: Introduction to control charts: Significance, Basis of Control Charts, types and construction of Charts for Averages, Range, Fraction Defective, Percent Fraction Defective, and Fraction defective per unit area control charts, Current and Future limits, Specification and Engineering limits, Scrap, Shifting of Average .

UNIT-IV

Time series :components of time series – Measurement of trend – method of least squares, second degree parabola – measurement by logarithms – shifting the trend origin

Correlation: Concept and Need, Methods of studying Correlation – Coefficient of correlation– Rank correlation;

Regression : Concept and need, Regression equations , correlation and regression coefficient.

UNIT-V

Non –Parametric Tests: , Kruskal –Wallis test, Duncan's Multiple Range Test, Newman-Keuls test, Mann-Whitney U Test . , SM test

Analysis of variance: elements , Interpretations, ANOVA of One way , Two way and, observations more than one per cell .

Design of Experiments: Introduction, Terminology , types of designs

Factorial Experiments:– Yate's algorithm, 2^k fractional design in detail ($2^2, 2^3, 2^4$)-

EXAMINATION : : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

COURSE OUTCOMES (Graduate to have an)

1. Ability to construct frequency distributions and measure central tendency, dispersion of chemical processes
2. Ability to apply probability distributions and perform tests of significance.
3. Ability to select control charts, estimate correlation & regression data.
4. Ability to trend the given data using parameter tests and ANOVA.
5. Ability to design experiments using factorial design and taguchi techniques
6. Ability to design a process and estimate its parameters for quality analysis.

TEXT BOOK

Design and Analysis of Experiments- Douglas C. Montgomery, 7th edition, 2010 John Wiley and Sons INC

REFERENCE BOOKS

- 1.Design and Analysis of Experiments- Douglas C. Montgomery, 5th edition, 2010 John Wiley and Sons INC.
2. Fundamentals of Applied Statistics- S.C.Guptha and V.K. Kapoor , Sultan Chand & Sons , New Delhi, 2012

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓						✓	✓
CO2	✓	✓			✓							✓
CO3	✓	✓	✓	✓	✓						✓	✓
CO4	✓			✓	✓							✓
CO5	✓	✓	✓		✓						✓	✓
CO6		✓		✓	✓							✓

MARKETING AND MERCHANDIZING MANAGEMENT

Instruction per week : [L-3, T-0] = 3 Hours
Duration of SEE : 3 Hours
Credits :3

CIE: 40 Marks
SEE : 60 Marks

COURSE OBJECTIVES:

- 1.To understand the concept of Market and Marketing
- 2.To learn about the Marketing Mix and Marketing Strategy
- 3.To learn about the consumer behavior
4. To understand the role of Advertisement and its management
5. To learn about the Merchandizing
- 6.To understand the concept of visual merchandizing

UNIT-I

Introduction to Marketing : Concept of and functions of Market and Marketing-Brief Idea about Marketing Management, Marketing process. –Classification of Market activities, Marketing Efficiency, Market Financing, -Market Planning: Elements, Process & Organisation.

UNIT-II

Marketing Mix & Marketing Strategy: Factors affecting, Marketing Audit- Marketing Decisions: Elements ,Significance, Scientific Tools, Decision Theory(Numerical Examples on Mini Max, Maxi Max etc.,-Effect of Culture, Organisation -Product Related Concept: PLC, Product Mix, Product Development,-Pricing Decisions: Factors, kinds of Pricing, Price determination for garment and pricing Policies

UNIT-III

Consumer Behaviour: Types of Buyers,factors influencing buying behaviour,Models, Motives & Habits-Product Identification(Branding, Packaging),Whole seller, Retailer-Market Research: Concept , Process and steps-Market Segmentation: Types, Criteria for segmentation, Alternative Strategies, Application of OR and Sample Design-Test Marketing

UNIT-IV

Advertising Management: Introduction, Activities Included & Excluded in Advertising-Uses & Abuses of Advertising-Types of Advertisements-Marketing Communication Process & Mix-Creativity in Advertising-Measuring effectiveness of Advertising –Advertising Budget-Advertising Agency-Print & Broadcasting Advertising.

UNIT-V

Merchandising: Meaning, sourcing, Requirements of purchase order, Functions of Merchandiser; Principles of Fashion Merchandising-Career in Merchandising, -Merchandise Planning-Time Management in Merchandizing

COURSE OUTCOMES: (Graduate to have)

- 1.An ability to identify the potential places as markets
- 2.An ability to develop the marketing mix
- 3.An ability to evaluate the Consumer Behaviour
- 4.An ability to apply Quantitative techniques for Market Research .
- 5.An ability to design and develop a suitable Advertising model for a specific product.
- 6.An ability to excel as Merchandiser

EXAMINATION : : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks
(5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOK:

1. Ramaswamy . V.S. & Namakumari.S “Marketing Management”, Mc-Millan India Ltd, 3 Ed, 2004
2. Philip Kotler & Arm Strong “Principles of Marketing” 10 th edition, Prentice-Hall of India, Pvt. Lt New Delhi, 2003
3. Donald.S. Tull & Del. I. Hawkins “Market Research-Measurement Methods”, Printice Hall of India, 1997
4. Chunnawala.S.A & Sethia .K.C “Foundations of Advertising” Himalaya Publishing House, 1997

REFERENCE BOOKS:

1. Fashion Buying & Merchandising : Sidney Packard, Arthur Winters, Nathan Axelrod, Fairchild Publications, New York
2. Fashion Merchandising Stone and Jean A. Samples, Mc-Graw Hill Book Company, NY

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓						✓	✓
CO2	✓	✓		✓								✓
CO3	✓	✓	✓	✓	✓						✓	✓
CO4	✓			✓								✓
CO5	✓	✓	✓	✓	✓						✓	✓
CO6		✓		✓								✓

MC 506-A- IC

**INDIAN CONSTITUTION
(Mandatory Course)**

Instruction per week : 3 Hours
Duration of SEE : 3 Hours
Credits : 0

CIE: 40 Marks
SEE : 60 Marks

Course Objectives

1. To learn about the concept of constitution
2. To understand the structure of constitution
3. To provide the knowledge of the various sections of Indian constitution
4. To educate the students about the constitutional amendments
5. To educate the students about the knowledge of fundamental rights of Indian citizens
6. To educate the application of procedures of constitution for various issues

Unit-I

Meaning of the constitution law and constitutionalism, Historical perspective of the Constitution of India, Salient features and characteristics of the Constitution of India

Unit-II

Scheme of the fundamental rights, The scheme of the Fundamental Duties and its legal status, The Directive Principles of State Policy – Its importance and implementation

Unit-III

Federal structure and distribution of legislative and financial powers between the Union and the States, Parliamentary Form of Government in India – The constitution powers and status of the President of India, Amendment of the Constitutional Powers and Procedure

Unit-IV

The historical perspectives of the constitutional amendments in India, Emergency Provisions : National Emergency, President Rule, Financial Emergency, Local Self Government – Constitutional Scheme in India

Unit-V

Scheme of the Fundamental Right to Equality, Scheme of the Fundamental Right to certain Freedom under Article 19, Scope of the Right to Life and Personal Liberty under Article 21.

Course Outcomes

1. Ability to understand and apply the laws of constitution
2. Ability to design the process set up with the knowledge of constitution
3. Ability to apply the provisions to various problems of society
4. Ability to apply the Constitutional rights for specific problems of society
5. Ability to design the state requirements based on the constitution rights
6. Ability to understand the conditions for imposing presidents rule to states.

EXAMINATION :Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Constitution of India - Subhash C Kashyap , 2018, Vitasta Publishing Pvt. Ltd., New Delhi
2. Constitution of India by V. N. Shukla, Mahendra Pal Singh , Publisher: Eastern Book Company , 2016
3. The Constitution of India, 1960 (Bare Act), Government Publication.
4. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

5. M.P. Jain, Indian Constitution Law, 7 th Edn., Lexis Nexis, 2014.

6. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓		✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓			✓								
CO5	✓	✓	✓	✓	✓							
CO6		✓		✓								

MC 506- B- EIKT

ESSENCE OF INDIAN KNOWLEDGE TRADITION

Mandatory Course

Instruction per week : 3 Hours

Duration of SEE : 3 Hours

Credits : 0

CIE: 40 Marks

SEE : 60 Marks

Course objectives

1. The course aims at imparting basic principles of thought process, reasoning and inferencing.
2. To study about the sustainability of Indian Traditional knowledge Systems connecting society and nature.
3. To study the olistic life style of yogic science
4. To understand the wisdom capsules in Sanskrit literature are also important in modern society with rapid technological Advancements
5. To learn the societal disruptions and introduction to Indian Knowledge Systems
6. To understand the Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.

Course Contents

Unit-I

Basic structure of Indian Knowledge System

Unit-II

Modern Science and Indian Knowledge System

Unit-III

Yoga and Holistic Health care

Unit-IV

Case studies-I

Unit-V

Case Studies –II

Course Outcomes

1. Ability to apply the Indian knowledge system
2. Ability to apply modern science for life problems solving
3. Ability to plan for Yoga for daily life
4. Ability to plan for some case studies
5. Ability to apply the knowledge for the implementation of outcomes
6. Ability to design the solutions to problems of society

EXAMINATION :Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

References

1. V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014
2. Swami Jitatanand, *Modern Physics and Vedant*, Bharatiya Vidya Bhavan
3. Swami Jitatanand, *Holistic Science and Vedant*, Bharatiya Vidya Bhavan
4. Fritzof Capra, *Tao of Physics*
5. Fritzof Capra, *The Wave of life*

6. VN Jha (Eng. Trans.), *Tarkasangraha of Annam Bhatta*, International Chinmay Foundation, Velliarnad, Arnakulam
7. *Yoga Sutra of Patanjali*, Ramakrishna Mission, Kolkata
8. GN Jha (Eng. Trans.), Ed. RN Jha, *Yoga-darshanam with Vyasa Bhashya*, Vidyanidhi Prakashan, Delhi 2016
9. RN Jha, *Science of Consciousness Psychotherapy and Yoga Practices*, Vidyanidhi Prakashan, Delhi 2016

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓		✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓			✓								
CO5	✓	✓	✓	✓	✓							
CO6		✓		✓								

HASS-II- 507-A-VE

VALUES & ETHICS

Instruction : 3 Hrs

Semester End Exam: 3 Hrs

Credits : 3

CIE : 40 Marks

SEE : 60 Marks

Course Objectives :

1. To learn classification of values
2. To learn Concepts related to values
3. To learn Egoism, Altruism and universalism
4. To learn Sustenance of value
5. To learn hierarchy of values and their choice
6. To learn views of Pt. Madan Mohan Malviya and Mahatma Gandhi.

UNIT-I

Definition and classification of values: Extrinsic values, Universal and Situational values, Physical, Environmental, Sensuous, Economic, Social, Aesthetic, Moral and Religious values.

UNIT-II

Concepts related to values: Purusartha, Virtue, Right, duty, justice, Equality, Love and Good.

UNIT-III

Egoism, Altruism and universalism. The Ideal of Sarvodaya and Vasudhaiva Kutumbakam.

UNIT-IV

The Problem of Sustenance of value in the process of Social, Political and Technological changes.

UNIT-V

The Problem of hierarchy of values and their choice, The views of Pt. Madan Mohan Malviya and Mahatma Gandhi.

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Books :

1. Little, William, : An Introduction of Ethics, Allied Publisher, Indian Reprint 1955
2. William, K Frankena : Ethics Prentice Hall of India, 1988
3. Dr. Awadesh Pradhan : Mahamana ke Vichara. B.H.U., Vanarasi-2007

Course Outcomes:

1. Able to use classification of values in practice
2. Able to follow Concepts related to values
3. Able to understand Egoism, Altruism and universalism
4. Able to follow Sustenance of value
5. Able to understand hierarchy of values and their choice
6. Able to follow Pt. Madan Mohan Malviya and Mahatma Gandhi.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓		✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓			✓								
CO5	✓	✓	✓	✓	✓							
CO6		✓		✓								

HASS-II- 507-B-EAHL

ETHICS AND HOLISTIC LIFE

Instruction : 3 Hrs

Semester End Exam. : 3 Hrs

Credits : 3

CIE : 40 Marks

SEE : 60 Marks

Course Objectives :

- 1) To enable students to understand the concept of contemporary ethics at different levels: Individual, local and Global and enable them to cross examine the ethical and social consequences of the decisions of their life-view and world view.
- 2) To develop the ability of students to create a balance between their individual freedom and social responsibilities and enable them to identify the personal, professional and social values and integrate them in their personality after cross examination.
- 3) To enable students to cross examine their earlier decisions taken in life and understand the meaning of ethical dilemma to overcome the ethical dilemmas and engage in critical reflection.
- 4) To develop positive habits of thought and conduct and work cohesively with fellow beings who have variety of strengths, experiences, shortcomings and challenges,
- 5) To enable them to handle diverse type of personalities.
- 6) To enable students to develop a method for making ethically sound decisions for themselves, within hostels, classrooms, university campus and society.

Unit-I

Human Life, its aim and significance: The concept of a successful life, happy life and a meaningful life. Ethical and decision making capability and its development: Meaning of Ethical dilemma, sharing real life experiences.

Unit-III

Creative and Leadership ability and their development: Intellectual, Emotional, Creative, Ethico spiritual development, Aesthetic sense, Self-dependency, Activeness. Development of positive attitude.

Unit-IV

Harmony in Personal and Social Life: Concept of personal and group Ethics; Balance between -rights and duties-welfare of self and welfare of all. Creating a value based work culture in hostel, classroom and other places in the campus and society.

Unit-IV

Character, Righteousness and Virtues for a Meaningful Life: Egolessness, Humility, Righteousness, Purity, Truthfulness, Integrity, Self-restraint, Self-control, Sense of responsibility, Empathy, Love, Compassion, *Maitri*/ Comradeship, Cooperation, Tolerance.

Unit-V

Dilemma Between materialistic development and human welfare: Science, Technology, Consumerism, Relation with Nature and Environment. New dimension of Global Harmony: Democracy, Equality, Social Justice

Text Books : Course readings will be announced in the class.

Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

COURS OUTCOMES

- 1) Able to follow the concept of contemporary ethics at different levels: Individual, local and Global and enable them to cross examine the ethical and social consequences of the decisions of their life-view and world view.
- 2) Able to develop the ability of students to create a balance between their individual freedom and social responsibilities and enable them to identify the personal, professional and social values and integrate them in their personality after cross examination.
- 3) To enable students to cross examine their earlier decisions taken in life and understand the meaning of ethical dilemma to overcome the ethical dilemmas and engage in critical reflection.
- 4) To develop positive habits of thought and conduct and work cohesively with fellow beings who have variety of strengths, experiences, shortcomings and challenges,
- 5) To enable them to handle diverse type of personalities.
- 6) To enable students to develop a method for making ethically sound decisions for themselves, within hostels, classrooms, university campus and society.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓		✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓			✓								
CO5	✓	✓	✓	✓	✓							
CO6		✓		✓								

GENDER, CULTURE AND DEVELOPMENT

Instruction : 3 Hrs
Semester End Exam. : 3 Hrs
Credits : 3

CIE : 40 Marks
SEE : 60 Marks

Course Objectives :

1. To learn about definition and Concepts of Gender
2. To learn about Gender Roles and Relations
3. To learn about Gender Development Issues
4. To learn about Gender-based Violence
5. To learn about Gender and Culture
6. To learn about Gender and Popular Literature

Unit- 1: Introduction to Gender, Definition of Gender, Basic Gender Concepts and Terminology, Exploring Attitudes towards Gender, Social Construction of Gender
Unit-2: Gender Roles and Relations, Types of Gender Roles, Gender Roles and Relationships Matrix, Gender-based Division and Valuation of Labour
Unit- 3: Gender Development Issues, Identifying Gender Issues, Gender Sensitive Language, Gender, Governance and Sustainable Development, Gender and Human Rights Gender and Mainstreaming
Unit- 4 : Gender-based Violence, The concept of violence, Types of Gender-based.violence, The relationship between gender, development and violence, Gender-based violence from a human rights perspective,
Unit- 5: Gender and Culture, Gender and Film, Gender and Electronic Media, Gender and Advertisement, Gender and Popular Literature

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Text Books : Course readings will be announced in the class.
Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.

Course Outcomes :

1. Able to understand definition and Concepts of Gender
2. Able to understand Gender Roles and Relations
3. Able to understand Gender Development Issues
4. Able to understand Gender-based Violence
5. Able to understand Gender and Culture
6. Able to understand Gender and Popular Literature

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01	✓	✓	✓	✓	✓							
C02	✓	✓		✓								
C03	✓	✓	✓	✓	✓							
C04	✓			✓								
C05	✓	✓	✓	✓	✓							
C06		✓		✓								

PC 551 TWP

TEXTILE WET PROCESSING LAB

Instruction per week : [P-3] : 3 Hrs
Duration of SEE: 4 Hrs
Credits :1.5

CIE: 40 Marks
SEE: 60 Marks

COURSE OBJECTIVES

1. To provide the students with sound knowledge about scouring, bleaching and dyeing processes.
2. To Educate the students for usage of solvents, enzymes & chemicals.
3. To train the students for understanding the processing parameters for fibres, yarns, fabrics.
4. To educate the students for the requirements of water and selection of the chemicals in the dye house.
5. To provide the knowledge involved in various processes involved in the dye
6. To educate the students for planning of commercial batches and linking the process parameters to the end product .

LIST OF EXPERIMENTS: (Minimum of 8 is to be performed)

1. Desize the given grey cotton fabric with MLR 1:30
2. Scour the given desized cotton fabric with MLR 1:30
3. Bleach the given scoured cotton fabric with MLR 1:30
4. Mercerize the given bleached cotton fabric with MLR 1:30
5. Dye the given bleached sample with direct dye
6. Dye the given mercerized/ bleached sample with direct dye (Tie and dye technique)
7. Degum the given silk fabric with MLR 1:30
8. Dye the degummed silk fabric with acid dye
9. Dye the degummed silk fabric with basic dye
10. Enzymatic desizing of grey cotton fabric

COURSE OUTCOME (Graduate to have)

1. An ability to understand the removal of different fabric impurities
2. An ability to improve the yarn, fabric surface characteristics.
3. An ability to plan for the total water requirements for a dye house
4. An ability to link the properties of wet processed fabric to the process parameters
5. An ability to plan the production schedule for the shop floor situations
6. An ability to apply the specific class of dye for specific fibre

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓		✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓			✓								
CO5	✓	✓	✓	✓	✓							
CO6		✓		✓								

PC 552 FSD

FABRIC STRUCTURE AND DESIGN LAB

Instruction per week : [P-3] : 3 Hrs
Duration of SEE 4 Hrs
Credits : 1.5

CIE: 40 Marks
SEE: 60 Marks

COURSE OBJECTIVES

1. To educate the students about the need of fabric analysis
2. To train the students in analyzing the plain fabrics for Sample data
3. To train the students in analyzing the plain fabrics for Manufacturing data
4. To plan for mass scale production of Plain fabrics
5. To educate the students in designing the different types of Plain fabrics
6. To train the students in establishing the relationship between various elements of fabric data

LIST OF EXPERIMENTS

1. Identification of basic features of fabrics and Need for Analysis
2. Knowledge of different construction particulars as per IS Standards
3. Analysis of different types of warp faced narrow width fabrics
4. Analysis of Medium width Weft faced fabrics
5. Analysis of Wide width equi faced fabrics
6. Analysis of Light ,weight plain fabrics
7. Analysis of Medium weight plain fabrics
8. Analysis of Heavy weight plain fabrics
9. Analysis of Cotton Duck, Cotton Canvas fabrics
10. Analysis of different types of Shirting fabrics
11. Analysis of Different types of Suiting and trouser fabrics
12. Selection of Reed and Pick for popular sorts of Plain fabrics
13. Analysis of Printed Plain fabrics

COURSE OUTCOME (graduate to have)

1. An ability to judge the fabric required for the Specific end use.
2. An ability to analyse the fabric for manufacturing and sample data
3. An ability to link the fabric design parameters to the design aspects of Loom
4. An ability to apply the special features of fabrics in relation to end use .
5. An ability to design a specific weave
6. An ability to suggest the loom particulars for a sort

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓	✓	✓		✓							✓
CO3	✓	✓	✓	✓	✓							✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓							✓
CO6	✓	✓	✓	✓	✓							✓

SCHEME OF INSTRUCTION AND EXAMINATION (AICTE)
B. Tech . (Textile Technology)
(For the Batch admitted in Academic Year 2023-24)

VI Semester

S.NO	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Durati on Hrs	CIE	SEE	
1.	PC 601 APD	Apparel Pattern Designing	3	-	-	3	40	60	3
2.	PC602 PTFA	Printing and Finishing of Textile & Apparel	3	-	-	3	40	60	3
3.	PC603 TCFA	Textile Costing and Financial Analysis	3	1	-	3	40	60	4
4.	PC604 AQCM	Apparel Quality Control & Merchandizing	3	-	-	3	40	60	3
5.	PC605 PCE-II	Professional Core Elective-II	3	-	-	3	40	60	3
6.	PO 606 POE-II	Professional Open Elective-II	3	-	-	3	40	60	3
Practicals									
7.	PC651 APD	Apparel Pattern Designing Lab	-	-	3	4	40	60	1.5
8.	PC652 PFTA	Printing & Finishing of Textile & Apparel Lab	-	-	3	4	40	60	1.5
9.	PC 653 II	Industrial Internship	-	-	4 weeks		60	-	2
		Total	18	1	6		380	480	24

Professional Core Elective-II: . A. Compliance Standards for Apparel Industry B. Exim Management for Textiles and Apparel Units C. Apparel Product Development Production Planning & Control D. Speciality Fabrics E. Technology of Denim Production F. Sports and Automobile Textiles

Professional Open Elective II : 1. Corrosion and Corrosion control (Chem. Eng.) 2. Simulation and Computer Aided Design(Chem. Eng.) 3. Industrial Hygiene and Health (FT) 4. Solar Energy Utilization,(FT) 5. Six Sigma and Lean Methodologies (TT) 6. Industrial Climatology & Relations (TT)

PC601APD

APPAREL PATTERN DESIGNING

Instruction per week : [L-3, T-0] = 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks Credits :3

Course Objectives:

1. To provide the knowledge of taking body measurements, tools required and method of cutting basic patterns.
2. To understand the basic concept of grading and pattern construction techniques.
3. To know the basic understanding of variation in human figure due to bone structure which leads to variation in figure shape.
4. To understand developments and modification in patterns according to variation in figure shape
5. To learn about the Garment Fit .
6. To understand about the designing of new ladies garments

UNIT –I

Tools for Apparel designing: Tools required for patterning and cutting ,measuring tools , marking tools, general tools.

Preparation for measuring: Method of recording measurements for men and women. body and garment measurements; taking body measurement manually, computerized body measuring systems Introduction to darts, Dart Manipulation principles, tucks, pleats, flares, godets, gathers, frills.

Introduction to paper patterns: Types and importance of paper patterns, Principles of drafting and alteration, rules of laying patterns on fabric, pattern layout, transferring pattern markings on fabric.

UNIT –II

Introduction to drafting: Considerations while cutting paper patterns, preparation of paper patterns, principles for pattern drafting, advantages of drafting, drafting basic pattern for bodice, sleeve, collar, yoke and skirt, Yoke styling.

Draping : Introduction, Draping fabric for various garments, advantages of draping. Different types of collars, sleeves, cuffs and pockets. Introduction to pattern cutting – planning, drawing and marker planning- requirements of pattern construction.

Size chart formulation: Standard size charts for Men, women's ,Kids. Pattern construction techniques: the positioning of computer patterns, creating pattern shapes by computer, techniques for construction pattern shapes. Block pattern construction: block patterns, garment balance, garment shaping suppression, ease allowance, influence of the fabric, drafting block patterns, testing block patterns Construction of primary block patterns: straight skirt block size 12.

UNIT –III

Computer pattern grading: Pattern grading: grading increments, grading point movement, methods of recording incremental growth, grade rules, constructing a grade rule table, variation in positioning the zero point, computer grading techniques. Grading primary block pattern: straight skirt grading that retains the same proportion, straight skirt grading that changes the proportion,

Pattern designing and grading: Pattern preparation for digitizing : setting up parameter tables, storage area, user environment.

Parameters tables: Notch parameter tables, drill hole parameter table, pattern annotation table. Checking master patterns.

UNIT - IV

Computer digitizing : Digitizing process, digitizing, graded nest of patterns, digitizing large pattern piece, verifying pattern grading .

Pattern design procedures: skirt styling: gathered skirt with flounce pleats, flared and gored skirts, construction of circular skirts, skirt style and yoke and pleats. Collar styling: section of a collar. Sleeve styling: relationship of the sleeve to the bodice, sleeve length.

Production patterns: checking the stitching line, seam allowances seam corners, hems, facings, approval of the sample garment and graded patterns.

Pattern modification for garment size and fit:

Assessing the figure shape and garment fit: variation in bone structure: height, shoulder slant, length of upper and lower torso stance.

UNIT –V

Variation in posture: garment balance, skirt waist level, trouser waist level and seat angle, and neck width sleeve pitch. Variation in body size and contour: small adjustment to the waist size, large adjustment to the waist size, incorrect suppression, prominence, shoulder blade prominence, prominence of the lower torso. straight skirt modification for a prominent seat, straight skirt modification for a flatter seat, straight skirt modification for a hip and thigh prominences, straight skirt modification for a stomach prominence, trouser modification for a seat prominence, trouser modification for a hip and thigh prominences, trouser modification for stomach prominence.

Course Outcomes

1. An ability to understand the method of taking body measurements by using the manual, and computerized body measuring systems.
2. An ability to understand the concept of pattern construction techniques and grading of basic pattern to create several range of pattern by using computer.
3. An ability to design the pattern for different styling (skirts, shirts and trousers)
4. An ability to understand the and assessing human figure shape due to variation in bone structure and posture
5. An ability to design the kids garment
6. An ability to assess the yarn consumption and cost of garment making

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit

TEXT BOOKS

1. Practical Clothing Construction : Part I , Mary Mathews, shanker Publishers, chamarajpet Bangalore , 2005
2. Patternmaking for Fashion Design, Fifth Edition, Pearson publication, Helen Joseph-Armstrong, 2010.
3. Metic Pattern Curring – Winfred Aldrich, Balckwell Publishers, 2007

REFERENCE BOOKS

1. Designing patterns- Hilary Campbell, Stanley Thornes, 2003
2. Pattern cutting made easy-Gillian Holman, B.T. Batsford Ltd. 2005
3. More dress pattern designing-Natalie Bray, Black well publishers, 2005

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2
CO1	✓	-	✓	-	✓	-	-	-	✓	-	-	-
CO.2	✓	-	✓	-	✓	-	-	-	✓	-	-	-
CO3	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO4	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO5	✓	✓	✓	-	✓	-	-	-	✓	-	-	-
CO6	✓	✓	✓	-	✓	-	-	-	✓	-	-	-

PC602 PFTA

PRINTING AND FINISHING OF TEXTILE AND APPAREL

Instruction per week : [L-3, T-0] = 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

COURSE OBJECTIVES

1. To understand the basic concept of Printing
2. To know the methods of Printing
3. To plan for the printing recipes
4. To learn about the Finishing process
5. To understand various types of finishes
6. To understand the method of evaluation of different types of finishes

UNIT – I:

Introduction of printing: Differences between printing and dyeing

Styles of printing: Direct, Discharge and Resist styles of printing

Methods of printing: Block , roller, screen and transfer methods, Defects in printing and their remedies.

Printing paste: essential ingredients and their functions, Types and properties of thickening agents Rheology of printing paste, methods of measuring it.

Printing Procedure: preparation of fabric for printing, preparation of printing paste, printing ,drying after printing, dyestuff fixation final treatment (washing off)

Recent Developments in Printing: Digital & Ink Jet Printing

UNIT – II:

Brief discussion on printing recipes n direct , discharge and resist styles of printing. Printing of cotton and viscose Rayons, , Polyester and its blends.

Introduction to finishing, Objectives and types of finishing, selection of chemicals with reference to type of fabrics and garments and their finishing (Parameters controlling the finish), Durable and temporary finishes, Raising and Shearing : Types and methods- Sueding- Napping

UNIT – III:

Anti Shrink Finish – Theory of shrinkage- Compressive – Relaxed shrinkage-compacting- Decatizing- Creeping- Non felting treatment – Calendaring- drying of textile with emphasis on stenter drying, calendaring, different types.

Shrinking process:, mechanism of shrinkage pre shrinking of cotton goods and machines used.

Crease: mechanism for crease formation. Wash and wear finish, Durable press finish. Brief description of DMU,DMEU,DMDHEU and DMEDHEU,non formoldehyde anti crease agents

UNIT – IV:

Denim washing – Stone washing, Denim bleaching, Acid washing, Enzyme washing, Sand blasting, Salt and pepper denim, Shot gun denim.

Conventional finishes:

Softening finishes: Mechanism of the softening effect. Types of Softeners.

Hand building finishes: The hand building effect. Textiles with hand building finishes. water proof finishes, water repellent finishes, , flame proof, flame retardant finishes, ,moth proof, mildew finish, softening and stiffening agents, Anti-static finish, Anti-pilling finish, Delustering agents,

UNIT V

Advances in Finishing

Brief note on : Ultraviolet protection finishes. Antimicrobial finishes.

Finishing with enzymes: Bio – finishes for cellulose – Introduction, Action of cellulose enzymes on cellulose, Evaluation of bio-finishing and Trouble shooting for bio-finishing

Novel finishes: Introduction. Anti-odour and fragrance finishes. Mosquito repellent finish. Conductive finish. Fibre surface modifying finishes using plasma and radiation technologies. Fibre surface modification by sol-gel finishes with inorganic oxide films. Microencapsulation technique for finishing of Textiles. Application of Plasma and Nanotechnology in finishing,

Course Outcomes (Graduate to have)

- 1..An ability to estimate the requirements of a fabric for a finishing process
- 2.An ability to select a proper printing method
- 3.An ability to design a printing recipe
- 4.An ability to assess the qualities of a print paste
- 5.An ability to set the various parameters of a finishing machine
- 6.An ability to assess the quality of finished goods

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

Schindler W.D. and Hauser P.J., “Chemical Finishing of Textiles”, The Textile Institute, Woodhead Publishing Ltd., Cambridge, 2004. ISBN : 1855739054

Technology of printing – V.A.Shenai Sevak publication, 1998

Technology of textile printing – R.S.Prayag, Shree J.Printers, 1999

Textile printing edited by L.W.C.Miles, Dyers company publication trust, 1998

REFERENCE BOOKS

Introduction to textile finishing – J.T.Marsh, Textile Trade Press, England, 1996

Technology of finishing – V.A.Shenai Sevak Publication, 1996

Technology of finishing – R.S.Prayag, Shree J.Printers, 1998

M.S.Parmer, S.S.Satsangi & Jai Prakash, “Denim – A Fabric for All”, Northern India Textile Research Association”, 1996.

.J.V.Rao, “Denim Washing”, Northern India Textile Research Association, Ghaziabad, 2006

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PO12
CO.1	✓	-	✓	-	✓	-	✓	-	-	-	-	-
CO2	✓	-	✓	-	✓	-	✓	-	-	-	-	-
CO3	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO4	✓	-	✓	-	✓	-	✓	-	-	-	-	-
CO5	✓	✓	-	✓	✓	-	-	-	-	-	-	-
CO6	✓	-	✓	-	✓	-	✓	-	-	-	-	-

PC603 - TCFA

TEXTILE COSTING AND FINANCIAL ANALYSIS

Instruction per week : [L-3, T-1] = 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits :4

COURSE OBJECTIVES

1. To provide the fundamental knowledge of cost and financial accounting in textile production.
2. To develop the formats of financial aspects dealt by the Textile and Apparel sectors.
3. To train the students for preparing Cash and other budgets
4. To provide the knowledge of handling the job orders and analysing the costs at every process.
5. To educate the students about the standard costing and budgeting control in textile production.
6. To educate the students about the cost control procedures in Textile production

UNIT I.

Introduction: Meaning, scope in Textile production, cost and costing - cost, financial and management accounting relation – elements of cost and their classification, methods and techniques of costing – cost sheet and cost/item – simple problems from the textile fields.

Material cost: material pricing by LIFO, FIFO and Weighted average methods. Calculation of raw cotton cost – waste multiplier – clean cotton cost – labour cost: elements and classification -different wage and incentive plans

UNIT II

Financial Management: Introduction to Financial Management – Scope -Financial section Organization and Finance Officer

Financial Statements: Introduction, Trading and Profit & Loss A/C, Balance sheet – Formats – Simple problems with and without adjustments

Capital Budgeting :Introduction to Decisions in Investments – Approaches – Capital Budgeting – proposals under pay back period, Discounted Pay Back – Accounting Rate of return – Net present value – Profitability index – Internal rate of return – Conflict between IRR & NPV – Decision under risk – Cost of capital.

UNIT III

Introduction to working capital management – Calculation of working capital – Receivables Management: Meaning – parameters – credit policy – cost of debtors – Optimum level of credit – credit standards – credit period – credit discount.

Cash Management: Introduction and scope, Management of cash by Receipts and payments method - simple problems -Stock market and their structure and working

UNIT IV

Management of Overheads – Accounting of overheads - classification of overheads – primary distribution summary and secondary distribution summary by simultaneous equation and repeated distribution method - LHR, MHR – absorption of overheads - percent on material cost, labor cost, prime cost.

Process costing and job costing – process accounts - simple problems – problems with abnormal gain, abnormal loss - normal loss, work-in-progress and concept of equivalent production.

UNIT V

Marginal costing – Introduction to cost – volume – profit analysis – Assumptions – Break Even Point – significance – calculation of P / V ratio, BEP sales etc.

Ratio Analysis: Meaning and scope, significance – Classification of Ratios – Interpretation – Simple problems

Standard costing: Meaning, concept of variances

Budgetary Control : Preparation of material, sales, purchase, flexible budgets.

Course Outcome (Graduate to have)

1. An ability to understand the concept of Cost and Financial Accounting in Textile Production.
2. An ability to understand the need and objectives of financial accounting and its formats.
3. An ability of the student to prepare cash and capital budgets for the industry.
4. An ability to understand the principles of process and job costing.
5. An ability to understand and apply the knowledge of standard costing principles
6. An ability to evaluate control measures to maintain the allocated budget in textile and apparel production

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. Cost Accounting A Basic Approach - P.T. Pattanshetty and D.R. Palekar R. Chand & Co. Publish N. Delhi, 2008
2. Cost Accounting in Textile Mills – Srinivasan. Mahajan Publishers, Ahmedabad, 2005
3. Management Accountancy: R. Ramachandran & R. Srinivasan, Sri Ram Publications. Tiruchy, 2009

REFERENCE BOOKS:

1. Financial Management: S.N. Maheshwari, Sultan Chand & Co, New Delhi, 2008
2. Management Accountancy: R. Ramachandran & R. Srinivasan, Sri Ram Publications. Tiruchy, 2009
3. Cost Accounting in Textile Mills – ATIRA. Mahajan Publishers, Ahmedabad, 2007
4. Financial Management – R. Ramachandran & R. S. Srinivasan, Sri Ram Publications. Tiruchy, 2009

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	-	-	✓	-	-	-	-	-	-
CO2	✓	-	✓	-	-	-	✓	-	-	-	-	-
CO3	✓	✓		-	✓	-	-	-	-	-	-	-
CO4	✓	✓	-	-	✓	-	-	-	-	-	-	-
CO5	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	✓	-	-	-	-	-	-	✓	-

PC 604 AQCM

APPAREL QUALITY CONTROL AND MERCHANDIZING

Instruction per week : [L-3, T-0] =4 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

COURSE OBJECTIVES:

- 1.To educate the students about Role & functions of Merchandising, Export Incentive.
- 2.To educate the students about Export Credit, License, Export Documents, visual Merchandising
- 3.To educate the students about Logistics & Supply chain.
- 4.To provide the knowledge on Quality of the product, AQL & Testing methods for product.
- 5.To provide basic knowledge on method for Testing of products.
- 6.To educate the students about the use of 10 point system

UNIT - I

Evaluation of fabrics and apparels, needle cutting, sew ability, bow and skewness; Distortion of yarns in woven fabrics, Barre analysis, fabric thickness, pilling, Snagging, Care Labeling system, Objective evaluation of fabric hand using tools KES-F, Tests done specifically for different products, ASTM Test methods for Apparels Accessories, Precautions taken to avoid stains & removal of stains.

UNIT – II

Quality: Definition, importance, stages inspection, raw material inspection: inspection loop, fabric defects, fabric grading methods, support material inspection, In process inspection- spreading, cutting, sewing, sewing defects, seaming defects, assembly defects, pressing or finishing. Types of inspection – No inspection, 100% inspection, spot checking, comparability checks, AQL Levels, AOQL, 3 party international inspections.

UNIT - III.

Merchandise, Merchandising :Types, functions, characteristics and requirements of a merchandiser, merchandise manager-functions , factors affecting merchandising function – merchandise hierarchy – merchandise mix – components of merchandise management – merchandise strategies -role of exporters, manufacturer, merchant exporter, job workers (CM/CMT), buying offices, buying agents, vendor evaluation and rating, vendor based rationalization, order placement.

Export incentives: Duty drawback, DEPB, Import – Export license, exchange control regulation-foreign exchange regulation acts. GATT/ WTO – functions and objectives.

UNIT-IV

Export Credit

Export credit - Short term- Medium term –Long term. Anticipatory letter of credit- Types of Letter of credit. Negotiation of bills. Terms of payment in international marketing. Factors responsible for counter trade growth.

Trading: Domestic Vs international trade- Regional trade blocks- Foreign exchange market- Main functions

Documentation: Order confirmation, various types of shipment documents, pre-shipment post-shipment documentation.

Export Documents: International codes for products, Principal documents- Auxiliary documents- Documents for claiming export assistance.

UNIT-V

Logistics & Logistics Management: Definition, Scope, Concept, Functions of LM, Integrated Logistics : Concept, Activities, 3 PL Vs 4PL, Inbound & Outbound Logistics

Supply Chain Management : Introduction, Concept, Supply chain, Approach, Value chain, Myths of SCM, Functions of SCM- Bull whip effect, IT for SCM: Concept, Need, Tools, , Data Mining: E- Business & SCM

COURSE OUTCOME: (Graduate to have)

1. An ability to understand & perform the merchandising Techniques.
2. An ability to understand the Export Credits terminology, Visual Merchandising.
3. An ability to analyze the importance of Logistics and Supply Chain in industry.
- 4.. An ability to analyze the Quality of the product, AQL levels and international inspections methodology
5. An ability to understand Testing methods for product.
6. An ability to evaluate the production possibilities of kids , mens and womens wear

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Fashion Marchadising-Eliane Stone and Jean A.Samples,Mc-Graw Hill Book Company,NY
2. Donald.J.Bowersox & Davis J.Closs “ Logistical Management” Printice Hall,2002
3. An introduction to quality control in apparel industry – Pradeep V.Mehta..A S Q C, Quality Press, Marcell Deckker INC, New York,2005

REFERENCE BOOKS:

1. Sarika Kulkarni& Ashok Sharma “Supply Chain Management” Tata Mc-Graw Hill,New Delhi,2004
2. Rahul V.Altekar” Supply Chain Managemtn”,_PHI, New Delhi, 2005
3. D.K.Agarwal “ A Reference book on Logistics & Supply Chain Management”,McMillan, 2006
4. Fashion design and product development – Harold carr,Blackwell Publications, USA
5. Materials management in clothing production – Gerry cooklin. Blackwell Publications, USA,2008

6. Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	✓	-	✓	-	-	-	-	-	-	✓	-	-
CO2	✓	✓	-	-	-	-	-	-	-	-	-	-
CO3	-	✓	✓	-	-	-	-	-	-	-	-	-
CO.4	✓	✓	✓	✓	-	-	-	-	-	-	-	-
CO5	✓	✓	✓	-	-	-	-	-	-	-	✓	✓
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-

PC605 PCE-II -A- CSIAI

COMPLIANCE STANDARDS IN APPAREL INDUSTRY

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

1. To acquire knowledge on concept and need for compliance in Apparel industry.
- 2.. To acquire knowledge on social compliance followed in Apparel industry.
- 3 .To gain knowledge on health and safety compliance followed in Apparel industry.
- 4 .To understand on environmental compliance to be adhered by Apparel industry.
- 5 .To comprehend technical compliance norms followed in Apparel industry.
- 6.To develop a strategy for changing scenario of textile garment industry in terms of standards

UNIT- I

COMPLIANCE - INTRODUCTION

Scope and Need for different compliances Social, health and safety, environmental, technical, international compliance - concept, need, benefits for industry, workers, and society. Social accountability and Corporate Social responsibility - scope and need. Social Compliance in supply chain management.

UNIT- II

SOCIAL COMPLIANCE

Conventions on Gender and caste discrimination, forced labour, child labour, minimum age convention. SA 8000 – Elements, Worldwide Responsible Apparel Production (WRAP). Ethical Trading Initiative (ETI). Corporate Social Responsibility (CSR) Compensation – norms applicable in India, Code of conduct, Minimum wages Act, remuneration, Trade Union Acts.

UNIT- III

HEALTH AND SAFETY

Environment and climate, health and safety – safety norms and measures to be enforced for safe working environment – protection against fire, water facilities, rest rooms, working Hours - conventions on Acquired Immune Deficiency Syndrome (AIDS). Requirements of local statutory bodies - PF, ES etc, OHSAS 18001

UNIT-IV

ENVIRONMENTAL COMPLIANCE

Environmental Laws and Regulations, The Regulations Related to Handling, Recycling, and Disposal of Hazardous Materials. Requirements of Pollution Control Board, ISO 14000 – elements and certification. Eco standards, Eco labels, REACH, OEKO TEX, GOTS Certification requirements for apparel industry

UNIT-V

TECHNICAL COMPLIANCE

Elements and requirements of ISO 9000, Meeting vendor compliance – WALMART, JC PENNY, etc. Needle policy, maintenance of safety data of materials in stain removal, Poly bags, Children wear requirements.

COURSE OUTCOMES (Graduate to have)

- 1 An ability to acquire knowledge on concept and need for compliance in Apparel industry.
- 2 An ability to evaluate the need of social compliance followed in Apparel industry.

- 3 An ability to apply knowledge on health and safety compliance followed in Apparel industry.
- 4 An ability to suggest on environmental compliance to be adhered by Apparel industry.
- 5 An ability to create technical compliance norms followed in Apparel industry.
- 6 An ability to comprehend compliance norms followed by various international sourcing companies

EXAMINATION : Five questions to be answered from Eight selecting atleast one from each unit.

REFERNCES

Das.S, Li & Fung, “Product safety and restricted substances in apparel’, Woodhead Publishing
Christie. R, “Environmental aspects of textile dyeing”, Heriot-Watt University, UK Woodhead
Publishing Series in Textiles No. 66 SA 8000 – NITRA Tablet
Rajesh Chhabara, “Social Accountability”, Ava Softech Pvt. Ltd., 2005
<http://www.labour.nic.in>
<http://www.unicef.org>
<http://www.indianchild.com>
<http://www.paycheck.in>
<http://www.sa-intl.org>

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO 2	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO 3	✓	✓	✓	-	✓	✓	-	-	-	-	-	-
CO 4	✓	✓	✓	-	-	-	-	-	-	-	✓	-
CO 5	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO -6	✓	✓	✓	-	-	-	-	-	-	-	-	✓

EXIM MANAGEMENT FOR TEXTILES AND APPAREL

Instruction per week : [L-3, T-0] = 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks Credits :3

COURSE OBJECTIVES:

- 1.To give the students an exposure on international market for textile products, regulations with respect to export and import of textiles
- 2.To understand the policies of export
- 3.To learn the marketing strategies
- 4.To learn about FEMA
- 5.To understand the procedure of exim management
- 6.To understand the latest textile exim policy

UNIT I

markets for yarns, woven fabrics; international market for cotton, silk, jute, wool and other fibres; export and import of textiles by India – current status, promotional activities

UNIT II

International markets for carpets and home textiles – product types, market potential and statistics, India - current status and promotional activities, role of export promotional councils

UNIT III

International markets for woven piece goods, knitted garments, leather garments; statistics of international apparel market and trade; export incentives, role of AEPC, CII, FIEO, Textile Committee

UNIT IV

Marketing – strategies, global brand building; logistics & SCM; role of export finances & EXIM banking, ECGC, Indian council of arbitration, FEMA; impact of foreign trade on Indian economy

UNIT V

Exim policy - customs act, acts relating to export/import of textile and apparel; Indian customs formalities - export documentation for excisable goods, import documentation, clearance of import goods; concepts - 100% export oriented units, export processing zones, special economic zones; duty drawback procedure; import/export incentives; licenses; case study

COURSE OUTCOMES: (Graduates to have)

1. An ability to gain knowledge on International market for textile products
2. An ability to evaluate Global marketing strategies
3. An ability to understand EXIM policy and procedures
4. 4.An ability to design the policy
5. An ability to evaluate the market
6. An ability to identify the SEZ

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Charles W.I. Hill., and Arun Kumar Jain., “International Business”, 10th Edition, Tata McGraw Hill, 2014, ISBN: 007811277X / ISBN: 978-0078112760.
2. John D. Daniels., and Lee H. Radebaugh., “International Business”, 15th Edition, Pearson Education Asia, New Delhi, 2014, ISBN: 0133457230 / ISBN: 978-0133457230.

3. Aswathappa K., “International Business”, 6th Edition, Tata McGraw Hill, 2015, ISBN: 933922408X / ISBN: 978-9339224081.

4. Michael R. Czinkota., Ilkka A. Ronkainen., and Michael H. Moffet, “International Business”, 8th Edition, Wiley, 2010, ISBN: 0470530660 / ISBN: 978-0470530658

REFERENCE BOOKS

1. Aravind V. Phatak., Rabi S. Bhagat., and Roger J. Kashlak., “International Management”, 2nd Edition, Tata McGraw Hill, 2008, ISBN: 0073210579 / ISBN : 978-0073210560

2. Oded Shenkar., and Yaong Luo., “International Business”, 3rd Edition, Routledge, 2014, ISBN : 0415817137 / ISBN : 978-0415817134

3. Datey V.S., “Indirect Taxes”, 34th Edition, Taxmann Publications, 2015, ISBN: 9360715570 / ISBN: 9789360715574.

4. Kapoor D.C., “Export Management”, Vikas Publishing House Pvt. Ltd., 2009, ISBN: 8140909397 / ISBN: 978-8140909392

5. Govindan N.S., “Indirect Taxes Made Easy”, C. Sitaraman & Co., 2014, ASIN: B00HYVS32K

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	-	-	-	-	-	-	✓	✓	✓	✓	-
CO2	✓	✓	✓	-	-	-	-	✓	✓	✓	✓	-
CO3	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓	-
CO4	✓	✓	-	-	✓	-	-	✓	✓	✓	✓	-
CO5	✓	✓	✓	-	-	-	-	✓	✓	✓	✓	-
CO6	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓

PC605PCE-II- C-APDPPC

APPAREL PRODUCT DEVELOPMENT AND PRODUCTION PLANNING AND CONTROL

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

Course Objectives

- 1.To educate the students about the concept and benefits of Product
- 2.To develop the students ability to understand the Product production
- 3.To educate the students for the production planning schedule in Textile and Apparel units
- 4.To educate the engineers about the process control in the shop floor
- 5.To plan for the product research process
- 6.To understand the role of recording techniques in production

UNIT –I

Product , Product Development : Introduction, types of Products, benefits of Products , Characteristics of an ideal Product ,Development of new products: need, scope idea generation, idea screening, concept testing, business analysis, the product development process, group product development, research, test marketing, commercialization

UNIT-II

Economic analysis of Products: Need, scope, Evolution of portfolio of product and projects , market potential, market demand, estimating sales, estimating cost and profit. Role of Operations Research , Role of Technology, politics and geography: apparel online, politics of apparel importing, the geography of manufacturing, meaning retail trade technology.

UNIT-III

Introduction to Production Control : Objectives of Production control- Relationship of production control to the functional areas of a manufacturing organization- Analyzing , Forecasting, Planning, Deputizing and Supervising.

Production System in Apparel Manufacture: Whole garment Production system- Unit flow system- Multiple flow and Progressive Bundle system- Principles for choosing a Production system- Evaluating production system

UNIT-IV

Operation Sequence Development: Operation required in garment construction - Operation specifications- Flow Process grid and charts

Plant Layout: Definition of Plant Layout- Types of Production Layout- Product and Process layout - Planning a layout- Calculation of minimum transport distance- Determining minimum space requirement for the layout- Formulating a layout for different styles of garments

Scheduling : Principles of Scheduling- Scheduling charts- Mathematical formula for scheduling

UNIT-V

Control Technique and Procedures: Distribution of documents and records- Types of control forms- Cutting order- Bundle Ticket Design- Bundle Control Sheet- Sewing and Pressing Department Projection Tally.

Method Engineering: Definition of Time study and Motion study- General approach for making a time and motion study in garment manufacture- Elements of a work cycle- Stop watch timing methods- Calculation for time study- Time study allowances- Leveling

Material Handling: Objective of material handling- Methods of classifying materials and handling equipment- Description and characteristics of material handling equipment- Specialized material handling equipment related to the apparel industry.

Course Outcome (Graduate have)

1. An ability to understand and design the process for a dedicated Product
2. An ability to design the material handling equipments for the product production
3. An ability to select a most suitable process and product layout
4. An ability to apply the concept of Time study in shop floor for material handling
5. An ability to assess the SMV for a product
6. An ability to calculate the Takt time

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOK:

1. Apparel manufacturing Analysis- Jacob Solinger, Textile Book Publisher, New York-2002.
2. Solinger Jacob, "Apparel Manufacturing Hand book - Analysis , Principles and Practice", Columbia Boblin Media Corp., 1988.

REFERENCES:

1. William K. Hodson "Maynard's Industrial Engineering Handbook", Fourth Edition McGraw-Hill, Inc., New York, 2002.
2. David J Tyler, "Materials Management in Clothing Production" 2010.
3. Apparel product development-M.J. Johnson & E.C. Moore, Prentice Hall, New Jersey-2009.
4. Product management-Donald R. Lehmann, McGraw Hill International Edition-2006.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PO12	PSO1	PSO2	PSO3
CO1	✓	✓	-	✓	✓	-	-	-	-	✓	-	-	✓	-	✓
CO2	✓	✓	-	✓	✓	-	-	-	-	✓	-	-	✓	-	✓
CO3	✓	✓	-	✓	✓	-	-	-	-	✓	-	-	✓	-	✓
CO4	✓	✓	-	✓	✓	-	-	-	-	✓	-	-	✓	-	✓
CO.5	✓	✓	-	✓	✓	-	-	-	-	✓	-	-	✓	-	✓
CO6	✓	✓	-	✓	✓	-	-	-	-	✓	-	-	✓	-	✓

PC605 PCE-II- D-SF

SPECIALTY FABRICS

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

- 1.To learn about the unconventional textile fibres
- 2.To understand the concept of 3D woven fabrics
- 3.To learn about the 3D Knitted fabrics
- 4.To learn about the Braiding and nonwoven
- 5.To study the advanced Textiles
- 6.To design a special type of fabric for a specific end use

UNIT I

Technology of Unconventional Natural fibre fabrics: Fabrics from , Basalt, Maize, Banana, Coir, Special class of Silk fabrics.

3 D Woven Fabrics

3D multilayer interlock weave, 3D non crimp weave, 3D dual interlaced weave; hollow 3 woven fabrics.

UNIT II

3 D Knitted fabrics

3D knitting technologies, 3D knitted structures, multi-axial warp knit, fully fashioned 3D fabrics, Spacer fabric

UNIT III

Braiding and Nonwoven

Tubular, bifurcated structures, track and column braiding processes; high bulk nonwovens, shaped 3D nonwovens, Glass Nonwovens

UNIT IV

Advances in Textiles I

Development in leno weave fabrics, development in tri-axial woven fabric, interwoven fabrics, pile carpets, flocked fabric, knotted fabrics

Advances in Textiles II

Shell woven textiles, nodal three-dimensional woven textiles

UNIT V

Technology of Non-Apparel fabrics: Classification of Non-Apparel fabrics, features of commercial fabrics used in Awnings , Micro fibre Upholstery , Drapery fabrics, Wall covering fabrics , Carpet fabrics, Wall paper fabrics, Thermal Spa cover and Pool fabrics , swimming pool covers, Air Domes, Restaurant fabrics, Marine fabrics, Shade sails ,

Types of General / Universal fabrics : Furnishing , Outdoor fabrics, stretch fabrics, fashion and special fabrics, A- Z types of fabrics . Composites and laminates -Textiles in kitchen and bathrooms--Towels, bed sheets, napkins.

Course Outcomes: (Graduate to have)

- 1: An ability to apply the knowledge of Formation of 3D woven fabric
- 2: An ability to apply the 3D knitted structures for specific end use
- 3: An ability to design Structures of braiding and 3D nonwovens
- 4: An ability to design an Advanced textile weave structure
- 5: An ability to evaluate non apparel fabrics
- 6: An ability to apply the Glass nonwovens for specific end use.

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Xiaogang Chen, “Advances in 3D Textiles 1st Edition”, Woodhead Publishing, 2015 ISBN: 9781782422143.
2. Yordan Kyosev, “Braiding Technology for Textiles, 1st Edition”, Woodhead Publishing, 2014, ISBN: 9780857091352.”

REFERENCES BOOKS:

1. Dewi Gwynfa Bailey Thomas, “An introduction to warp knitting”, Merrow Publishing Company Limited, 1971, ISBN 0900541067, 9780900541063.
2. Jinlian Hu., “3D Fibrous Assemblies: Properties, Applications and Modelling of Three-Dimensional Textile structures”, CRC Press, 2008, ISBN: 1420079867 | ISBN-13: 9781420079869
3. Antonio Miravete., “3D Textile Reinforcements in Composite Materials”, Wood head Publishing, 1999, ISBN: 1855733765 | ISBN-13: 9781855733763
4. Tong L., Mouritz A.P., and Bannister M., “3D Fibre Reinforced Polymer Composites”, Elsevier, 2002, ISBN: 0080439381 | ISBN-13: 9780080439389
5. Nandan Khokar, “3D-Weaving and Noobing: Characterization of Interlaced and Noninterlaced 3D Fabric Forming Principles”, Ph. D. Thesis, Chalmers University of Technology, 1997. ISBN: 91-7197-492-X

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2
CO 1	✓	-	✓	-	✓	-	-	-	-	-	✓	✓
CO 2	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO 3	✓	-	✓	-	✓	-	-	-	-	-	✓	✓
CO 4	✓	✓	-	-	✓	-	-	-	-	-	-	-
CO 5	✓	✓	-	✓	-	-	-	-	-	-	-	-
CO 6	✓	-	✓	-	✓	-	-	-	-	-	✓	✓

PC605 PCE-II- E-TODP

TECHNOLOGY OF DENIM PRODUCTION

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

1. To understand the concepts of Denim construction
2. To know the methods of Denim production
3. To know about the production planning using quantitative techniques
4. To understand the concept of Mill Planning
5. To know the applications of Work study in Textile industry
6. To know the applications of Work study in Apparel industry

UNIT-I

Introduction : History of Denim and Jeans- An overview of Denim Industry of world.

Development of Indian Denim Industry-.

Introduction to Denim fabric: Fibres for Denim like Cotton, Viscose, Lycra ,Polyester and blending of these fibres .Warp faced , weft faced , equi faced twill for Denim, Types of Commercial Twill Weave and its modification, Characteristics of Denim, Denim Production plant capacity, Fibre selection ,Percentage of two cotton fibres in mixing (ATIRA method) role of LPP in cotton mixing

UNIT-II

Spinning of Denim Cotton Yarns: Preparation of Mixing, Use of modern equipments, selection of openers and cleaners, Processing in Card, Drawframe, Simplex and Ringframe- Characteristics of Ring Denim yarns- Open – End spinning processes , Use of Rotor yarn in Denim, fibre properties of 6's Rotor yarn, Ring Vs Rotor spun yarns , Multi count and Multi twist effect on Denim

Weaving preparatory : Weaving preparatory for Denim – features of Cone winding machine- type of Warping machine used- Sizing recipe for Denim, sizing machine, types of heald wires, reed and post sizing process.

UNIT-III

Loom shed for Denim production: Shuttle , Autoloom and Shuttless loom – requirements for weaving Denim fabric on shuttles loom, Defects in Denim fabrics

Testing of Denim fabric.- NITRA's Special study on Denim and various tests conducted on Denim.

Denim Dyeing : Past History of Indigo Dye , Synthesis of Indigo, Chemistry of Indigo Dyeing , Factor affecting Dye Up take ,pre-requisites of Indigo Dyeing Equipments, Pre-requisites for continuous Indigo Dyeing range , Types of Indigo Dyeing machines.- Merits and Demerits of these machines.

UNIT- IV

Precautions to be taken during dyeing with Indigo Dyeing , New machines for processing Denim Fabric Dyeing with mixture of Indigo and some other Dyes-Determination of Indigo and Sulphur Dye by different methods, surface Dyeing effect.- Dyeing technology & process - Air flow Vs Soft Flow

Finishing:some finishing and Rewetting formulae, preshrinking of Denim, Integrated Finishing and Shrinking , Sanforset process, skewing , New Finishing line for Denim,

UNIT- V

Objective of Washing, Stone wash, Enzyme wash, Selection of Pumice stones, Criteria for selecting softener, Acid wash, combined washing effects, Special fadings - KMnO₄ Spray, Bleaching agents, laser and ozone fadings, trouble shoot and problem solving, quality control.-Denim Value Addition:

Special effects – worn out look, Pleats and creases, Patterned effects, Specialty prints, Functional finishes – water and stain repellent, antimicrobial, aroma finishes, and stretch denims.

, Snow wash, Salt water denim, Flat finish, Over dye, Sun washing Super dark ,Wash down effects on Denim , antique wash, ball blast, whiskering, Sand blast, Ice wash.

COURSE OUTCOMES (Graduate to have)

- 1.Complete knowledge of Denim construction
2. knowledge of various Methods of Denim dyeing
- 3.An ability to plan the balancing of machinery for Denim production
- 4.An ability to apply the quantitative techniques for shop floor production
- 5.An ability to evaluate the Denim dyeing process
- 6.An ability to create new types of designs in Denim production

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. Processing of Jeans an Over View- NCUTE- IIT Delhi, 2006
- 2.Denim – A fabric For all – M.S Parmar, S.S Satsangi. , Jai Prakash, NITRA publication, 2013

REFERENCE BOOKS

- 1.Roshan Paul, Denim: Manufacture, Finishing and Applications, Elsevier, Woodhead Publishing Ltd. Cambridge, 2015.
- 2.Industry Expert Presentations, One Day National Seminar on Denim Processing, Organized by Department of Textile Technology, PSG College of Technology, 2013.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PO12
CO1	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
CO2	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
CO3	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
CO4	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
CO.5	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
CO6	✓	✓	-	✓	✓	-	-	-	-	✓	-	-

PC605 PCE-II- F-SAT

SPORTS & AUTOMOBILE TEXTILES

Instruction per week : [L=3, T=0]= 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

- 1.To design a textile for sports applications
- 2.To study type of Nonwoven fabric for Interior applications of an Automobile
- 3.To educate the students about the design requirements of the Sports Textile .
- 4.To design the properties of Textile supplement for a specific sports event .
- 5.To learn about the structure of SAT
- 6.To understand the requirements yarns and fabrics for swim wear

UNIT-I

Sportswear design: seamless garments; stitch less seams, impact of advances in laminating, wearable technology, Material requirements for the design of performance sportswear, technical sportswear for women, garment development., application of technical textiles in performance sportswear., **Functional sport footwear:** design aspects ,Functional fit, biomechanic of the foot; Functional materials and components, properties of materials and components; materials for sport footwear of upper sole

Innovative fibres and fabrics in sport: High performance and high functional fibres and textiles: Properties and design aspects, hydrophobic surface; dirt and oil repellence; Various types of finishing **Sportswear and comfort:** Aspects of wear comfort, Measurement , Role of Elastic sport textiles, biofunctional textiles; foul weather protective clothing; textile combinations

UNIT-II

Elastic textiles: Introduction, breathability; breathable stretch, breathable waterproof stretch; bi-component stretch as an alternative to elastanes; use of Lycra, garment engineering : in footwear, in Football, in rugby, hydrodynamics in swimwear, aerodynamics in track and field and cycling - Performance, recovery and wellbeing, enhanced performance and prevent injury; energising socks; performance and recovery; textronics; wellbeing through clothing

Protection: Protection against impact using clothing and personal equipment, Analysis of injury sustained during sporting activities, Impact protection provided through protective clothing / equipment, general principles; effectiveness of impact protection in selected sporting codes, Effects of protective clothing/equipment on human performance national and international Requirements ; standards and standard test methods; status of standards.

UNIT-III

Protection against cold: cold environment, convection; radiation; evaporation; airway heat Exchange, Energy metabolism; heat production and physical work, The human heat balance equation Requirements for protection, Measurements of clothing performance: thermal insulation; evaporative resistance; wind resistance; water resistance; standards for protective clothing against cold and foul weather

Performance of clothing for cold protection: standard values for clothing insulation; influence of walking and wind; influence of water and moisture; effects of solar radiation; effects of treatments; prediction of protection, Specific materials and textiles for cold protection

UNIT-IV

Specific applications

Textile composites in sports products: Materials, Design, Production technology – continuous processes, Applications: pole vault; fishing gear; bicycles; golf; baseball/softball; tennis; kayaks; skis and snowboards; hockey

Textiles in sailing: Polyester sailcloth, manufacture , preparation ,dyeing finishes and finishing of polyester sailcloth

Spinnaker fabrics: production and processing of nylon spinnaker; dyeing and finishing r

Textile use in sports shoes :Use of textiles in sport shoes: uppers, sole

UNIT-V

Textiles in Automobiles :fibres employed, Requirements, Interior design: Type of substrates and their manufacture ,Yarn and fabric processing: Dyeing and finishing, Printing, Coating and lamination, Quality assurance and testing: Quality assurance, Test method details,, Product engineering. Interior trim: Seats, Headliners, Door casings, Parcel shelves, Other interior trim, Complete modular interiors: Seat belts , Airbags, Carpets, Cabin air filters, Battery separators, Bonnet (hood) liners Wheel arch liners, Hood material for convertibles, Tyres, Hoses and belts

Textiles in other forms of transportation :Composite materials, Flame retardancy, Fabric coating, Textiles in other road vehicles, Railway applications, Marine applications, Textiles in aircraft.

COURSE OUTCOME(Graduate to have)

1. An ability to design a textile for sports applications
2. A graduate is able to decide the type of Nonwoven fabric for Interior applications of an Automobile
3. An ability to design the precision jumping suit
4. An ability to Design the interior of Automobiles
5. An ability to design a special suit for a special sports event
6. An ability to assess the cost aspects

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXTBOOKS

1. Wellington Sears Handbook of Industrial Textiles by Sabit Adanur., CRC, publications, 2006
2. Hand book of Technical Textiles by A. R. Horrocks, CRC, publications, 2006
3. Textiles in automotive engineering by W. Fung., Wood Head Publications, 2008

REFERENCE BOOKS

1. Composite forming technologies by A. C. Long., CRC, publications, 2006
2. Automotive textiles by Textile progress Vol. 29 , S. K. Mukhopadhyay, 2000
3. New Millennium Fibres by G.O. Phillips & T. Hongu., Woodhead Publications , 2009

4. Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO1	PSO2	PSO3
CO 1	✓	-	✓	-	✓	-	-	-	-	-	✓	✓	-	✓	✓
CO 2	✓	✓	✓	-	✓	-	-	-	-	-	-	-	-	✓	-
CO 3	✓	-	✓	-	✓	-	-	-	-	-	✓	✓	-	✓	✓
CO 4	✓	✓	-	-	✓	-	-	-	-	-	-	-	✓	-	✓
CO 5	✓	✓	-	✓	-	-	-	-	-	-	-	-	-	✓	-
CO 6	✓	-	✓	-	✓	-	-	-	-	-	✓	✓	-	✓	✓

PO 606 POE-II(1)

CORROSION AND CORROSION CONTROL(CHEM.ENG.)

Professional Open Elective – II(1)

Instruction per week : [L-3, T -0] 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

Course Objectives	
1.	To learn various corrosion types, methods of corrosion and to solve practical corrosion problems.
2.	To learn prevention methods of corrosion, analysis and estimation
3.	To learn the corrosion testing, analysis and methods of prevention
4.	To learn the analysis of metals and alloys in preventing corrosion
5.	To learn preventive coatings methods
6.	To learn modern principles of Corrosion

UNIT - I

Introduction . Cost of corrosion; corrosion engineering; Definition corrosion; environments; corrosion damage; appearance maintenance and operating costs; plant shut downs, contamination of product, loss of valuable products, effects on safety and reliability; Classification of corrosion.

CORROSION PRINCIPLES :

Introduction; Corrosion rate expressions; Electro-Chemical Reactions; polarization passivity; Environmental effects : effect of oxygen and oxidizers – effect of velocity; effect of temperature; effect of corrosive concentration; effect of galvanic coupling. Metallurgical aspects; Metallic properties; Ring work corrosion.

UNIT - II

THE EIGHT FORMS OF CORROSION :

Uniform attack :- Galvanic Corrosion : EMF and galvanic series; Environmental effects; Distance Effect: Area effect prevention; Cathodic protection. Crevice Corrosion : Environmental factors : Combating crevice Corrosion, fill form corrosion; Environmental factors; prevention. Pitting : Solution composition; Velocity; Metallurgical variables; Evaluation of pitting damage; prevention. Intergranular Corrosion : Austenitic stainless steels; Control for Austenitic stainless steels; Knife line attack. Selective Leaching :Dezincification; Mechanism, prevention, graphitization. Erosion Corrosion : Surface films; Velocity; Turbulence; Impingement; Galvanic effect nature of metal or alloys; Combating Erosion Corrosion; Civilization damage; Fretting corrosion. Stress Corrosion :Clack morphology; stress effects; Time of cracking; environmental factors; Metallurgical factors; Methods of prevention; Corrosion fatigue.

Hydrogen damage: Characteristics; Environmental factors, Hydrogen blistering; prevention.

UNIT - III

CORROSION TESTING

Introduction; Classification- Purposes; Materials and specimens surface preparation; Measuring and weighing; Exposure Techniques; Duration; Planned interval tests; Aeration; Cleaning specimens after exposure; Temperature Standard expression for corrosion rate; Huey test for stainless steels; Stretcher test for a stainless steels; warren test for low carbon steel.

UNIT - IV

Materials: Mechanical properties; other properties; Metals and alloys; cast irons; Stainless steels. Non-metallic : Natural and synthetic rubbers, plastics. Thermoplastics : Thermometers : Other non-metallic : Carbon and graphite, wood. CORROSION PREVENTION : Materials selection; Metals and alloys; Metal purification non-metallic; Alteration of environment; Changing mediums; Inhibitors. Cathodic and Anodic Protection : Cathodic protection; Anodic protection; Comparison of anodic and cathodic protection.

Coatings : Metallic and other Inorganic cosigns; Electro deposition; Flame spraying; cladding; Hot dipping; Vapor deposition; Diffusion; Chemical conversion.

UNIT - V

MODERN THEORY – PRINCIPLES

Introduction; Thermodynamics : Free energy; Cell potentials and EMF Series; Applications of thermodynamics to corrosion; Electrode Kinetics; Exchange current density; Activation; Polarisation; Concentration polarization; Combined polarization mixed potential theory; Mixed electrodes; passivity.

MODERN THEORY – APPLICATIONS

Introduction; Predicting corrosion behavior; Corrosion prevention; Corrosion rate measurements.

EXAMINATION: Part – A for 40 marks (with 10 questions: two question from each unit - Compulsory) and Part – B for 60 marks (5 questions to be answered out of 7 of equal weightage selecting at least one from each Unit).

TEXT BOOK :

M.G.Fontana and N.D.Greene, Corrosion Engineering, McGraw Hill Book Company (1978) A, 2nd Edition.

Course outcomes:

At the end of the course, student will be

CO1	The students should be able to use knowledge in various corrosion types, methods of corrosion and to solvepractical corrosion problems
CO2	Able to apply prevention methods of corrosion, analysis and estimation
CO3	Able to apply corrosion testing, analysis and methods of prevention
CO4	Able to provide knowledge in analysis of metals and alloys in preventing corrosion

CO5	Able to apply preventive coatings
CO6	Able to apply modern principles of Corrosion

Mapping of Course Outcomes with Programme Outcomes

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓					✓	✓
CO2	✓	✓	✓	✓		✓					✓	✓
CO3	✓	✓		✓		✓					✓	✓
CO4	✓	✓		✓		✓					✓	✓
CO5	✓	✓	✓								✓	
CO6	✓	✓	✓			✓					✓	✓

SIMULATION AND COMPUTER AIDED DESIGN (CHEM.ENG.)

Professional Open Elective – II(2)

Instruction per week : [L-3, T -0] 3 Hours

Duration of SEE : 3 Hours

Credits : 3

CIE: 40 Marks

SEE : 60 Marks

Course Objectives	
1.	To learn Modular approaches to process simulation
2.	To learn Convergence promotion
3.	To learn Professional simulation packages- HYSIS, CHEMSHARE, ASPENPLUS and their Architecture.
4.	To learn Graphics packages & their functions
5.	To learn the Computer Control techniques
6.	To learn the Direct Digital control and Supervisory control

UNIT - I

Modular approaches to process simulation- Analysis vs. design mode, The equations solving approach, Decomposition of networks- tearing algorithms, based on the signal flow graph, list processing algorithms

UNIT- II

Convergence promotion, Newton's method, direct substitution, Wegstins method. Physical and thermodynamic properties, sources, data banks and Routing. Professional simulation packages- HYSIS, CHEMSHARE, ASPENPLUS and their Architecture.

UNIT - III

Fundamentals of CAD : Introduction, Definitions. The Design process, the application of computers for Design. The Design work station , Graphics terminal, Input and output devices.

UNIT - IV

Graphics packages & their functions. The data base structure & content, wire frame modeling, Solids modeling.

UNIT - V

Computer Control. Introduction, Model of process. Process control strategies. Distributed and Centralized control. Direct Digital control and Supervisory control.

EXAMINATION: Part – A for 40 marks (with 10 questions: two question from each unit - Compulsory) and Part – B for 60 marks (5 questions to be answered out of 7 of equal weightage selecting at least one from each Unit).

TEXT BOOKS :

1. B. V. Babu 'Process Plant Simulation' , Oxford University Press, 2004
2. Crowe, Hamielec, Hoffmon, Johnson, Shannou & Woods, 'Chemical plant Simulation' McMaster University Publication. 1965
3. Mickell P. Groover & E.N. Zimmers Jr. , CAD/CAM Prentice Hall India Pvt. Ltd., N.D. 1989.

Course outcomes:

At the end of the course, student will be

CO1	Able to use Modular approaches to process simulation
CO2	Able to use Convergence promotion techniques
CO3	. Able to use Professional simulation packages- HYSIS, CHEMSHARE, ASPENPLUS and their Architecture.
CO4	Able to use the Graphics packages & their functions
CO5	Able to use the Computer Control techniques
CO6	Able to use the Direct Digital control and Supervisory control

Mapping of Course Outcomes with Programme Outcomes :

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓					✓	✓
CO2	✓	✓	✓	✓		✓					✓	✓
CO3	✓	✓		✓		✓					✓	✓
CO4	✓	✓		✓		✓					✓	✓
CO5	✓	✓	✓								✓	
CO6	✓	✓	✓			✓					✓	✓

PO 06 POE II -IHS

INDUSTRIAL HYGIENE AND SANITATION (Food Technology)

Instruction per week : 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

COURSE OBJECTIVES

1. Describe the nature of the health effects associated with exposure to industrial agents;
2. Be familiar with the standard methods for measuring and evaluating worker exposure to chemical and physical agents and identify strengths and weaknesses to typical approaches;
3. Apply and interpret health and safety standards and regulations for the work place environment;
4. Apply feasible approaches to controlling worker exposure to health and safety hazards to a specific industrial setting.
5. Describe how the social and economic context of work affects workers' and employers' ability to control threats to health and safety.
6. To learn about personnel hygiene HACCP and GMP concepts
7. To learn about factory sanitation

UNIT I

Industrial Hygiene: What is it? (Overview), Federal Regulations. Gases, Vapors, and Solvents

Toxicological effects of them, Physiological effects

Industrial Toxicology- Definition, Routes of entry, Dose-response relationship, Timing: exposure and effect, Systemic toxins

Industrial Noise- Hearing ability, Risk factors, Analysis of noise exposure

UNIT II

Particulates-Background/basic concepts, procedures, and examples, Crystalline, structural, and isotopic nature, Shape of the particles, Size of the particles, Dose, Concurrent exposure to other toxic agents, Biological reactions

Ionizing Radiation- Ionizing radiation terms, Biological effects of radiation, Nonionizing Radiation, Types of nonionizing radiation, Biological effects, Exposure standards M.

Thermal Stress -Degrees of thermal stress and Recognition

UNIT III

Good manufacturing practices and current good manufacturing practices

Sanitation and the food industry: Sanitation, sanitation laws and regulations and guidelines, establishment of sanitary, potential risks of food borne bioterrorism, bioterrorism protection measures and role of pest management in biosecurity, Relationship of microorganisms to sanitation, Food contamination and protection against contamination

UNIT IV

Personal hygiene and sanitary food handling: Role of HACCP in sanitation, quality assurance for sanitation cleaning compounds, handling and storage precautions, Sanitizers, sanitizing methods, sanitation equipment,

Waste product handling, solid waste disposal and liquid waste disposal

Pest control: Insect infestation, cockroaches, insect destruction, rodents, birds, use of pesticides and integrated pest management

UNIT V

Sanitary design and construction for food processing: Site selection, site preparation, building construction considerations, processing and design considerations and pest control design Low-moisture

Food Manufacturing and storage sanitation: Sanitary construction considerations, receipt and storage of raw materials and cleaning of low-moisture food manufacturing plants

Food processing plant sanitation: Contamination sources, sanitary construction considerations, cleaning considerations, cleaning of processing plants, cleaners and sanitizers, cleaning procedures and evaluation of sanitation effectiveness

COURSE OUTCOMES

1. Describe the legal, professional, and ethical framework for the practice of industrial hygiene.

2. Define basic terms and technical concepts integral to the practice of industrial hygiene.
3. Explain the differences between chemical (gases/vapors, dusts/mists/fumes), physical, and biological agents in the workplace.
4. Identify the basic concepts of workplace exposure assessment.
5. Describe the hierarchy of controls and how it applies to hazard control.
6. Integrate various concepts into a broader occupational/ environmental health practice.
7. Provide a basis for advanced course work in occupational safety and health.

TEXT BOOK

1. Fundamentals of Industrial Hygiene (5th edition), National Safety Council Chicago, IL, from any online reseller or through the Matthews Johns Hopkins Medical Book Center
2. Fundamentals of Industrial Hygiene by Barbara A. Plog & Patricia J. Quinlan, 5th edition, NSC Press a. ISBN number is 9780879122164
3. Principles of Food Sanitation Marriot and Gravi Springer, 2006
4. Food Hygiene and Sanitation Roday S. McGraw Hill Education, 2011
5. Essentials of Food Sanitation Marriot N. Springer 1997 R

PO 06 POE II- SEU

SOLAR ENERGY UTILISATION (Food Technology)

Instruction per week : 3 Hours

Duration of SEE : 3 Hours

Credits : 3

CIE: 40 Marks

SEE : 60 Marks

COURSE OBJECTIVES

1. To learn the fundamental concepts of solar energy and
2. To learn about radiation collecting instruments
3. To study about approaches for the storage of solar energy
4. To study about construction of solar energy collectors
5. To learn about solar cooker
6. To learn about use of solar energy for drying

UNIT I

SOLAR RADIATION History of solar energy utilization - Solar radiation and modeling - Empirical equations for predicting the availability of solar radiation – Measurement of global, direct and diffuse radiation – Radiation computations on inclined surfaces – Angstrom's turbidity - Solar chart - Standard radiation scale.

SOLAR RADIATION MEASUREMENT AND ESTIMATION Measurement of solar radiation - Solar energy measuring instruments – Pyranometer – Pyrliometer – Sunshine recorder - Estimation of average solar radiation - Ratio of beam and total radiation on tilted surface of that on horizontal surface

UNIT II

SOLAR COLLECTORS Flat plate collector - Materials for flat plate collector and their properties - Thermal Analysis of Flat- plate Collector and Useful Heat Gained by the fluid - fin efficiency - collector efficiency factor - Heat Removal Factor - Focusing collectors - Types and applications of focusing collectors

UNIT III

SOLAR ENERGY APPLICATIONS Introduction and principle of operation of solar cooker - solar air heater - solar water heater - solar distillation - solar pond - solar thermal power generation – Greenhouse - Solar PV system

STORAGE OF SOLAR ENERGY Types of Energy Storage - Thermal Storage - Electrical Storage - Chemical Storage - hydro-storage

UNIT IV

SOLAR COOKING- Introduction, Types of solar cookers – Advantages and disadvantages - Box type – Parabolic dish cooker - Performance evaluation of solar cookers – Testing of a solar cooker – Applications of solar cooking - Case studies

UNIT V

SOLAR DRYING- Introduction – Need for solar drying - Basics of solar drying – Types of solar dryers – Direct type solar dryer – Mixed mode type solar dryer – Forced circulation type dryers – Hybrid dryer – Bin type dryer – Solar timber drying – Applications - Case studies.

COURSE OUTCOME

1. The fundamental concepts of solar energy were studied
2. The fundamental concepts of radiation collecting instruments were studied.
3. The approaches for thermal energy storages were learned.
4. The principles of solar energy collectors were studied..
5. The applications of solar energy for cooking were studied
6. The application of solar energy for drying were studied

TEXTBOOKS

1. Rai, G.D., Solar Energy Utilization, Khanna Publishers, N. Delhi, 2010.
2. Sukhatme S.P., Solar Energy, Tata McGraw Hills P Co.,3rd Edition, 2008.
3. Jean Smith Jensen, Applied solar energy research: a directory of world activities and bibliography of significant literature, Volume2, Association for Applied Solar Energy, Stanford Research Institute, 2009.

4. Duffie, J.A., and Beckman, W.A. Solar Energy Thermal Process, John Wiley and Sons, New York, 2006.
5. Jui Sheng Hsieh, Solar Energy Engineering, Prentice- Hall, 2007.
5. Garg, H.P., Treatise on Solar Energy, John Willey & Sons, 2006.
6. Anna Mani, S Rangarajan: Handbook of Solar Radiation Data for India, Allied Publishers, 2006.
7. HP Garg and J Prakash: Solar Energy: Fundamentals and Applications, Tata McGraw Hill, 2010.
8. Rai, G.D., Solar Energy Utilization, Khanna Publishers, Delhi, 2010.
9. Michael Group, Time to Shine: Applications of Solar Energy Technology, John Wiley & Sons, 2012.

PO06POE-II - SSALM

SIX SIGMA AND LEAN MANUFACTURE

Instruction per week : 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

1. To provide the fundamental knowledge of concepts of Six Sigma.
2. To provide knowledge of Phases and tools used Six sigma and their concepts.
3. To develop the understanding of statistical tools used in lean and six sigma concepts..
4. To provide the knowledge of lean tools and lean implementation.
5. To educate the students about modern methods of maintaining inventory and lean culture.
6. To educate the students about modern methods of lean culture

UNIT- I

Introduction to production process, variation in process, causes of variation, measurement of variation by SD or Sigma, spread of variation, process performance thro DPMO Triangle.

Meaning and scope of Six Sigma (SS): Basic concepts, scope , need and benefits of SS, Themes of SS, Key concepts of SS, Road map of SS. SS philosophy, TQM Vs SS, Road map of SS,

FOUNDATION PHASE: organizational structure of SS, Cost –Benefit analysis, Introduction to production process, types, Concept of Defect , Defectives, First pass Yield, Rolled throughput Yield, PPM, DPMO, DPU(simple numerical example).

UNIT –II

Customer dynamics Management: Types of Customer, Customer Window, Customer satisfaction model, Customer retention model, Kano model, Customer care and ways to get VOC

Six Sigma Statistical Tools: Data and types, construction of frequency distributions and diagrammatic representation, stem and leaf diagram, Normal plot, Range and its importance in relation to variation, Range method for Within and between CV , PMR, SD and CV, Time series, Significance testing (t, F, Z, Chi-Square).

UNIT- III

Six sigma Methodology: Expansion of DMAIC, DFSS, DMADV, DFMA, RPN, ROSS, ROI, and SS and leadership – COPQ- Meaning of DMAIC.

Various tools used in Define stage: Project Charter, A3, Process Flowchart and use of OPC and FPC, SIPOC Diagram, Stakeholder Analysis, Work Breakdown Structure, CTQ , Methods of Brainstorming , 6-3-5 , TOC and TIL, QFD , ABC analysis, Pareto Analysis, 5 Why analysis

Financial aspects of a project for Six sigma: Project selection by Pay back period, Net Present Value, Accounting Rate Return, Internal Rate of Return (Simple problems to be dealt)

UNIT- IV

Measure Phase : Gage R & R and a numerical example , Interpretation

Analyse phase: analyzing the source of variation -cause and effect diagram -box plots – statistical interference -regression -correlation -Design of Experiments (DOE)- Overview – ANOVA, Factorial experiments, Yates algorithm – Failure mode and effects analysis .

Improve and Control phases:

Improvement decisions , Control charts for Variables and Attributes, Shifting of average, Project control thro' CPM, PERT, Crashing in Networks., Control thro Cash budget and Flexible budget

UNIT – V

Lean Manufacture : Introduction to lean, Origin of lean, approach, elements, principles, benefits, , Waste and its types(Muda and its types – Mura – Muri), Visual Management – 5S – Six Big Losses- Concept of Standardised work, estimation of Standard Minute Value (SMV) ,simple numerical examples on CMV calculation- SAM in relation to productivity, methods to improve SAM - Takt time, Pitch time

– Comparison of overall efficiency with individual efficiency .

Brief note on: Common Layouts, JIT, Kanban and its six rules, Value stream mapping– Three types of Pull Systems –JIDOKA and its implementation, Kaizen and steps, Kaizen training, Poke Yoke (Common errors, Types and use of Poka-Yoke systems), Lean improvement and culture, Hoshin Planning, Hujinka Box.

COURSE OUTCOME(Graduate to have)

1. An ability to understand the concept of lean manufacturing in textile and apparel industry.
 2. An ability to examine the role Six sigma and its concepts in making an error free environment in textile and apparel production systems.
 3. An ability to understand the need and objectives of statistical tools in lean and six sigma applications.
 4. An ability to understand the principles of lean tools and lean implementation.
 5. An ability to understand and apply the knowledge of modern methods of inventory management and lean culture.
 6. An ability to apply the concept of lean for spinning or weaving operations
- EXAMINATION** : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. Forrest W. Breyfogle, III, James M. Cupello, Becki Meadows, Managing Six Sigma: A Practical Guide to Understanding, Assessing, and Implementing the Strategy That Yields Bottom-Line
2. Fred Soleimannejad , Six Sigma, Basic Steps and Implementation, Author House,
3. James P. Womack, Daniel T. Jones, Lean Thinking, Free Press Business, 2003
4. Michael L. George, David Rowlands, Bill Kastle, What is Lean Six Sigma, McGraw – Hill 2003 Success, John Wiley & Sons, 2000
5. Thomas Pyzdek, The Six Sigma Handbook, McGraw-Hill, 2000.
6. Pascal Dennis, Lean Production Simplified: A Plain-Language Guide to the World's Most Powerful Production System, (Second edition), Productivity Press, New York, 2007.
7. Jeffrey Liker, The Toyota Way : Fourteen Management Principles from the World's Greatest Manufacturer, McGraw Hill, 2004.

REFERENCE BOOKS

1. Michael L. George, Lean Six SIGMA: Combining Six SIGMA Quality with Lean Production Speed, McGraw Hill, 2002.
2. Taiichi Ohno, Toyota Production System: Beyond Large-Scale Production, Taylor & Francis, Inc., 2010.
3. Field W M, “Lean Manufacturing: Tools, Techniques, and How to Use Them”, St. Lucie Press, London, 2001.

Mapping of Course Outcomes with Programme Outcomes :

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓					✓	✓
CO2	✓	✓	✓	✓		✓					✓	✓
CO3	✓	✓		✓		✓					✓	✓
CO4	✓	✓		✓		✓					✓	✓
CO5	✓	✓	✓								✓	
CO6	✓	✓	✓			✓					✓	✓

PCPO E-II - ICR

INDUSTRIAL CLIMATOLOGY & RELATIONS

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

- 1.To Know about the elements of Industrial Climatology
- 2.To understand the concept of Industrial and Human relations
- 3.To learn the procedure of Collective Bargaining
- 4.To understand the role and functions of Trade Unionism
- 5.To learn about the Grievance redressal procedure
- 6.To know the various elements of Industrial Laws.

UNIT-1

INTRODUCTION TO INDUSTRY- Meaning of Industry and Need , Types of Industry & types of Production

INDUSTRIAL CLIMATOLOGY – Meaning and scope, Need for study- Size of the firm and Optimum firm -small scale industries-reasons for survival- capacity planning-Def. measurement of capacity

INDUSTRIAL LOCATIONS- Need, scope , types , selection and Factors governing- Industrial locations: Need, types , selection, factors governing and evaluation for optimum location by qualitative and quantitative means.

INDUSTRIAL MAINTENANCE MANAGEMENT: Need, Types, Maintenance Audit

UNIT – II

INDUSTRIAL LAYOUT : Def, need, Principles of layout, Types of material flow, factors governing the layout , types of layouts , selection and evaluation by qualitative and quantitative means.

PRODUCTION DYNAMICS: types (Peak and Off-Peak Demand), selection & Economical criterion in selection -Production Vs Productivity, Role of NPC, Tools & Indices of productivity, factors affecting production, Numerical examples for production and productivity

UNIT- III

INDUSTRIAL SAFETY: Need for safety , Accident proneness, Safety significance, causes of accidents , safe-t-score test.

MATERIAL HANDLING : Need, Classification, Handling costs, Principles of material handling – Types

METHODS OF WAGES AND INCENTIVE PAYMENT IN INDUSTRY: Concept of wage, incentive and fringe benefits , method of fixation of wage, methods of wage and incentive schemes followed in industry(simple Numerical examples)

INDUSTRIAL REALTIONS: Background of Industrial Relations – Definition, scope, objectives, factors affecting IR, participants of IR, importance of IR. Approaches to Industrial relations, system of IR in India

UNIT-IV

INTRODUCTION TO LABOUR: Role of Labour in Industry, Labourless Industry, Types of Labour, Government policies relating to labor, Role of ILO and its significance , Labour turnover and methods to estimate, Causes of Labour turnover and remedies to prevent labour turnover, Labour unrest in organised and unorganised sector

HAWTHORNE EXPERIMENTS : Contents of Hawthorne experiments, Impact and their significance in the present scenario

INDUSTRIAL DISCIPLINE :Code of Discipline- Disciplinary procedures, approaches to manage discipline in Industry, Principles of Hot stove rule

UNIT – V

TRADE UNIONISM IN INDUSTRY : Need ,Meaning, Objective, and functions ,theories of Trade Union, Trade Union Act 1926

GRIEVANCE AND GRIEVANCE REDRESSAL PROCEDURE : Grievance, Meaning and forms, sources of grievance grievance redressal machinery,

COLLECTIVE BARGAINING & NEGOTIATION : Need , Meaning , essential conditions for the success of collective bargaining and the process of bargaining and negotiations-Types of Negotiations

WORKERS PARTICIPATION IN MANAGEMENT: Need and Meaning, Types and levels

EMPLOYER RELATIONS & ASSOCIATIONS: Need and types of Employer associations in India

INDUSTRIAL LEGISLATIONS : Factories act 1948, Industrial disputes act 1957, Minimum Wages Act, 1948, Payment of Bonus Act, 1965, Employees Compensation Act in 2013

COURSE OUTCOMES: (Graduate to have)

- 1.An ability to understand and involve in Industrial Relations\
- 2.An ability to design the various schemes under Human relation concept
- 3.An ability to design an ideal Collective Bargaining process
- 4.An ability to lead the Trade Unions in the path of Industrial peace
- 5.An ability to redress the grievances in industry at faster rates
- 6.An ability to apply the industrial laws in Industry.

EXAMINATION : Part-A fr 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Production Engineering – Aswathappa, Himalaya Publishing House, 12 th Edition, 2019
- 2.Arun Monappa: Industrial Relations, TMH, New Delhi,2003
- 3.Sinha: Industrial Relations, Trade Unions and Labour Legislation Pearson Education, 2013

REFERENCE BOOKS

1. Industrial Relations - Ramaswamy ,Cheran publishing house Publicatons, Coeimbaotre , 2014
- 2.Industrial Relations- C.S. Venkata Ratnam, Oxford University Press, 2015
3. Industrial Relations - T.V. Rao , Kalyani Publications, Bangalore , 2014
4. Industrial Relations – C.B.Memoria, Himalaya Publishing House, Mumbai, 2015
5. Industrial Relations – Sharma, Abhijit Publications, Kalyan, 2016

Mapping of Course Outcomes with Programme Outcomes :

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓					✓	✓
CO2	✓	✓	✓	✓		✓					✓	✓
CO3	✓	✓		✓		✓					✓	✓
CO4	✓	✓		✓		✓					✓	✓
CO5	✓	✓	✓								✓	
CO6	✓	✓	✓			✓					✓	✓

PC651APD

APPAREL PATTERN DESIGNING LAB

Instruction per week : [P-3] : 3 Hrs

Duration of SEE: 4 Hrs

CIE: 40

SEE: 60,

Credits :1.5

COURSE OBJECTIVES

1. To provide the basic knowledge of paper patterns and tools required for making of it.
2. To Educate the students about current fashion trend.
3. To provide the methodology of preparation of drafting procedure for particular style of garment.
4. To understand the principles of Drafting for pattern preparation.
5. To learn the designing method for men's and women's .
6. To learn the designing method for kids wear

LIST OF EXPERIMENTS (Minimum of 8 is to be performed)

1. To develop a paper pattern for Basic Sleeve, skirt and bodice pattern
2. To develop a paper pattern for Basic Skirt
3. To develop a paper pattern for basic skirt with block pattern
4. To develop a paper pattern for Salwar
5. To develop a paper pattern for Kameez (Women Kurta)/ men's kurta
6. To develop a paper pattern for A-Line Baby Frock
7. To develop a paper pattern for Princess Frock
8. To develop a paper pattern for Women/men's Trouser
9. To develop a paper pattern for Men's Shirt
10. To develop a paper pattern for T-shirt
- 12.. To develop a paper pattern for Jumping Suit

COURSE OUTCOME (Graduate to have)

1. An ability to understand pattern construction process and tools required.
2. An ability to prepare drafting procedure for construction of pattern.
3. An ability to prepare the patterns for different styles of garments.
4. An ability to design the patterns by using CAD marker software.
5. An ability to design the apparel for Men's wear
6. An ability to assess the commercial styles

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO1	PSO2	PSO3
CO1	✓	-	✓	✓	-	-	-	-	-	-	-	-	-	✓	✓
CO2	✓	✓	✓	-	✓	-	-	-	-	-	-	-	-	✓	-
CO3	✓	✓	✓	-	✓	-	-	-	-	-	-	-	✓	✓	-
CO4	✓	✓	-	-	✓	-	-	-	-	-	-	-	✓	-	✓
CO5	✓	✓	-	✓	-	-	-	-	-	-	-	-	-	✓	-
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-	✓	-	-

PC652PAF

PRINTING AND FINISHING LAB

Instruction per week : [P-3] : 3 Hrs
Duration of SEE: 4 Hrs

CIE: 40
SEE: 60, Credits :1.5

COURSE OBJECTIVES

- 1.To learn the method of application of Reactive Dyes on cotton fabrics
- 2.To practice the method of dyeing of fabrics using Basic and Vat dyes
- 3.To learn about the new methods of dyeing of cotton fabrics
- 4.To understand the working of industrial dyeing machines
- 5.To learn the printing methods of fabrics
- 6.To understand the finishing method for technical textile

LIST OF EXPERIMENTS (Minimum of 8 Experiments is to be conducted)

1. Dyeing of cotton with different varieties of Reactive dyes
2. .Dyeing of acrylics by basic colours.
3. Application of vat colours on Cotton.
4. Application of compound shades on cotton
5. Application of reactive dye on cotton by cold, hot and high exhaustion methods.
6. Dyeing of 100% polyester with disperse dye by using HTHP beaker dyeing machine.
7. Dyeing of polyester-cotton by using beaker dyeing machine.
8. Demonstration of dyeing of cotton on Jigger, winch, Padding mangle, Package dyeing,
9. soft flow dyeing machine
10. Printing of cotton with pigments.
11. Practice of Block and Screen printing
12. Batik and Ikat printing
13. Testing of various types of finishes

COURSE OUTCOME (Graduate to have)

- 1.An ability to apply the Reactive colours on different sorts of Cotton fabric
- 2.An ability to apply the composite colours on Cotton and other fabrics
- 3.An ability to design the process of Dyeing of cotton and other blends
- 4.An ability to evaluate the dyed goods
- 5.An ability to apply the different styles of Printing on fabrics
- 6.An ability to evaluate the quality of Printed goods

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2
CO1	✓	✓	✓	-	✓	-	✓	-	-	-	✓	-
CO2	✓	✓	✓	-	-	-	-	-	-	-	✓	-
CO3	✓	✓	✓	-	✓	-	✓	-	-	-	✓	-
CO4	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO5	✓	✓	-	-	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-

PC653II

INDUSTRIAL INTERNSHIP

Duration of the Internship : 4 Weeks

CIE: 60

Duration of SEE : Nil

SEE: Nil

Credits :2.0

COURSE OBJECTIVES

- 1.To provide the practical exposure to the students about the production processes
- 2.To learn about the industrial best practices followed
- 3.To educate the students about the industrial climatology
- 5.To provide the knowledge about the commercial facts about the product
- 6.To train the students in different organisations

Procedure :

Each student is instructed to undergo Industrial internship and study the various operations involved in product manufacture.

The report shall have following

1. Industry Details:
 - 1.Name of Industry
 2. Annual Turn over
 3. Products of the Industry
 4. Probable Buyer in Local and International Market.
 - 5.Total Number of Labours
 6. Lay out the Unit
 7. Safety aspects followed
2. Report details
 - Process flow , Material Balance , Energy balance, Technical inputs like count processed , Number of machines, Make of the machines, Labour allotment , Production per shift, methods of Quality control followed
 - Certificate from the industry
- Acknowledgements
- Typing instructions
- Margins : 1” right, 1 “ left , 1 “ top and `1” bottom
- Line spacing : 1.5 and one sided typing
- Provision for figures and flow charts: separate sheet

PO / CO	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PO12
CO1	✓	✓	✓	-	-	✓	-	-	-	-	-	-
CO2	✓	-	✓	-	-	-	✓	-	-	-	-	-
CO3	✓	✓		-	✓	-	-	-	-	-	-	-
CO4	✓	✓	-	-	✓	-	-	-	-	-	-	-
CO5	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	✓	-	-	-	-	-	-	✓	-

R-22 SCHEME OF INSTRUCTION, EXAMINATION AND SYLLABI (AICTE)

B. Tech . (Textile Technology)

(For the Batch admitted in Academic Year 2023-24)

VII -Semester

S.NO	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Durati on Hrs	CIE	SEE	
1	PC 701 IETA	Industrial Engineering for Textile & Apparel	3	1	-	3	40	60	4
2	PC702 TT	Technical Textiles	3	-	-	3	40	60	3
3	PC703 RBA	Retailing & Branding of Apparel	3	-	-	3	40	60	3
4	PC704 PCE-III	Professional Core Elective-III	3	-	-	3	40	60	3
5	PC705 PCE-IV	Professional Core Elective-IV	3	-	-	3	40	60	3
6	PO706 POE-III	Professional Open Elective-III	3	-	-	3	40	60	3
Practicals									
7	PC 751 GA	Garment Analysis Lab	-	-	3	4	40	60	1.5
8	PC 752 APP	Apparel Production Planning Lab	-	-	3	4	40	60	1.5
9	PC 753 Project	Project Seminar (Part-A)	-	-	4		100 P=60 R=60	-	2
		Total	18	1	10		420	480	24

R- Report; P-Presentation and Viva-Voce

Professional Core Elective-III : . **A.** Yarn and Fabric Engineering **B.** Coated Textiles **C.** Advances in Textile and Apparel Wet Processing. **D.** Automation in Apparel Manufacture **E.** Advances in Technical Textiles **F.** Medical Textiles

Professional Core Elective-IV: **A .** Sourcing and Supply management for Textile & Apparel **B. C.** Entrepreneurship for Textile and Apparel Units **D.** Visual Merchandizing **E.** Protective Garments **F.** Artificial Intelligence for Textile and Apparel Units

Professional Open Elective-III : 1).Pollution Control in Process Industries (Chem. Eng.) 2. Safety & Hazard Analysis (Chem. Eng.) 3). Intellectual Property Rights (FT) 4) Human Nutrition and Health (FT) 5). Operations Research for Engineers (TT), 6)Human Resource Management (TT)

PC 701 IETA

INDUSTRIAL ENGINEERING FOR TEXTILE & APPAREL

Instruction per week : [L=3, T=1]= 4 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 4

COURSE OBJECTIVES:

1. To educate the students about Role & functions of Plant Engineer, importance of Plant Building.
2. To educate the students about importance of Plant Location and Safety methodology.
3. To provide the knowledge on importance and planning of Plant Layout and Material Handling in Textile industries.
4. To educate the students about Concept of Maintenance Management, Value Engineering, Purchasing Techniques.
5. To provide knowledge on Method Study and its application
6. To understand the concept of Time Study and Ergonomics

UNIT – I

INTRODUCTION TO PLANT ENGINEERING: Meaning of plant, firm, company, Economical size of the firm, factors governing size, Product selection process-new idea mortality curve

INTRODUCTION TO PROJECTS AND PROJECT ENGINEERING : Concept of a Project , types of projects, Meaning and concept of Project Engineering , Product Life Cycle, Project Life Cycle,(Mortality Curve), Material Selection ,Project cost estimation (Interest formulas , present , future worth , Annual equivalent , rate of return methods , Make or Buy decision, Depreciation, Value analysis) .

PLANNING OF PROJECT PLANTS: Steps involved, planning techniques, techno-economics and evaluation , conceptual designing , controlling and Value engineering

UNIT – II

PLANT CAPACITY ESTIMATION : Introduction, capacity planning-Def. measurement of capacity and capacity planning (Simple numerical examples)Bottlenecks ,Capacity Forecasting and Capacity Planning (use of BEA & LPP) ,capacity and Breakdown costs,

Plant Production Dynamics: types of production in Textile and Apparel industry, Estimation and calculation of production and productivity in textile and apparel industry- Input Output Analysis

Material Handling : Need, Classification, Handling costs, Principles of material handling – meaning &significance, types equipments for Textile production

PLANT LOCATION: Def., need, Factors governing, theories, selection of actual site, quantitative techniques, types of location like: Rural, sub-urban & Urban, merits &demerits-Examples from Textile field

UNIT-III

PLANT LAYOUT : Def, need, objectives of Scientific layout, Principles of layout, Types of material flow, factors governing the layout , types of layouts, Merits and demerits, textile examples. Quantitative techniques for selection of plant layout

PLANT CLIMATOLOGY:

Plant Building : Significance, considerations of building design, types of industrial building-Textile examples, Ideal building- Impact on industrial climate

Plant lighting: Need, types, Classification of light for various works in a plant and factors governing- Impact on industrial climate.

Plant Ventilation : Need and methods of Ventilation- Impact on industrial climate

Plant Heating and Air conditioning : Types of heating systems and their selection , Type of Plant humidification systems and their selection, RH at different departments of textile and apparel industry

UNIT – IV

MAINTENANCE MANAGEMENT: Need, Types, Organisation of Maintenance Dept., Maintenance Audit, Maintenance cost , Maintenance Indices.

Safety in Textile Industry: Accident prone zones in Textile Processing ,Organisation for Safety, Safety significance, Accidents classified, causes of accidents costs of accidents, safe-t-score test, various approaches of accident prevention and recording

Noise Control: Need for Noise control, sound levels in various parts of Textile and apparel industry, Role of Acoustical Textiles

UNIT – V

PURCHASING & MATERIALS MANAGEMENT : Fundamentals, purchase procedure – types of purchases – purchase organization Inventory and stores management: Store Layout, organization & Building , Study of EOQ& ABC analysis.

Work study: Need, Objectives from Apparel & Textile industry point of view.

Method study: steps in method study, tools of record

Time study-Time & Motion Economy, steps, elements, allowances, work measurement and Derivation for Standard Minute Value (S M V or S A M) – Calculations from Apparel Industry

Ergonomics: Meaning, Scope in Apparel & Textile Industry, Impact on working conditions & Productivity, recommendations for better Ergonomical conditions.

COURSE OUTCOME (Graduate to have)

1. An ability to understand responsibility of Industrial Engineer, Plant Climatology.
2. An ability to understand the Safety methods to be followed and setting up new Plant Location.
3. An ability to analyze setting up of Plant Layout, Material Handling.
4. An ability to understand the Techniques of Purchasing, Value Engineering, Maintenance Management.
5. An ability to understand Work study, Method Study, Ergonomics, Humidification.
6. An ability to establish the Standard minute value in Garment industry

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXTBOOKS:

1. Production and Operations Management – Chunnawala and Patel, Himalaya Publishing House, 2007
2. Production and Operations Management – Aswathappa & Sridhar Rao, Himalaya Publishing House, New Delhi, 2009.

REFERENCE BOOKS:

1. Industrial Engineering & Management: O.P.Khanna, Dhanpat Rai & Sons, New Delhi, 2004
2. Ergonomics for an Apparel Industry: Project Report by P.Gopalakrishna, Submitted to OU, 2011
3. Production Management – Sridhar Rao, Himalaya Publishing House, New Delhi, 2009.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	-	✓		-	-	-	-	-	✓	-	-
CO2	✓	✓	-	-	-	-	-	-	-	-	-	-
CO3	-	✓	✓	-	-	-	-	-	-	-	-	-
CO.4	✓	✓	✓	✓	-	-	-	-	-	-	-	-
CO5	✓	✓	✓	-	-	-	-	-	-	-	✓	✓
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-

PC702TT

TECHNICAL TEXTILES

Instruction per week : [L=3, T=0]= 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE: 60 Marks Credits: 3

COURSE OBJECTIVES

1. To provide the fundamental knowledge of Industrial Textiles.
2. To provide different types of machinery used for manufacturing Industrial Textiles.
3. To develop the understanding the role played by Textile Insert in Industrial Textiles with respect to properties
4. To provide the knowledge of different applications of Industrial Textiles.
5. To educate the students about the Parameters of manufacturing and their impact on Product.
6. To learn about the manufacturing details of Technical Textiles

UNIT I

Technical Textiles: Classification of textiles according to tailor-made,

The initiative by Govt. of India: Identification of 12 Class of Textiles in Technical areas, Role of Ministry of Textiles for promotion of Technical and Industrial Textile through Technology Mission on Technical Textiles"

Agro Textiles- textiles in Agriculture, Animal Husbandry and Horticulture, fibers used, properties, manufacturing techniques, and applications.

Build Tech: Indoor and Outdoor stadiums, Military Tents, Awnings and Canopies, Rubberised fabrics for flexible Dams, insulation (cold, thermal) for buildings.

Acoustical Textiles: Need, forms, and Types of Textile supplement used, and applications

UNIT-II

Cloth Tech: Industrial Sewing Thread- Types, functions, fibers found, Manufacture of Industrial Sewing thread, Application as interlinings, fusing material, insulating material, fiber fillers, waddings.

Geo- Tech: Geotextiles, Requirements, Properties, Functions - Applications, geosynthetics, geogrid, geomembrane

Natural fiber Geotextiles: Brief note on Natural fibers in geo Textiles

Home Tech: a brief note on carpet backing cloths, curtains, wall coverings, bed and bed furnishings, quilt covers, kitchen furnishings- kitchen gloves, napkins, bathroom furnishings- shower curtains, bath towels, dining room furnishings-table cloth, table mats, chair pads, chair covers

UNIT III

Industrial Textiles: Filtration textiles- Textiles in filtration media, selection of textiles for filtration Dust collection, fabric construction, finishing treatments, solid-liquid, gas-solid separation, fabric construction, and properties, cleaning mechanisms

Tarpaulins: Cotton Duck and Canvas fabrics, types, Manufacture of Tarpaulins, Testing of Tarpaulins

Medical Textiles: Classification, fibers used, Non-implantable textiles –wound dressing, bandages, Extracorporeal devices- artificial kidney, liver, Implantable textiles- sutures, vascular grafts, artificial joints, healthcare products- surgical gowns, clothing. Biomedical textiles

UNIT-IV

Mobile Tech: Textiles in Transportation: Tyre cord, the cross-section of passenger Tyre, manufacture of Tyre cords, types of Tyres, textiles in a passenger car – fiber requirements, manufacturing process, textiles in heavy goods vehicles, rail applications, marine applications Textiles in Aeronautical applications, fibers used, Aircraft construction

Eco-Tech- Textile in Environment: Textile in controlling pollution- air pollution, water pollution, land pollution

Pack Tech: Need of Textiles, Fibres used, forms of Textiles used, a brief note on FIBC and leno bags, sacks, tea bags, food packaging, soak pads

UNIT-IV

Protective Textiles: Requirement, criteria for modern military textiles, military Combat clothing system, Camouflage systems, Camouflage for UV, IR,.- cut resistant fabrics Conductive Textiles, Protective clothing for extremely cold region, sleeping bags, Ballistic protective armors, biological and chemical warfare protection

Sport Tech: Breathable fabrics- need, laminated waterproof breathable textile, coated waterproof breathable textiles, moisture transport mechanism, factors affecting moisture transport mechanism, developments active sportswear, multi-layered fibers, assessment techniques

COURSE OUTCOMES: (Graduate to have)

1. An ability to identify various types of Textiles used in different applications.
2. An ability to learn about the application textiles in Filtration
3. An ability to understand the applications Textiles in Aerospace applications
4. An ability to understand about designing of textiles in Geo-Engg applications.
5. An ability to design a Coated fabric suiting a specific application.
6. An ability to evaluate the transportation textiles

EXAMINATION: Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting at least one from each Unit)

Text Books:

1. Welingtons Handbook of Industrial Textiles- Sabit Adanur, CRC Publications, 2011
2. Handbook of Industrial Textiles- Harlock, CRC Publications, 2012

REFERENCE BOOKS:

1. Horrocks A. R., Anand S.C., "Handbook of Technical Textiles", Woodhead Publishing, Cambridge, 2000
2. Fung W., Collins & Aikman Textiles in Automotive Engineering, Wood head Publishing ltd., UK, 2000.
3. Jai Prakash, D.R., and Gaur R.K., " Sewing Threads", NITRA, 2012
4. Kanna M.C., Hearle, O Hear., Design and Manufacture of Textile Composites, Textile progress, Textile Institute, Manchester, April 2004.
5. Scott, Textiles for Protective Clothing Textile progress, Textile Institute, Manchester, Oct. 2005.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	-	✓	-	-	-	-	-
CO2	✓	-	✓	✓	✓	-	✓	-	-	-	-	-
CO3	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO4	✓	-	✓	-	✓	-	✓	-	-	-	-	-
CO5	✓	✓	-	✓	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	-	-	-	✓	-	-	-	-	-

PC 703 RBA

RETAILING AND BRANDING OF APPAREL

Instruction per week : [L=3, T=0]= 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

1. To provide the fundamental knowledge of concepts of retailing.
2. To provide knowledge on the customer relationship management.
3. To develop the understanding of retail advertising and retail sales promotion.
4. To provide the knowledge of international retailing and influence of information technology on retailing.
5. To educate the students about the branding and its concepts.
6. To educate the students to design for a typical Brand for an apparel product

UNIT-I

Retailing: Introduction to Retail, Functions of a retailer-The Marketing-Retail equation-The Rise of the Retailer – Proximity to customer – Rise of consumerism-Global retail market- Challenges and opportunities-Empowered consumer-Technology enabled effectiveness- FDI in retail- -The Concept of life cycle in Retail-Innovation, accelerative growth- Maturity-Decline-Phases of growth in retail markets-Classification based on ownership /Merchandise offered/Franchising /Non Store Retailing/Direct selling/Direct response marketing/Telemarketing/Fairs and Road Shows/Event Management/Automated Vending/kiosks/ The Cash & Carry/credit Marketing /

UNIT II

Customer Relationship Management (CRM) : Scope, Components, Customer Life Cycle- B2B CRM, Using Customer touch ,CRM Planning& Strategy development

Services Management: Scope, Service Bench marking, Service strategy, Designing the service enterprise Marketing Channels , Franchising:

Mall Management: Types of Various retail formats-Concepts in mall design-Factors influencing Malls establishments-Aspects in Finance-Aspects in security / accounting -Aspects in HR-Aspects in Quality management-Statistical methods used in measuring mall performance.

Visual Merchandizing: Different kinds of images, store design, window displays, interior displays

Display props (rent, buy, or build), lighting the display window,

Mannequin: Types, Functions, Dressing of Mannequins.

Signs and Communication: need for signs, merchandise signs, departmental signs, sign sizes, merchandising staff

UNIT-III

Retail Advertising and Promotion

Advertising in retailing: Advertising principles-steps in planning a retail advertising campaign-advertising for the retail store.

Media and copy decisions: Media objectives-planning and budgeting-advertising evaluation-creating and producing copy-copy testing.

Retail promotional strategy: Promotional objectives, promotional budget, selecting the promotional mix, implementing the promotional mix.

Management of sales promotion: Role of sales promotion-types of sales promotion evaluating sales promotion.

Personal selling and publicity: Publicity and special events-role of personal selling in retailing-process in personal selling.

UNIT-IV

Information Technology in retail management

Influencing Parameters for use of IT in Retailing, IT Application for Retail,

Issues concerning the use of Internet and Related Technology to Improve Retail Business, Types on Online Retailing, Effective Management of Online catalogues, Direct Retailing Methods that Involves Technology such as Interactive TV and Mobile Commerce, Electronic Data Interchange, E-Retailing Strategies.

International Retailing

Scope and Concepts, assessing the potential of retail markets, Methods of international retailing, accessing retail markets, the form of entry, joint ventures, franchising, acquisition etc-Competing in

Foreign Markets(Need and modes) -Competing in Emerging Foreign Markets- -Retail Structure- Enterprise Density- market Concentration- Product Sector.

UNIT-V

Branding of Apparels:

Branding: What is a Brand- Brand Development: Extension, Rejuvenation, Re launch- Product Vs Brands, Goods and services, Retailer and distributors. Brand challenges and opportunities, The brand equity concept, Identity and image. Brand Leveraging & Brand Performance- Establishing a brand equity management system, measuring sources of brand equity and consumer mindset, Co-branding, celebrity endorsement. Brand Positioning & Brand Building- Brand knowledge, Brand portfolios and market segmentation- Steps of brand building, Identifying and establishing brand positioning, Defining and establishing brand values. Designing & Sustaining Branding Strategies- Brand hierarchy, Branding strategy, Brand Extension and brand transfer –Managing brand over time .

COURSE OUTCOME (Graduate to have)

1. An ability to understand the concept of retailing
2. An ability to examine the role of Customer relationship management in retailing.
3. An ability to understand the need and objectives of retail advertising and retail sales promotion.
4. An ability to understand the factors influencing international retailing and the scope and role of information technology on retailing.
5. An ability to understand concept of branding.
6. An ability to design a brand for apparel product

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

- 1.J.Paul Peter and JERRY L.OLSON, Consumer Behaviour and marketing Strategy, Tata Mcgraw Hill,Newyork-2006.
- 2.Swapna pradhan, Retailing Management : Text and Cases. Tata McGraw hill, New Delhi- 2 nd edition, 2006

REFERENCE BOOKS:

- 1.Patrick M Dunne, Robert F. Lusch and David A. Griffith-Retailing, Thomson Asia Pvt. Ltd. 2002.
- 2.Gillespie, Hecht and Lebowitz-Retail Business Management, McGraw Hill Book Company, Third Edition, 2002.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	-	-	-	✓	-	-	✓	-	-
CO2	✓	✓	-	-	-	-	-	-	-	-	-	-
CO3	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO.4	✓	✓	✓	✓	-	-	-	-	-	-	-	-
CO5	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-

PC704 PCE-III- YAFE

YARN AND FABRIC ENGINEERING

Instruction per week : [L-3, T-0] = 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks Credits :3

COURSE OBJECTIVES

- 1.To understand the basic concepts of Yarn Engineering for Yarn formation
- 2.To study the distribution of fibres in drafting zone in spinning
- 3.To understand the stress and strain in fibres during yarn formation
- 4.To understand the aspects of Pierce plain fabric geometry
- 5.To study the behaviour of woven and knits for Tensile deformation
- 6.To educate the students to apply the principles of helical geometry in textile production

UNIT -I.

Introduction to Yarn Engineering : Role of Engineering aspects in Yarn formation, Basic concepts of Engineering design of Textile Structures ,Geometry of twisted yarn , idealised helical yarn geometry, yarn count and twist factors , Limits of twists , Real and idealised yarns,– Schwarz Constant, Twist contraction, Contraction & retraction factor.

UNIT-II.

Packing of fibers – yarn idealised packing – concept of open and close packing – Deviations from ideal forms of packing – specific volume of yarns – Measurement of packing facts – yarn diameter concept as suggested by pierce Hamilton, Grosberg and Dickson.

UNIT -III.

Fiber migration – ideal migration – Tracer fibre technique – characteristics of migration – Strain mechanics: Strain in yarns – with and without lateral change – determination of twist angles before and after straining (simple numerical problems) – energy stored in fibre – blended yarn mechanics – Hambergers analysis.

UNIT -IV.

Elements of fabric geometry – pierce cloth geometry – Problems on Pierce geometry model. Concept of Kemp's race track model and Olefin mechanistic model – Derivation of formula of Aerial density of fabrics. Problems on fabric weight , cover factor and fabric cover – Pierce & Balls weight factor – Fabric quality index.

UNIT -V.

Tensile properties of woven fabric – Geometrical changes during extension –the load extension modulus (without considering bending energy) – Geometry of plain knitted fabrics – Empirical dimensionless relations. Concept of Runners ratio. Structure ratio – Problems on dimensionless constants. Analysis of fabric shear.- Introduction to Neural Networks

COURSE OUTCOME(Graduate to have)

1. An ability to apply the basic engineering concepts to Textile Design
2. An ability to understand the packing of fibres in Yarn formation at Ring frame
3. An ability to apply the concept of fibre migration in understanding the yarn hairyness
4. An ability to apply the pierce fabric geometry in weaving of fabrics
5. An ability to design the textile supplement with necessary Tensile properties for woven and knitted fabrics.
6. An ability to judge the structure of fibre and decide the yarn and fabric properties there of .

EXAMINATION : EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. Structural Mechanics of Fibers, Yarns and Fabrics, Vol – I – Hearle, Grosberg and Backer, Wiley – Inter-science, New York 2011
2. Textile Yarns - B.C.Goswami, John Wiley & Sons, New York 2010.

REFERENCE BOOKS:

1. Mechanics of Flexible fiber assemblies – J.W.S. Hearle, The Textile Institute, Manchester, 2009.
2. The Mechanics of Wool Structures – Ron Posal, DeJong, New South Wales university publication, New South Wales, Australia, 2008.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	-	-	✓	-	-	-	-	-	-
CO2	✓	-	✓	-	-	-	✓	-	-	-	-	-
CO3	✓	✓		-	✓	-	-	-	-	-	-	-
CO4	✓	✓	-	-	✓	-	-	-	-	-	-	-
CO5	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	✓	-	-	-	-	-	-	✓	-

PC704PCE-III – CT

COATED TEXTILES

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

- 1.To understand about the construction of Coated fabrics
- 2.To Understand the Rheology of Fluids
- 3.To learn about the Coating methods
- 4.To Understand about the applications of Coated fabrics
- 5.To study the test methods for testing Coated fabrics.
- 6.To educate the students to evaluate the validity of Coated fabrics

UNIT I

Rubber-natural and synthetic, polyvinyl chloride, polyurethanes, acrylic polymers; adhesive treatment, radiation-cured coatings; materials and trends; textile fibres-spinning, woven fabrics, knitted fabrics, nonwoven fabrics

UNIT II

Rheological behavior of fluids; rheology of plastisols; hydrodynamic analysis of coating; clothing comfort, impermeable coating, breathable fabrics

UNIT III

Coating features, methods of coating- knife coating, roll coating, dip coating, transfer coating, rotary screen printing, calendaring, hot-melt coating; general characteristics- tensile strength, elongation, adhesion, tear resistance, weathering behaviour, microbiological degradation, yellowing

UNIT IV

Synthetic leather, architectural textiles, fluid containers, tarpaulins, automotive air bag fabrics, carpet backing; textile foam laminates for automotive interiors; flocking fabrics for chemical protection; thermochromic fabrics, temperature adaptable fabrics, camouflage nets metal and conducting polymer, coated fabrics

UNIT V

Test methods for coated fabric evaluation; environmental norms for the chemicals used in coating industry.

COURSE OUTCOMES: (Graduate to have)

- 1.. An ability to select the Polymers used for coating
2. An ability to understand Rheology of coated polymers
3. An ability to select the specific Method of coating of textiles
4. An ability to judge the uses and Application of coated fabrics
5. An ability to interpret the results of Testing of coated fabrics
- 6.. An ability to design the construction of a specific Coated fabric for a specific end use.

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXTBOOKS

1. Fung. W., “Coated and Laminated Textiles”., Wood head Publishing Limited., Cambridge., 2002., ISBN: 1 85573 576 8
2. Ghosh. S. K., “Functional Coatings”., Wiley-VCH Verlag, GmbH & Co. KGaA, Weinheim, 2006, ISBN:3-527-31296-X

REFERENCE BOOKS

1. GuneuAkovali., Diveswar Banerjee., Sen A. K., and Dipak K. Setua., “Advances in polymer coated textiles”, SmithersRapra, 2012
2. Ashish Kumar Sen., “Coated Textiles: Principles and Application”,
3. TechnomicPublication, U.S.A., 2007, ISBN: 1420053460 | ISBN-13: 9781420053456
4. Mary Jo Waters., “Laboratory Methods for Evaluating Protective Clothing System Against Chemical Agents”, Report no. CRDC-SP 84010, CRDC, Aberdeen Proving Ground, MD, U.S.A, 1984

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
CO2	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
CO3	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
CO4	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
CO.5	✓	✓	-	✓	✓	-	-	-	-	✓	-	-
CO6	✓	✓	-	✓	✓	-	-	-	-	✓	-	-

ADVANCES IN TEXTILES AND APPAREL WET PROCESSING

Instruction per week : [L=3, T=0]= 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

1. To understand the scope for modern developments in preparatory process of Textile wet processing
2. To understand the developments in Dyeing
3. To understand the concept of Super critical CO₂ Dyeing
4. To understand the concepts of New methods in Wet processing of Terry Towel and Synthetics
5. To understand the developments in Printing
6. To understand the developments in Finishing

UNIT-I

Process modifications in Pretreatments: Eco-friendly peracetic acid bleaching, Eco-friendly retting of Jute, Redox H₂O₂ bleaching, Concept of Eco-friendly stabilizers for H₂O₂ bleaching.

Biotechnology in Pretreatments: Developments in singeing, desizing and its eco-aspects, size recovery, bleaching and its eco-aspects, classification of enzymes, Mode of action of enzyme, Factors affecting efficiency of enzyme treatment. Enzyme retted flax using different formulations, influence of enzymatic pretreatment on the colours of bleached and dyed flax fibers, combined bio-scouring and bleaching of cotton fibers, effect of ultrasound on the performance of industrial enzymes used in cotton bio-preparation/bio-finishing applications, Enzymatic degumming, enzymatic H₂O₂ bleaching, A brief note on Nano biotechnology.

UNIT-II

Developments in Dyeing: Dyeing and its eco-aspects, new dyes and their advantages. Eco-friendly dyeing with sulphur & vat dyes. New developments in reactive dyes like HF dyes, low and no salt reactive dyes, multifunctional dyes, neutral fixing and acid fixing reactive dyes. Photo chromic dyes, thermo chromic dyes, fluorescent dyes.

Super critical CO₂ dyeing – concept, mechanism, methods and techno-economical features.

Ultrasound in dyeing - Concept, mechanism, methods and techno-economical features. Low temperature dyeing - concept, mechanism, methods and techno-economical features.

Natural Dyes - Sources and classification of natural dyes, extraction methods, mordents, dyeing of natural and synthetic fibrous material with natural dyes.

UNIT-III

Processing of Terry towel: Different stages of towel processing and finishing.

Processing of specialty fabrics: Carpet Processing - Dyeing and printing of carpets. Mechanical and chemical finishing of carpets.

Processing of Lyocell - Pretreatment, dyeing and finishing of lyocell. Concept of fibrillation, its causes and remedies.

Processing of Fabric containing spandex - Wet processing of Cotton / Spandex, polyester / Spandex fabrics.

UNIT-IV

Digital Printing: Concept, methods of inkjet printing, colour separation, selection of dyes and developments in inks, techno-economical features.

Transfer Printing – Concept, selection of dyes and paper, mechanism of dye transfer, process sequences, techno-economical features, various transfer printing machines.

Special Printing Effects – Advantages and disadvantages of pigment printing, various developments to overcome the problems, Special print recipes for fashion & garments. Khadi, Metallic, Floc, Plastisol, Reflective, Pearl, Fluorescent Printing, High Density Printing, Puff Printing, Foil Printing, Plastic Printing, Label Printing Defects,.

UNIT-V

Application of Nanotechnology in Textiles: Nano-finishes - Super hydro phobicity and lotus effect, self cleaning,

Application of Plasma in Textiles: Concept, types of plasma and their generation, Plasma treatment of textile for water and oil repellency, Interfacial engineering of functional textiles for biomedical applications, plasma modification of wool, plasma modification of natural cellulosic fibers, characterization of plasma treated textiles.

Development in Finishing: Various Low liquor and minimum application techniques in textile finishing, their advantages and limitations, various eco-friendly resin finishes, Concept of UV-A and UV-B, factors affecting UV protection. Various UV- protection finishes and their evaluation, antimicrobial finishes – mode of action, factors affecting, various antimicrobial finishes.

COURSE OUTCOMES

1. An ability to understand the Need for Water conservation.
2. An ability to use the modern techniques to improve the product quality.
3. An ability to standardized the processes to optimize the process.
4. An ability to identify the parameters which affect the efficacy of the process.
5. An ability to select and plan a printing technology for Textile goods
6. An ability to test and evaluate various chemicals used for wet processing

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXTBOOKS:

1. Biotechnology in Textile processing, by Georg M. Guebitz, Artur Cavaco-paulo, Ryszard ,2009 Kozlowski, The Hawarth Press, Inc
2. Handbook of Textile processing machinery by R.S. Bhagwat, 2008
3. Garment Finishing & Care Labelling by S.S. Satsangi, Usha Publishers, 53-B/AC-IV, Shalimar Bagh, New Delhi., 2013
4. Plasma technologies for textiles by R. Shishoo, 2014
5. Manufacturing of Terry Towel by Subhash J. Patil, Universal Book Corporation, Mumbai., 2010
6. Textile Floor covering by G. H. Crowshaw, Textile Progress, Vol. 9, No. 2, Textile Institute., 2011

REFERENCE BOOKS

1. Wool science and Technology by W. S. Simpson, G. H. Crowshaw, Woodhead Publishing, Textile Institute., 2005
2. Trouble shooting in Wet Processing: Acetate, Rayon / Lyocell and Spandex Blends, AATCC., 2010
3. Environmental Issues – Technology option for Textile Industry Edited by R. B. Chavan, Indian
4. Journal of Fibre & Textile Research Special Issue - March, 2010.
5. Eco-friendly Textiles Challenges to Textile Industry – Textile Committee., 2008

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2
CO1	✓	✓	✓	-	✓	-	✓	-	-	-	✓	-
CO2	✓	✓	✓	-	-	-	-	-	-	-	✓	-
CO3	✓	✓	✓	-	✓	-	✓	-	-	-	✓	-
CO4	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO5	✓	✓	-	-	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-

PC704PCE-III- AIAM

AUTOMATION IN APPAREL MANUFACTURE

Instruction per week : [L=3, T=0]= 3 Hours

Duration of SEE : 3 Hours

CIE: 40 Marks

SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

1. To learn about various mechanical and electrical drives used in automation of apparel manufacturing.
2. To understand the concept of various hybrid energy transfer power transmission drives
3. To learn about the working of automated elements in cutting, sewing and special machines.
4. To know the working of automated apparel finishing equipment.
5. To understand the role of automated material handling equipment.
6. To understand the need for application of Robot in apparel industry

UNIT- I

CONCEPT OF AUTOMATION

Base subject information, basic terms and definitions from mechanization area and automation area. Energy transfer in kinematic system, drive requests, types of drives, comparison, characteristics, fluid drives, characteristics, comparing, pneumatic drives, air properties as a medium for energy transfer. Hydraulic drives, schematic diagram, power packs, Proportional hydraulic system, servo-operated valves, circuits with PAS (power assisted steering). Electric drives, general view, characteristics, powers (outputs).

UNIT- II

AUTOMATION IN APPAREL DESIGNING AND FIT ANALYSIS

Automated elements in clothing production - cutting of fabric - cutting by water jet, laser, plasma - automated sewing machines - Types of driving mechanism of sewing machines – single needle lock stitch machine, over lock and flat lock machine. Automation in special machines – bar tack, pocket making and patterning machines, button holing and sewing machines.

UNIT- III

AUTOMATION IN APPAREL FINISHING:

Automation in fusing, pressing and folding machines. Automation in apparel packing equipments.

UNIT- IV

AUTOMATION IN MATERIAL HANDLING

Types of equipment- Automated storage and retrieval systems- Overview of conceptions of “Work Robots” and “Manipulators”. Conveyor systems – Unit production systems. Ply separation; Transportation - position and orientation, pick and place – clamping grippers and pinch grippers. Machine vision system – image acquisition, feature enhancement; Image segmentation – feature extraction, image understanding.

UNIT-V

ROBOTICS IN APPAREL INDUSTRY

Robotics in spreading and cutting; Robotics in sewing – double lock stitching, one side stitching, Tufting; Robotics for material handling; Robots as 2D and 3D folding machines; Robot control and simulation. Return on investment on automation.

COURSE OUTCOMES (Graduate to have)

1. Acquire knowledge on various mechanical and electrical drives used in automation of apparel manufacturing.
2. Gain knowledge on various hybrid energy transfer power transmission drives
3. Explain the working of automated elements in cutting, sewing and special machines.
4. Gains knowledge about automated apparel finishing equipment.
5. Describe the concepts of automated material handling equipment.
6. Explain the application robotics in various areas in apparel industry

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

REFERENCES

1. Berkstresser, G.A. & Buchanan, E.M., Automation and Robotics in the Textile and Apparel Industries, Noyes Publications, 1986.
2. M.G. Mahadevan, "Textile Robotics and Automation", Abhishek Publications, Chandigarh, 2001.
3. A. Gordan, et al., "Automation and Robotics in the Textile and Apparel Industries (Textile series)", Noyes Publication, UK, 1986.
4. G.A. Berkstresser, "Automation in the Textile Industry: From Fibers to Apparel", 1st Edition, Technomic Publishing Co., Inc, UK, 1995.
5. M. Acar, "Mechatronic Design in Textile Engineering", NATO Science Series, 1st edition, Springer, USA, 1994.
6. Carr, H. and Latham, B., 'The Technology of Clothing Manufacture', Wiley-Blackwell, 2009.
- Relis, N. & Strauss, G, 'Sewing for Fashion Design', Upper Saddle River, NJ: Prentice Hall, 1997.
7. Stylios G, 'Textile Objective Measurement and Automation in Garment Manufacture' Ellis Horwood Ltd., U.K., 1991

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO1	PSO2	PSO3
CO1	✓	✓	✓	-	-	✓	-	-	-	-	-	-	✓	-	✓
CO2	✓	-	✓	-	-	-	✓	-	-	-	-	-	✓	-	-
CO3	✓	✓		-	✓	-	-	-	-	-	-	-	✓	✓	-
CO4	✓	✓	-	-	✓	-	-	-	-	-	-	-	✓	-	✓
CO5	✓	✓	✓	-	-	-	-	-	-	-	-	-	✓	-	✓
CO6	✓	✓	✓	✓	-	-	-	-	-	-	✓	-	-	-	✓

PC704PCE-III-ATT

ADVANCES IN TECHNICAL TEXTILES

Instruction per week : [L=3, T=0]= 3 Hours

Duration of SEE : 3 Hours

CIE: 40 Marks

SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

- 1.To educate the students for the applicability of various fibers, yarns and fabrics in industrial textiles.
- 2.To provide the knowledge on textiles used in various fields in defense, medical, protective transportation textiles
3. To develop the knowledge about the sports and automobile textiles
- 4.To understand the role of Textile supplement in Agro applications
- 5.To Design the substrate meant for Aerospace and Civil Aviation applications
- 6.To understand the design aspects of geotextiles

UNIT I

Scope of Technical Textiles: Modern Classification of textiles as 16 Technical Textiles , Role of Technical Textiles, Initiatives by Govt. of India, Components of TMTT, Various COE's for Technical Textiles in India and their progress.

Industrial sewing threads: Types , selection , characteristics , and their manufacture.

Agro Tech. : Nomenclature, types , selection , materials , textiles in agriculture, dairy and horticultural applications, textiles in cigarettes .

Medi Tech: Textiles in Surgical applications (Drapes , Gowns), Textiles in Orthopedics, Textiles in Ophthalmology, Textiles as replacement for Pancreas, Intestine, Heart and its valves , Textiles in Radiology, Hospital Textiles, Textiles in Urology, Textiles in Neo –Netology, Textiles in Tissue Engineering , Textiles in Bio-Medical Instrumentation.

Textiles in Aerospace and Marine applications: fabrics, Architectural fabrics , Building structure - application of GT in vertical dams Roofing materials - Awnings and Canopies - Flags. Rubberised fabrics for flexible dams

UNIT-II

Pro Tech :

Protection against cold: cold environment, convection; radiation; evaporation; airway heatExchange, Energy metabolism; heat production and physical work, The human heat balance equation Requirements for protection, Measurements of clothing performance: thermal insulation; evaporative resistance; wind resistance; water resistance; standards for protective clothing against cold and foul weather

Performance of clothing for cold protection: standard values for clothing insulation; influence of walking and wind; influence of water and moisture; effects of solar radiation; effects of treatments; prediction of protection, Specific materials and textiles for cold protection Textiles for defense & survival: Requirements , parade clothing, Canvas for defense, Combat clothing , Water vapour permeable clothing , Breathable clothing. Camouflage systems, Deceptions, Decoys ,Types and methods ,Colour and patterns, Camouflage for UV, IR, antiradar and multiple spectral camouflages.- cut resistant Conductive Textiles, Protective clothing for extremely cold region, sleeping bags, Ballistic protective armours and accessories, Aerospace Textiles, Fabrics for nuclear, biological and chemical protection.

UNIT-III

Sport Tech.: Sportswear design: seamless garments; stitch less seams, impact of advances in laminating, wearable technology, Material requirements for the design of performance sportswear, technical sportswear for women, garment development., application of technical textiles in performance sportswear.

Functional sport footwear: design aspects ,Functional fit, biomechanic of the foot; Functional materials and components, properties of materials and components; materials for sport footwear of upper sole

Innovative fibres and fabrics in sport: High performance and high functional fibres and textiles: Properties and design aspects, hydrophobic surface; dirt and oil repellence; Various types of finishing

Sportswear and comfort: Aspects of wear comfort, Measurement, Role of Elastic sport textiles, biofunctional textiles; foul weather protective clothing; textile combinations

Spinnaker fabrics: production and processing of nylon spinnaker; dyeing and finishing

Textile use in sports shoes: Use of textiles in sport shoes: uppers, sole

UNIT-IV

Elastic textiles: Introduction, breathability; breathable stretch, breathable waterproof stretch; bi-component stretch as an alternative to elastanes; use of Lycra, garment engineering : in footwear, in Football, in rugby, hydrodynamics in swimwear, aerodynamics in track and field and cycling - Performance, recovery and wellbeing, enhanced performance and prevent injury; energising socks; performance and recovery; textronics; wellbeing through clothing

Textile composites in sports products: Materials, Design, Production technology – continuous processes, Applications: pole vault; fishing gear; bicycles; golf; baseball/softball; tennis; kayaks; skis and snowboards; hockey

Textiles in sailing: Polyester sailcloth, manufacture, preparation, dyeing finishes and finishing of polyester sailcloth

UNIT- V

Textiles in Automobiles: fibres employed, Requirements, Interior design: Type of substrates and their manufacture, Yarn and fabric processing: Dyeing and finishing, Printing, Coating and lamination, Quality assurance and testing: Quality assurance, Test method details, Product engineering. Interior trim: Seats, Headliners, Door casings, Parcel shelves, Other interior trim, Complete modular interiors: Seat belts, Airbags, Carpets, Cabin air filters, Battery separators, Bonnet (hood) liners Wheel arch liners, Hood material for convertibles, Tyres, Hoses and belts

Textiles in other forms of transportation: Composite materials, Flame retardancy, Fabric coating, Textiles in other road vehicles, Railway applications, Marine applications, Textiles in aircraft.

Course Outcomes: Graduate to have an

1. Ability to know the application of various fibers, yarns and fabrics in industrial textiles.
2. Ability to design fabrics for defense, medical, protective transportation textiles
3. Ability to develop the sports and automobile textiles
4. Ability to plan for Agro applications of Textiles
5. Ability design the substrate meant for Aerospace and Civil Aviation applications
6. Ability to design an advanced Technical Textile

REFERENCE BOOKS:

1. Kanna M.C., Hearle, O Hear., Design and manufacture of Textile Composites, Textile progress, Textile Institute, Manchester, April 2004.
2. Scott, Textile for production, Textile progress, Textile Institute, Manchester, Oct. 2005.
3. Shishoo, Textile in sports, Textile progress, Textile Institute, Manchester, Aug. 2005
4. Horrocks A. R., Anand S.C., "Handbook of Technical Textiles", Woodhead Publishing, Cambridge, 2000
5. Adanur S., "Handbook of Industrial Textiles", Technomic Publication, Lancaster, 2001

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	-	-	-	-	✓	✓	✓	✓	-
CO2	✓	✓	✓	-	-	-	-	✓	✓	✓	✓	-
CO3	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓	-
CO4	✓	✓	-	-	✓	-	-	✓	✓	✓	✓	-
CO5	✓	✓	✓	-	-	-	-	✓	✓	✓	✓	-
CO6	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓

PC704 PCE-III -MT

MEDICAL TEXTILES

Instruction per week : [L=3, T=0]= 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks Credits : 3

Course Objectives

- 1.To understand the concept of Medical Textiles
- 2.To learn about the materials used for manufacture of Medical Textiles
3. To know about Health care and Hygiene products
- 4.To learn about the applications of Medical Textiles
5. To learn about scaffolds
- 6.To educate the students about the Extracorporeal devices

UNIT I:

Medical Textile Science Medical textiles – An overview, classification: Implants, Non implants, Extra corporeal, Health care and hygiene, Medical textile products and processes. Testing methods and international standards. Non-implantable materials: wound dressing- requirements of wound dressing, types, properties and applications; bandages - types, evaluation and applications

UNIT II:

Materials for Medical Textiles: Introduction to materials. Classification of biomaterials – metallic, ceramic. Polymers in biomedical use – natural and synthetic, biodegradable synthetic polymers. Biodegradable nanospheres. Polymer sterilization. Electro conductive polymeric fibers. Bio textile product development. Production of bio textile under GMP conditions.

Implantable biomedical devices: vascular grafts, sutures - types, properties and applications; extra-corporeal devices; scaffolds for tissue engineering: development and characterization

UNIT III:

Healthcare and hygiene products: surgical gowns, masks, respirators, wipes, napkins, antibacterial, antiodour textiles

Smart Medical Textiles Biomedical sensing. Films, coatings, adhesives, polymers and stimuli responsive materials. Smart polymers for Biotechnology and Protective clothing. Intelligent chemical indicators. Implantable sensors for long-term monitoring; Application of phase change and shape memory materials in medical textiles. Micro electro mechanical system (MEMS) based medical textiles.

UNIT IV:

Medical textiles applications: Textiles in drug delivery. Antimicrobial textiles. Chitosan based gels and hydro gels in biomedical and pharmaceutical sciences. Intelligent garments for pre-hospital emergency care, smart medical textiles in rehabilitation, monitoring pregnancy, heart patients, and children in hospital. Wearable assistants for mobile health monitoring.

UNIT V:

Tissue Engineering Tissue engineering - basics, textiles in tissue engineering, textiles for tissue scaffolds, culture types, general aspects of cells in culture, Biology and characterization of cultured cells; transport limits in 3D culture.

Standards; safety, legal and ethical issues involved in conducting trials with medical textile materials; disposal of medical textile products

Course Outcomes: (Graduate to have)

- 1.An ability to select the material suitable for Medical Textiles
- 2.An ability to test and evaluate the performance of Medical Textiles
- 3.An ability to apply the bio materials
- 4.An ability to apply the smart textiles in Medical field
- 5.An ability to practice the legal and ethical issues involved in conducting trials
6. An ability to select the biomaterials for specific applications.

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Van Langenhove, L. (2007), Smart textiles for medicine and healthcare, Wood head publishing Ltd, UK.
2. Cass A.E.G and Cooper, J.M. (2004), Biosensors: a practical approach, 2 nd edition, Oxford University Press, New York.
3. Eggins, B.R (2002), Chemical Sensors and Biosensors, John Willey & Sons, Wiley publications, England.
4. Mel Schwartz, (2009), Smart materials, CRC press, USA.
5. Lakes RS, (2000), Composite Biomaterials in The Biomedical Engineering Handbook , ed. J. D. Bronzino, CRC Press, Second Edition, Boca Raton, FL.
6. Enderle, J, Blanchard, S and Bronzino, J. (2005) Introduction to Biomedical Engineering, 2 nd Edition, Academic Press series in Biomedical Engineering, USA
5. Allison Mathews., and Martin Hardingham., “Medical and Hygiene Textile Production - A Hand Book”, Intermediate Technology Publications, 1994, ISBN: 1853392111 | ISBN-13: 9781853392115
6. Anand S.C., Kennedy J.F., Miraftab M., and Rajendran S., “Medical Textiles and Biomaterials for Health Care”, Wood head Publishing Ltd., 2006, ISBN: 0849317800 | ISBN-13: 9780849317804

REFERENCE BOOKS

1. Joon B. Park., and Joseph D. Bronzino., “Biomaterials – Principles and Applications”, CRC Press, Boca Raton London, New York, Washington, D.C. 2002, ISBN: 0849314917 | ISBN-13: 9780849314919
2. Anand S., “ Medical Textiles”, Textile Institute, 1996, ISBN: 185573317X
3. Horrocks A.R., and Anand S.C., “Technical Textiles”, Textile Institute, 1999, ISBN: 185573317X
4. Adanur S., “Wellington Sears Handbook of Industrial Textiles”, Technomic Publishing Co. Inc., Lancaster Pennsylvania, 1995, ISBN 1-56676-340-1
5. Michael Szycher., and Steven James Lee., “Modern Wound Dressing: A Systematic Approach to Wound Healing”, Journal of Biomaterials Applications.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	-	✓	-	✓	-	-	-	✓	-
CO2	✓	✓	✓	-	-	-	-	-	-	-	✓	-
CO3	✓	✓	✓	-	✓	-	✓	-	-	-	✓	-
CO4	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO5	✓	✓	-	-	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-

SOURCING AND SUPPLY MANAGEMENT FOR TEXTILE & APPAREL

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

Course Objectives

1. To understand the concept of Sourcing in industry
2. To study the methods of purchasing
3. To Understand the concept of supply chain
4. To understand the concept of process of strategic sourcing
5. To understand the process of strategic sourcing
6. To provide knowledge on certain tools & techniques

UNIT - I

INTRODUCTION TO PURCHASING AND SUPPLY CHAIN MANAGEMENT

The Purchasing Process. Purchasing Policies and Procedures. Supply Management Integration for Competitive Advantage, Purchasing and Supply Management Organization.

UNIT - II

STRATEGIC SOURCING:

Supply Management and Commodity Strategy Development, Supplier Evaluation and Selection Supplier Quality Management Supplier Management and Development, Creating a World-Class Supply Base, Worldwide Sourcing.

UNIT - III

STRATEGIC SOURCING PROCESS

Strategic Cost Management, Purchasing and Supply Chain Analysis: Tools and Techniques, Negotiation and Conflict Management Contract Management Purchasing Law and Ethics.

UNIT - IV

SUPPLIER PERFORMANCE AND QUALITY MANAGEMENT

Performance Measurement and Evaluation: Strategies, tools and techniques for measuring and managing supplier performance, Supplier performance evaluation, Purchasing services, Supply Chain Information Systems and Electronic Sourcing.

UNIT – V

FUTURE DIRECTIONS

Purchasing and Supply Strategy Trends Green Buying, Sustainability, material research, Lean supply Chain Management

Course Outcomes(Graduate to have)

1. An ability to understand basic functions.
2. An ability to apply holistic dimensions of SCM
3. An ability to plan for corporate perspectives.
4. An ability to Learn to acquire skills to become a sourcing professional.
5. An ability to apply the tools of Sourcing
6. An ability to plan for Green buying

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. Purchasing and Supply Chain Management, Robert .M. Monczka, Handfield, Glunipero Paterson, Waters, 6th Edition, Cengage Publication
2. Purchasing and Supply Chain Management, . Benton, 3 rd Edition, Tata Mc Graw Hill.

REFERENCE BOOKS

1. World Class Supply Chain Management, Burt, Dobler, Starling, 7th Edition, Tata Mc Graw Hill.
2. Supply Chain Management For The 21st Century by B S SAHAY. Macmillan Education, 2001

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	-	✓	-	-	-	-	-	✓	-
CO2	✓	✓	-	-	-	-	-	-	-	-	✓	-
CO3	✓	✓	✓	-	✓	-	-	-	-	-	✓	-
CO4	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO5	✓	✓	✓	✓	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-

PC 705PCE-IV-EFTA

ENTREPRENEURSHIP FOR TEXTILE AND APPAREL

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

- 1..To understand about the concept of Entrepreneurship
2. To learn about the Entrepreneurial development process
- 3.To understand the procedure for getting permission for SSI
- 4.To understand the process of financing
- 5.To learn the objectives of CPM
6. To learn the method of estimating the probability of completion of project

UNIT - I

Introduction to economic development and industrialization, small scale enterprises – meaning, role in Indian economy, SSI vendor plan periods – products reserved for SSI, characteristics of SSI, reasons for growth of SSI- Introduction to entrepreneurship – concept, entrepreneur Vs Enterprise, true entrepreneur, types, woman entrepreneur – types, growth of woman entrepreneur, problems , (Entrepreneur Vs Intra preneur)Entrepreneurship: concept, comparison of entrepreneurs, entrepreneurship and enterprise, Peter Drucker's views on entrepreneurship, psychological and sociological theories of entrepreneurship, factors contributing, role of gouvernement, entrepreneurial culture and structure, a brief note on rural entrepreneurship

UNIT - II

Entrepreneurship and environment – policies governing entrepreneurial development programs (EDPs), objectives, concept, need, operational problems of EDP, corridor principle, incubator, phases in EDP, EDP – training and development programs- engineer entrepreneur training program, training of trainers, various institutions assisting entrepreneurs(SFDO, SIDCO, SSIC, SISI, SIPCOT, NSIC, TIIC, IIC, EGB, NAYE, SIETI, MPC, NRDCI, KVIC, PCOS, ITCOT)-Commercial banks (ICICI, IDBI, IRBI, IFCI) new entrepreneurial development agency

UNIT - III

Project defined, classification, objectives, project life cycle, project identification, comparison with child, role of market survey, trade fairs, demand and resource base industries-Project Formulation: Meaning, p[preliminary study, pre feasibility study, feasibility report, project selection, general format on scope of feasibility report, planning commission, guidelines, project design on role of PERT & CPM-Project Appraisal: Concept, methods, various feasibilities like technical , economic , commercial, managerial, financial etc, social considerations, energy management and ecological aspects, balancing of various factors, a brief note on methods of profitability appraisal, social cost benefit analysis

UNIT - IV

Financial flows with in and through the enterprise, financial statement analysis, calculation of important ratios, working of funds flow operations. Project financing- sources (equity, debt, debentures, term loans, deposits lease), fixed capital requirements, working capital requirements. Selection of site and equipment: preliminary screening, detailed investigation, tangible Vs intangible aspects, factory design, selection of optimum site, factors governing, applicability of factories act, layouts, choice, specification,. Vendor's list, evaluation of quotations

UNIT - V

Organizational structure of SSI: steps for starting a small industry, selection of types of organization and ownership, preliminary and implementation stage, policy imitativeness, measures, central and state incentives and subsidies, export and imports, export assistance, industrial sick ness (problems of entrepreneurship and sick ness in SSI), potential of SSI in international business, franchising, e-commerce, ISO 9000 and standardization, marketing and man power channel (planning)

COURSE OUTCOMES (Graduate to have)

- 1.An ability to take up an Entrepreneurship projects
- 2.An ability to plan for the project with CPM
- 3.An ability to predict the probability thro PERT project
- 4.An ability to plan for the finances
- 5.An ability to assess the viabilities of projects
- 6.An ability to assess the usefulness in context of society.

EXAMINATION : Part-A for 40 Marks (with 10 Questions-Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

- 1.Entrepreneurial Development (Principles, Policies, & Programmes)-P.Saravancel, ESSPEEKAX Publishers, Chennai, 2 nd Edition,
- 2.Entrepreneurship Development in India-De. C.B.Gupta, Dr. N.P.Srinivasan,Sultan Chand & Sons, 6 th Edition,2002
- 3.Dynamics of Entrepreneurial Development & Management – Vasanth Desai, Himalaya Publishing House, Millennium Edition,2005

REFERENCE BOOKS:

- 1.Entrepreneurial Development –S.S.Khan,S .Chand & Company Ltd., 2003 Edition.
- 2.Entrepreneurship Development –Colombo Plan Staff college for Technical Education ,Manula-Tata-Mc. Graw Hill Publishing Company Limited,2003
- 3.Management of small Enterprises –Rudra Sai Baba,& Renuka sagar, Kalyani Punlishers,2003

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	-	✓	-	-	-	-	-	✓	-
CO2	✓	✓	✓	-	-	-	-	-	-	-	✓	-
CO3	✓	✓	✓	-	✓	-	-	-	-	-	✓	-
CO4	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO5	✓	✓	✓	✓	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-

705PCE-IV- VM

VISUAL MERCHANDISING

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

- 1.To understand the concept of visual merchandizing
- 2.To learn the different phases of VM
- 3.To understand the interior decoration and Display
- 4.To learn the methods of presentation
- 5.To know the concept of colour and its role in VM
- 6.To learn about the estimation of mannequins

UNIT I

Visual Merchandising

Origin and progression, Definition, Importance and Impact of visual merchandising , Purpose of visual merchandising, Principles of visual merchandising, status of VM and current status of VM in India, Importance of Team work- Structure of VM department, functions of Visual merchandiser, Different kinds of images, the four P's of marketing, store design, image changes, style.

UNIT II

Display

Objectives, Merchandise display, Rules for display, Purpose and function of display, points to enhance display. Types of display – Display setting – elements of display –Props- Store display methods- window display, Interior display, effective store displays. Common errors in display. Store Layout design- Objectives, selection of layout, Methods of layout, Division of merchandising by Department, Organizing merchandise within department, Locating departments within store, Merchandise presentation- Principles, types merchandise presentation,

UNIT III

Store design and display

Types of stores- traditional product retailers- discount stores, speciality discount stores, variety stores, catalog showrooms, Off- price retailers, factory outlets, hyper market, departmental stores, convenience stores.

Exterior store design- Signs and entrances, marquees, the straight front, the angles front, corner window. Display windows- elevated windows, Elevator windows, raised floors, lobby windows, corner windows. Open back windows- semi closed back windows, closed back windows, outdoor lighting, banners, Planters. Interior store design- Objectives, Fixtures, counter and table display, Ledges, kiosks areas, Platform display. Merchandise walls- types, purpose, methods to present merchandise walls. Wall displays- selling floor, sound and aroma.

UNIT IV

Colour, Lighting and Fixtures

Colour- objectives, colour and display, impact of colour, guidelines in colour display.

Lighting- Objectives, types of lighting- primary lighting, secondary lighting, task lighting, fluorescent lighting, reflector lamp, colour reflector lamp, high intensity discharge lighting, lighting fixtures. Planning the lighting- lighting windows of store, lighting the open back window, lighting the closed back window, lighting store interior, lighting tips for specific merchandise.

Fixtures- Objectives, types of fixtures- hanging fixtures, non-hanging fixtures, tips for fixture selections

UNIT V

Signage and Mannequins

Signage- Objectives, window signage, interior signage. Types of signage- Directional signs, Departmental signs, service signs, marketing signs, information signs, sizes of the signage, colour selection for signs. Effective retail signage, Sound and aroma.

Mannequins- types of mannequins- realistic, semi realistic, abstract, semi abstract, headless. Alternatives to mannequins – three-quarter form, soft-sculpted figures, articulated artistic figures,

dress and suit forms, hangers. Selection of mannequins, steps in dressing mannequin, positioning mannequin, Point of purchase- objectives of POP display, material used in POP display, types of POP

COURSE OUTCOMES (Graduate to have)

1. An ability to design visual merchandizing process
2. An ability to understand and organise different phases of VM
3. An ability to design the elements of interior decoration and Display
4. An ability to select the methods of presentation
5. An ability to apply the concept of colour and its role in VM
6. An ability to estimate the requirement of mannequins

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXTBOOK

Robert Colborne, “Visual Merchandising: The Business of Merchandise Presentation”, Delmar Learning, 1996.

REFERENCE BOOKS

1. Jay Diamond, Ellen Diamond, “Contemporary Visual Merchandising and Environmental Design”, 4th edition, Prentice Hall, New Delhi, 2007.
2. Elaine Stone, “Fashion Merchandising”, Blackwell Science Ltd., 2000.

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓	-	✓	-	-	-	-	-	✓	✓
CO 2	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO 3	✓	✓	✓	-	✓	-	-	-	-	-	✓	✓
CO 4	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO 5	✓	✓	-	✓	-	-	-	-	-	-	-	-
CO 6	✓	-	✓	-	✓	-	-	-	-	-	✓	✓

PC 705PCE-IV- PG

PROTECTIVE GARMENTS

Instruction per week : [L=3, T=0]=3 Hrs

CIE: 40

Duration of SEE 3 Hrs

SEE: 60 Credits :3

COURSE OBJECTIVES

1. To learn about chemical protection
2. To understand about the concept of Thermal protection.
3. To develop the new ideas to design and use different materials for creating innovative protective clothing.
4. To understand about the design of new protective clothing based on the requirement
5. To know about the different international standards for protective clothing

UNIT-I

CHEMICAL PROTECTION

Chemical Hazards- Need, evaluation of barrier effectiveness of protective clothing- performance of protective clothing. Material requirements- test methods.

UNIT-II

THERMAL PROTECTION

Thermal Protective Clothing-Thermal characteristics and combustion mechanism of fibres- Heat resistant and Flame retardant - Inherently flame retardant fibres and chemical modified fibres, Flame retardant finishes. Requirements of ballistic protection.

UNIT-III

MECHANICAL PROTECTION

Requirements-knife performance- fundamental principle of knife impact, protection levels- test methods-ballistic protection-requirements- materials used- test methods

UNIT-IV

ELECTRICAL AND RADIATION PROTECTION

Material Selection, production techniques: Nuclear Hazards, Protection from Electromagnetic radiation waves-UV and others. Electrical protective clothing and its evaluation

UNIT-V

HEALTH CARE AND HYGIENE CLOTHING

Material Selection, production and processing techniques: bedding, surgical wound dressings, bandages and sanitary napkins. Quality parameters.-Surgical drapes, Gowns for operating personnel, theatre masks, non-woven swabs, post operation dress-Materials and quality parameters.

COURSE OUTCOMES (Graduate to have)

1. An ability to apply the required knowledge on different functional requirements of protective clothing and technology used in the manufacture of protective clothing.
2. Design and select materials for new protective clothing
3. Explore new ideas to design and use different materials for creating innovative protective clothing.
4. Evaluate and design new protective clothing based on the requirement
5. Understand the different international standards for protective clothing
6. Gain knowledge material selection, production of healthcare and hygiene apparels

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXTBOOK

1. Bajaj.P., and Sengupta.A.K., “Protective clothing”, The Textile Institute, 1992.
2. Richard A.Scott., “Textile for Protection”Woodhead Publishing Ltd., 2005.
3. W Ilusz., “Military Textiles” Woodhead Publishing Ltd., 2008

Eugene

REFERENCES

1. L.Van Langenhove., “Smart Textile For Medicine And Health Care” Woodhead Publishing ltd
2. Johnson J.S., and Mansdork.S.Z., “Performance of Protective Clothing”, American Society for Testing and Materials (ASTM),1996.
3. P.W.Harrison., “The Design of Textiles for industrial Application”, The Textile Institute, Manchester, 1998
4. Sabit Adanur,Wellington Sears Handbook of Indusrial textiles,Technomic publishing company,1995, ISBN 1-56676-340-1
5. J T Williams, De Montfort University, UK., “Textile for cold weather apparel” Woodhead Publishing Series in Textiles No. 93

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓	-	✓	-	-	-	-	-	✓	✓
CO 2	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO 3	✓	✓	✓	-	✓	-	-	-	-	-	✓	✓
CO 4	✓	✓	-	-	✓	-	-	-	-	-	-	-
CO 5	✓	✓	-	✓	-	-	-	-	-	-	-	-
CO 6	✓	-	✓	-	✓	-	-	-	-	-	✓	✓

ARTIFICIAL INTELLIGENCE FOR TEXTILE AND APPAREL UNITS

Instruction per week : [L-3, T-0] = 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

- 1.To familiarize the principles of Artificial Intelligence
- 2.To study the techniques for knowledge pre presentation and inference
- 3.To learn the techniques involved in the creation of intelligent systems
- 4.To study the application like Game playing and Expert system
- 5.To study the applications like machine learning and natural language processing
6. To educate the students a rigorous, advanced and professional graduate-level foundation in Artificial Intelligence.

UNIT-I

Introduction to AI: Concept of AI, history, current status, scope, agents, environments, Foundations of AI, Sub – areas of AI, Applications , Problem solving and Formulations. Review of Tree and Graph structures

State Search representation and control Strategies: General Problem Solving, Characteristics of Problem, Exhaustive searches, Heuristic Search Techniques, Iterative Deepening Search graph and Search tree.

UNIT- II

Random search, Search with closed and open list, Depth first and Breadth first search, , Best first search, A* algorithm, Game Search

Logic concepts and logic programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic , Logic Programming

UNIT- III

Knowledge representation : Introduction , Approaches to Knowledge representation and Knowledge representation using Semantic Network , Knowledge representation using frames Expert System and Applications: Introduction, Phases in Building Expert systems, Architecture of ES, Traditional Systems Vs ES, Truth Maintenance systems, Application of ES

UNIT- IV

Uncertainty Measure & Probability theory : Introduction, Probability theory, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model Bayesian Belief Networks, Certainty Factor Theory, Dempster – Shafer theory

UNIT- V

Markov Decision process : MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

Reinforcement Learning : Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.

COURSE OUTCOMES: (Graduate to have an)

- 1.Ability to identify the problems that are amenable to solution by AI
- 2.Ability to understand and analyse working of AI technique
- 3.Ability to formulize a given problem in the language /framework of different AI methods.
- 4.Ability to . Build intelligent agents for search and games
- 5.Ability to Solve AI problems through programming with Python
- 6.Ability in Learning optimization and inference algorithms for model learning

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach” , 3rd Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill
3. Trivedi, M.C., “A Classical Approach to Artificial Intelligence”, Khanna Publishing House, Delhi.
4. Saroj Kaushik, “Artificial Intelligence”, Cengage Learning India, 2011
5. David Poole and Alan Mackworth, “Artificial Intelligence: Foundations for Computational Agents”, Cambridge University Press 2010

REFERENCE BOOKS

1. M. Tim Jones, —Artificial Intelligence: A Systems Approach(Computer Science)□, Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, —The Quest for Artificial Intelligence□, Cambridge University Press, 2009.
3. William F. Clocksin and Christopher S. Mellish,□ Programming in Prolog: Using the ISO Standard□, Fifth Edition, Springer, 2003.
4. Gerhard Weiss, —Multi Agent Systems□, Second Edition, MIT Press, 2013.
5. David L. Poole and Alan K. Mackworth, —Artificial Intelligence: Foundations of Computational Agents□, Cambridge University Press, 2010

WEBSITES FOR REFERENCE

<https://nptel.ac.in/courses/106106077>
<https://nptel.ac.in/courses/106106126>
<https://aima.cs.berkeley.edu>

Mapping of Course Outcomes with Programme Outcomes :

PO / CO	PO1	PO2	PO	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓	-	✓	-	-	-	-	-	✓	✓
CO 2	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO 3	✓	✓	✓	-	✓	-	-	-	-	-	-	✓
CO 4	✓	✓	-	-	✓	-	-	-	-	-	-	-
CO 5	✓	✓	✓	✓	-	-	-	-	-	-	-	-
CO 6	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓

PO 706 POE- III-PCPI

POLLUTION CONTROL IN PROCESS INDUSTRIES (Chem. Eng.)
(OPEN ELECTIVE-CHEMICAL ENG.)

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

Course Objectives

Students to learn

1.	Global environmental problems, industry emissions and categorize pollutants
2.	Pollution levels, monitoring of pollutants and estimation of pollutants
3.	the methods of control, Design equipment
4.	to Measure BOD, COD, TOC levels, treatment of IWW
5.	to Examine bacterial phenomena , determine efficiencies
6.	to Chose the required level of treatment and various P-C-methods

UNIT - I

Introduction to Industrial pollution and types of pollution from chemical industries. Effects of pollution as environment and ecosystems - global warning - green house effect.

Environmental legislatures - standards and guide lines.

UNIT – II

Air pollution - Meteorological aspects of pollution dispersion - adiabatic lapse Rate - Environmental lapse rate - Turbulence and stability of atmosphere Richardson Number - Plume rise - plume behaviour and characteristics effective stack height. Major Air pollutants and their sources and measurement of air pollutants. Indoor air pollution - smoke and hydrocarbons.

UNIT - III

General methods of control of air pollutants removal of sulphur dioxide - oxides of nitrogen and organic vapors from gaseous effluents. Removal of particulate matter - principle and working of settling chambers cyclone separators solid traps, fabric and fibre filters - electrostatic precipitators. Treatment of gaseous.

UNIT - IV

Introduction to water pollution - water pollutants classification - characteristics of liquid effluents from fertilizer, pulp & paper and petroleum Industries Estimation of oxygen demands - DO, BOD, COD, TOD - BOD curves oxygen sag curve - modeling of BOD curves.

Biological treatment of waste waters - aerobic and anaerobic methods - suspended and attached growth processes - bacteria - Reproduction in bacterial - Bacterial growth curves conventional activated sludge process - Trickling filters Aerated lagoons - stabilization ponds - fluidized bed reactors.

UNIT - V

Physical Trt methods principle and working of screening - sedimentation - flotation - filtration - flocculation. Tertiary Trt methods - carbon adsorption - Ion Exchange - Reverse Osmosis - Borealin chlorinating - ultrafiltration. Sludge treatment and disposal removal of chromium and phenol from liquid effluents.

EXAMINATION: Part – A for 40 marks (with 10 questions: two question from each unit - Compulsory) and Part – B for 60 marks (5 questions to be answered out of 7 of equal weightage selecting at least one from each Unit).

TEXT BOOK

1. C.S. Rao Environmental Pollution Control Engineering, New Age International Publishing Ltd, 2006.

REFERENCE BOOKS

- S.P. Mahajan Pollution control in process industries,. McGraw Hill Publishing

University College of Technology, ,OU,HYD-7

R-23 B.Tech(TT) Approved in Academic Council meeting held on 16 th July .,2024

M.Narayanna Rao & A.K.Datta Waste Water Treatment, Oxford and IBH. Publishing --Co. Pvt.Ltd., New Delhi.

P.Pratap Mouli & N.Venkata subbayya Divya Jyothi Prakasham Air pollution control , Jodhpur.

R.S.Ramaiho Introduction to Waste Water Treatment , Academic Press, new york.

Stem Fundamentals of Air Pollution Control , Academic press

Course outcome:

At the end of the course, student will be

CO1	Analyze global environmental problems, industry emissions and categorize pollutants
CO2	Evaluate Pollution levels, monitoring of pollutants and estimation of pollutants
CO3	Justify the methods of control, Design equipment
CO4	Measure BOD,COD,TOC levels, treatment of IWW
CO5	Examine bacterial phenomena , determine efficiencies
CO6	Chose the required level of treatment and illustrate various P-C-methods

Mapping of Course Outcomes with Programme Outcomes

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓	✓					✓
CO2	✓	✓	✓	✓		✓	✓					✓
CO3	✓	✓		✓		✓	✓					✓
CO4	✓	✓		✓		✓	✓					✓
CO5	✓	✓	✓				✓					✓
CO6	✓	✓	✓			✓	✓					✓

PO 706 POE- III -SAHA

**SAFETY AND HAZARD ANALYSIS
(OPEN ELECTIVE -CHEMICAL ENG.)**

Instruction per week : [L=3, T=0]= 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

Course Objectives :

1.	1. To learn the knowledge of human error and human factors principles and how they relate to Process Safety Management.
2.	2. To learn to improve human performance by reducing human error-likely work situations through design, improved work instructions, training and the recognition of human factors hazards.
3.	3. To learn the performing human factors and procedures analyses in realistic workshops and safety education training programmes.
4.	4. To learn to reduce the process hazards by using protective equipments and communicate the safety and hazard analysis reports
5.	5. To learn the Assessment & Maintenance of safety
6.	6. To learn the Personal protective equipment and Fire Extinguishing Agents

UNIT- I

SAFETY PHYLOSOPHY, ORGANISATION & MANAGEMENT

Introduction : Need for safety operations and Process in chemical Engg., Evaluation of safety concepts, Organisational structure of safety in an organisation(Brief note on : safety management functions, safety organization, safety department, safety committee, safety audit) chemical Industry Injury Rates, safety education & training of workers, Chemical hazards and worker safety, Safety aspects of site selection ,plant layout, and unit planning,

UNIT -II

HAZOP : Hazards of commercial chemical reactions , Hazards of commercial chemical operations. Environmental management and emergency planning (sewage disposal and cleaning

UNIT -III

Safety in Process design: introduction the technique of safe process design-separation sections, materials handling storage sections, flow sheet review, batch or continuous processing reaction conditions. Safe control of the process variables-Definition and scope control of temperature in thermal systems, pressure containment analytical procedures for control of composition safety as part of process development-Evaluation of hazards, pilot plants, scale up instrumentation for safe operations,.

DOW Fire and explosion index, calculation of the DOW F & EI, material factor
general process hazard, special process, hazard potential loop, basic preventive and protective.

UNIT - IV

Effects of Toxic Agents: Toxicity of Lead – Nickle, chromium and manganese toxicity gas poisoning (such as CO, Ammonia, Chlorine, SO₂ , H₂S)their effects and prevention – effects of ultra violet radiation and infrared radiation on human system Agents, physical state a factor in Exposure, chemical and the skin, chemicals and the eyes, chemical and the respiratory tract, chemicals and digest ice tract, examples of Inadequate protection, some chemical “criminals”, respiratory Hazards and protection, selection chart for respiratory protective devices, types and applications of respiratory protective devices, Air purifying respirators, Air supplied respirators, self contained breathing apparatus, maintenance training , and medical aspects of respiratory protective devices.

Regulations for Safety : Provision for safety under Factories Acts, Indian explosives Act OSHA standards, Rules for Import of Hazardous chemicals

UNIT - V

Equipments , Assessment & Maintenance of safety : Accident measurements and motivation – employee participation in safety - safety and productivity, safety and reliability, causes of accidents, accident prevention programmes. specific hazard control strategies – Hazard and operability studies, Basic principles, use of the guide words.

Personal protective equipment, Fire Extinguishing Agents and their applications, Accident investigation, recording & reporting, & Measurement accident , plant safety inspection, job safety analysis – safety permit procedures. Product safety – plant safety rules and procedures – safety sampling – safety inventory systems. Determining the cost effectiveness of safety measurement (use of SAFE-T-SCORE test) The role of Mechanical Integrating in Chemical process safety.

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS

1. Fawcett H H and W.S.Wood , Safety and Accident prevention in chemical operations, John Wiley and Sons Inc. ,1965
2. Daniel A. Crowl, Joseph F. Louvar, Chemical Process Safety: Fundamentals with Applications, 2nd Edition, Publisher: Prentice Hall, 2002
3. Roy E.Sanders, Chemical Process Safety (learning from Case Histories)-1999

REFERENCE BOOKS

1. R.K.Sinnott, Coulson & Richad Son`S Chemical Engineering Design, 3rd Ed., 1999
2. John V Grimaldi, Safety Manageemnt. AITB publishers, 2003.

Course outcome:

At the end of the course, student will be

CO1	Apply Able to apply the knowledge of human error and human factors principles and how they relate to Process Safety Management.
CO2	1) Able to improve human performance by reducing human error-likely work situations through design, improved work instructions, training and the recognition of human factors hazards.
CO3	2) Able to practice performing human factors and procedures analyses in realistic workshops and safety education training programmes.
CO4	3) Able to reduce the process hazards by using protective equipments and communicate the safety and hazard analysis reports
CO5	4) Able to apply the Assessment & Maintenance of safety
CO6	5) Able to apply the Personal protective equipment and Fire Extinguishing Agents

Mapping of Course Outcomes with Programme Outcomes

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓	✓					✓
CO2	✓	✓	✓	✓		✓	✓					✓
CO3	✓	✓	✓	✓		✓	✓					✓
CO4	✓	✓	✓	✓		✓	✓					✓
CO5	✓	✓	✓	✓		✓	✓					✓
CO6	✓	✓	✓	✓		✓	✓					✓

PO 706 POE- III -IPR

INTELLECTUAL PROPERTY RIGHTS (FT)

Instruction per week : [L=3, T=0]= 3 Hours
Duration of SEE : 3 Hours
Credits : 3

CIE: 40 Marks
SEE : 60 Marks

Course Objectives

1. To provide students the concepts of Patents.
2. To make the student learn about International bodies involved with IPR
3. To understand about IPR law basics
4. To give the knowledge on trademark systems
5. To impart the knowledge on system of copy rights
6. To learn how the applications of IPR done in process Industries

UNIT I

Patents • Concept of Patent • Product / Process Patents & Terminology • Duration of Patents- Law and Policy Consideration Elements of Patentability,- Novelty and Non Obviousness (Inventive Steps and Industrial Application, Non- Patentable Subject Matter • Procedure for Filing of Patent Application and types of Applications • Procedure for Opposition, • Revocation of Patents • Ownership and Maintenance of Patents • Assignment and licensing of Patents • Working of Patents- Compulsory Licensing • Patent Agent- Qualification and Registration Procedure. Patent Databases & Patent Information System • Patent Offices in India • Importance of Patent Information in Business Development • Patent search through Internet, Patent Databases.

UNIT – II

Preparation of Patent Documents • Lab Notebooks/Log Books/Record Books • Methods of Invention Disclosures • Patent Application and its Contents • Writing of the Patent Document. Process for Examination of Patent Application • Publication of Patent Applications • Request for Examination • Process for Examination & Prosecution • Reissue & Reexamination. Patent Infringement • Literal Infringement • Doctrine of Equivalence and Doctrine of Colorable Variation • Contributory Infringement • Defenses to Infringement including Experimental Use, Inequitable Conduct, Patent Misuse • Legal Aspects (Act, Rules, Procedures). Recent Developments in Patent System • Software and Business Method Patenting in India & other Jurisdiction • Patentable Inventions with Special Reference to Biotechnology Products entailing Creation of New Forms of Life

UNIT – III

IPR; Introduction • Meaning, Relevance, Business Impact, Protection of Intellectual Property • Copyrights, Trademarks, Patents, Designs, Utility Models, Trade Secrets and Geographical Indications • Bio-diversity and IPR • Competing Rationales for Protection of Intellectual Property Rights • Introduction to the leading International Instruments concerning Intellectual Property Rights: the Berne Convention, Universal Copyright Convention, The Paris Convention, Patent Co-operation Treaty, TRIPS, The World Intellectual Property Organization (WIPO) and the UNESCO

UNIT – IV

Trademarks • The rationale of protection of trademark as (a) an aspect of commercial and (b) of consumer rights • Definition and concept of Trademarks • Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) • Non Registrable Trademarks • Procedure for Registration of Trademarks • Opposition Procedure • Assignment/Transmission / Licensing of Trademarks • Infringement of Trademarks • Passing off Action • Offences and Penalties • International Conventions- Madrid Protocol • Domain Names • WIPO Internet Domain Name Process. **Copyrights** • Nature of Copyright • Works in which Copyrights subsist (vi) • Author & Ownership of Copyright • Rights Conferred by Copyright • Assignment, Transmission, Licensing of Copyrights • Infringement of Copyrights • Remedies & Actions for Infringement of Copyrights • Copyright Societies, Office, Board, Registration of

Copyrights & Appeals • International Conventions • Copyright pertaining to Software/Internet and other Digital media • Remedies, especially, possibility of Anton Pillar Injunctive Relief in India

UNIT – V

Industrial Designs • What is a Registrable Design • What is not a Design • Novelty & Originality • Procedure for Registration of Designs • Copyright under Design • Assignment, Transmission, Licenses • Procedure for Cancellation of Design • Infringement • Remedies 11. Geographical Indications • Meaning and Nature • Who are entitled for registration • Conditions & Procedure for Registration • Offences and Penalties. Protection of Trade Secrets. Key Business Concerns in Commercializing Intellectual Property Rights • Competition and Confidentiality Issues, Antitrust Laws • Assignment of Intellectual Property Rights • Technology Transfer Agreements • Intellectual Property Issues in the Sale of Business • Care & Maintenance of Confidential Information • Legal Auditing of Intellectual Property • Due Diligence of Intellectual Property Rights in a Corporate Transaction, Management and Valuation of Intellectual Property.

Course Outcomes:

1. Understand about the procedure for patenting.
2. Understand about International bodies involved with IPR like TRIPS, UNESCO etc.
3. Understand about IPR law basics
4. Understand about the trademark systems
5. Understand about the rules of copy rights
6. Understand the applications of IPR for process Industries

Examination: Part-A for 40 Marks (with 10 Questions: two questions from each unit -Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

Reference Books:

1. IPR, Neha Publishers & Distributors, ISBN10: 8183871648, ISBN13: 9788183871648
2. Patent Searching: Tools & Techniques, 20 Feb 2007, [David Hunt](#)), [Long guyen](#) , [Matthew Rodgers](#) .
3. Das P, Das G. Protection of industrial property rights.
4. Katju SN. Laws and drugs. Law Publishers.
5. Original Laws published by Government of India.
6. Hussain. Law of drugs in India. Patent Law, Fourth Edition (Aspen Treatise) 4th Edition, [Janice M. Mueller](#).
7. Indian Patents Law – Legal & Business Implications -Ajith Parulekar, Saritha D'Souza. Macmillan Publishers India, 2006.
8. The Law of Intellectual Property Rights – Shiv Sahai Singh, Deep & Deep publishers, 2004.

Mapping of Course Outcomes with Programme Outcomes

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓	✓					✓
CO2	✓	✓	✓	✓		✓	✓					✓
CO3	✓	✓		✓		✓	✓					✓
CO4	✓	✓		✓		✓	✓					✓
CO5	✓	✓	✓				✓					✓
CO6	✓	✓	✓			✓	✓					✓

PO 706 POE- III -HNAH

HUMAN NUTRITION AND HEALTH (FT)

Instruction per week : [L=3, T=0]=3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

COURSE OBJECTIVES

1. To understand the relation between nutrition and health
2. To understand the relation between nutrition and fitness
3. To know about the nutrients present in food and their function
4. To understand diet planning according RDA
5. To help planning of diet during disease
6. To understand planning of diet for different age groups

UNIT I

Understanding Health and Fitness: Definition of fitness, health and related terms, Assessment of fitness, Importance of nutrition, Role of nutrition in fitness, Nutritional guidelines for health and fitness, Nutritional supplements, Importance and benefits of Physical activity, Weight Management, Assessment, etiology, health complications of Underweight, Overweight and Obesity, Diet and exercise for weight management, Food Fad diets and Faddism. Water and Energy balance: Water intake and losses; Basal metabolism, BMR; Body surface area and factors affecting BMR

UNIT II

Basic terms used in study of food and nutrition Understanding relationship between food, nutrition and health Functions of food - Physiological, psychological and social, Nutrient Functions, dietary sources and clinical manifestations of deficiency/excess of the following nutrients: Carbohydrates, lipids and proteins Fat soluble vitamins - A, D, E and K Water soluble vitamins – thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and Vitamin C Minerals – calcium, iron and iodine, Malnutrition, Potentially toxic substance in human food, Blood constituents.

UNIT III

Food Groups Selection, nutritional contribution and changes during cooking of the following food groups: Cereals Pulses Fruits and vegetables Milk & milk products Eggs Meat, poultry and fish Fats and Oils, Methods of Cooking and Preventing Nutrient Losses during Dry, moist, frying and microwave cooking- Advantages, disadvantages and the effect of various methods of cooking on nutrients Minimizing nutrient losses, Basic concepts of meal planning and concept of balanced diet, Food pyramid Concept of Dietary Reference Intakes Dietary guidelines for Indians.

UNIT IV

Nutrition during different age Groups: The adult years (Above 20 years), Physiological changes, RDA, nutritional guidelines, nutritional concerns and Healthy food choices ,Pregnant woman, Lactating mother, Elderly, Nutrition during childhood (Under 20 years) Growth and development, growth reference/standards, RDA, Nutritional guidelines, nutritional concerns and healthy food choices in: Infants, Preschool children, School children .Adolescents.

UNIT V

Principles of nutrition care: Therapeutic adaptations of the normal diet, Progressive diets – clear fluid, full fluid, soft and regular, Clinical features and nutritional management of Infections and Fevers, Typhoid, Tuberculosis, HIV. Clinical features and nutritional

management of GI Tract Disorders: Diarrhea, Constipation, Lactose intolerance, Celiac disease, Liver: Infective Hepatitis, Eating disorder- anorexia nervosa and bulimia, Clinical features and nutritional management of Type 1 and Type 2 Diabetes Mellitus, Metabolic Syndrome, Hypertension and Coronary Heart Disease, Food allergy and food intolerance.

COURSE OUTCOMES

1. An ability to understand the role of nutrition in maintaining health and fitness
2. To understand the functions of nutrients.
3. An ability to assess the nutritional deficiencies
4. An ability to plan balanced diet according to food pyramid and RDA
5. An ability to understand the nutritional requirements for different age groups
6. An ability to Plan diet for different disease conditions

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit

TEXTBOOKS

1. Wardlaw, Smith. Contemporary Nutrition: A Functional Approach. 2nd ed: 2012.
2. Mc Graw Hill. • Williams Melvin. Nutrition for health, fitness and sports. 2004
3. Mc Graw Hill • Joshi AS. Nutrition and Dietetics 2010. Tata Mc Graw Hill. S
4. Khanna K, Gupta S, Seth R, Passi SJ, Mahna R, Puri S (2013).
5. Textbook of Nutrition and Dietetics. Phoenix Publishing House Pvt. Ltd. Mahan L K and Escott Stump S (2013).
6. Krause's Food & Nutrition Therapy, 13th ed. Saunders-Elsevier Stacy Nix (2009).
7. William's Basic Nutrition and Diet Therapy, 13th Edition. Elsevier Mosby.
8. Advanced Text Book on Food & Nutrition (Volume I and II) Swaminathan M The Bangalore Printing and Publishing Co.Ltd, Bangalore. 2006

REFERENCE BOOK

1. Essentials of Human Nutrition Jim M. and Stewart T. Oxford University Press, 2002 ISBN 019860861
2. Introduction to Human Nutrition Micheal J. G., Susan A.L. Aedin C. and Hester H.V. Wiley-Blackwell Publication, UK 2009 ISBN 9781405168076
3. Nutrition and Health Gerald W. Taylor and Francis, London 2002 ISBN 0415278740
4. Handbook of Nutrition and Food Carolyn D. Berdanier, Elaine B. Feldman and Johanna Dwyer 2nd Ed. CRC Press, Boca Raton, FL, USA. 2008
5. Nutrition and Physical Fitness Bogert L.J., Goerge M.B, Doris H.C. W.B. Saunders Company, Toronto, Canada

Mapping of Course Outcomes with Programme Outcomes

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓	✓					✓
CO2	✓	✓	✓	✓		✓	✓					✓
CO3	✓	✓	✓	✓		✓	✓					✓
CO4	✓	✓	✓	✓		✓	✓					✓
CO5	✓	✓	✓	✓		✓	✓					✓
CO6	✓	✓	✓	✓		✓	✓					✓

PO 706 POE- III -ORFE

OPERATIONS RESEARCH FOR ENGINEERS

Instruction per week : [L-3, T-0] = 3 Hours

CIE: 40 Marks

Duration of SEE : 3 Hours

SEE : 60 Marks

Credits : 3

COURSE OBJECTIVES

- 1.To understand the need and scope of Operations Research for Engineering applications
- 2.To learn the formulations of different models in Operations Research
- 3.To understand the concepts of LPP, Assignment and their applications for Engineering process
4. To understand the concepts of Transportation and their applications for Engineering process
- 5.To design a process with all variables and constraints and model it for a specific end use
6. To Plan for the various phases of Project

UNIT -I

Introduction: Definition of OR , Objectives, Scope, Phases and Different models of OR, Role of Operations Research in Engineering , Essential requirements of a problem

Linear Programming Model : Characteristics, Assumptions, formulations and graphical solution , Special cases of Graphical solution.

UNIT – II.

Simplex Model : contents of a simplex problem, types of simplex problem, Maximisation, Minimization, two-phase method, duality and its objective, writing a dual problem for LPP and solving by simplex, dual simplex

Assignment Model: objective, types of assignment problems, Hungarian method, profit maximisation, Airline crew problem, special assignment problem.

UNIT – III.

Transportation model: objectives, types of transportation problems, lowest cost entry method and north west corner method

Replacement models – waiting line models – optimum replacement of age of items that deteriorate with time – optimum replacement of items that fail completely

Decision Theory: Need, elements of decision theory, simple problems with Risk and Uncertainty

UNIT – IV

Queuing Model and their classification – characteristics of queuing systems – problems on Queuing theory

Inventory Control: Need, Def, Significance types of decisions, types of Inventories, EOQ : elements, derivation for EOQ, simple problems with and without EOQ, A brief note on Production Model, Shortages

UNIT – V

Sequencing Model : Need , Assumptions , Types of problems (n-job on 2 machines, n-job on three machines and 2 jobs on n-machines

Project scheduling by PERT and CPM – introduction to network analysis – Construction of network diagrams – calculation of floats- A brief note on Crashing of Networks

COURSE OUTCOMES: (Graduate to have)

1. An ability to select a model for a specific end use.
2. An ability to design a production /marketing/ personnel case study and modeling it
3. An ability to allocate the minimum resources with maximum returns
4. An ability to design a Transportation model in material handling and transportation
5. An ability to select a project from the alternatives and preparing the PERT
6. An ability to apply the OR model for a project

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. Operations Research : Pannerselvam, Tata-Mc GrawHill, 5t Edition ,New Delhi,2013
2. Operations Research – S.K. Kapoor, Chand Publications, New Delhi, 2013

REFERENCE BOOKS

1. Problems and solutions in Operation Research – Man Mohan and P.K.Gupta, Dhanpathi Roy & sons, New Delhi, 2010
2. PERT and CPM – B.C. Punmia, Dhanpathi Roy & sons, New Delhi, 2012

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓	-	✓	-	✓	-	-	-	✓	✓
CO 2	✓	✓	✓	✓	✓	-	-	-	-	-	-	-
CO 3	✓	✓	✓	✓	✓	-	-	-	-	-	✓	✓
CO 4	✓	✓	✓	✓	✓	-	-	-	-	-	-	-
CO 5	✓	✓	✓	✓	✓	-	-	-	-	-	-	-
CO 6	✓	✓	✓	-	✓	-	-	-	-	-	✓	✓

PO 706 POE- III -HRM

HUMAN RESOURCE MANAGEMENT

Instruction per week : [L-3, T-0] = 3 Hours
Duration of SEE : 3 Hours

CIE: 40 Marks
SEE : 60 Marks Credits : 3

COURSE OBJECTIVES

- 1.To know the aims and objectives of HRM
- 2.To learn about the personal policies
- 3.To know about the staffing process
- 4.To learn about the process of Performance appraisal
- 5.To understand the role of Human relation in Industry
- 6.To teach the role of Hawthorne experiments impact on production in Textile Industry

UNIT - I.

Functions and objectives of Human resource management– organisational structure of personnel department – Aims and objectives of personnel policies – need for policy – essential character and principle of personnel policy.

UNIT - II.

Staffing in textile mills – recruitment and selection procedures – job analysis, description and specification – job enlargement vs job enrichment Tests, interviews, – characteristics of tests - types

UNIT - III.

Developing a test and interview programme – placement – principles of training – steps in training – training methods – promotion – types – promotion and transfer policy – absenteeism and control.

UNIT - IV.

Performance appraisal – methods – job evaluation methods – factors influencing wage and salary structure – types of wages and incentives – incentive schemes – morale and motivation – types of morale and motivation – motivation theories.

UNIT - V.

Industrial relations – labour unrest in organised and unorganised sector – grievance settlement– trade unionism – structure – objectives and functions – theories of trade unionism – labour legislations – Factories Act 1948, 1926 Trade Union Act, 1957 Industrial Disputes Act – Disciplinary action procedure – Role of ILO.

COURSE OUTCOMES : (Graduate to have)

- 1.An ability to design the personnel policies
- 2.An ability to design a interview and induction programme
- 3.An ability to assess the credentials of the applicant
- 4.An ability to evaluate the performance of an employee
- 5.An ability to maintain the industrial peace
- 6.An ability to apply the industrial laws for a specific situation

EXAMINATION : Part-A for 40 Marks (with 10 Questions: two questions from each unit - Compulsory) & Part -B for 60 Marks (5 Questions to be answered out of 7 of equal weightage selecting atleast one from each Unit)

TEXT BOOKS:

1. Human resource management– Edwin phillipo, Mc-Graw Hill, Canada, 1987
2. Human resource management– Arun Monappa, CBS publishers, New Delhi, 1987.

3. Industrial Relations in India – Subrahmaniam K.M., Universal Publishers, Mumbai, 1988.
4. Human resource management and Industrial Relations – Dale Yoder, Tata- McGraw Hill, New Delhi, 1988.

SUGGESTED REFERENCES:

1. Personal Management – C.B. Memoria, Himalaya Publishing House, New Delhi, 2000.
2. Dynamics of Industrial Relation – C.B. Memotia, Himalaya Publishing House, New Delhi 2000.

Industrial Relation – Simpson, CPS Publishers, Mumbai 1986

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	-	✓	-	✓	-	-	-
CO.2	✓	✓	✓	✓	✓	-	-	-	✓	-	-	-
CO3	✓	✓	✓	✓	✓	-	-	-	-	-	-	-
CO4	✓	✓	✓	✓	✓	-	✓	-	-	-	-	-
CO5	✓	✓	✓	-	✓	-	-	-	✓	-	-	-
CO6	✓	✓	✓	✓	✓	-	-	-	✓	-	-	-

PC 601 GA

GARMENT ANALYSIS LAB

Instruction per week : [P-3] : 3 Hrs

Duration of SEE: 4 Hrs

CIE: 40

SEE: 60,

Credits :1.5

COURSE OBJECTIVES:

1. To educate the students about product development and execution of studies on costing and size chart.
2. To provide the knowledge on operation bulletin & Layout, consumption of materials.
3. To understand the concept of Size chart
4. To learn the operation bulletin for different sorts
5. To derive the elements of Garment costing
6. To develop the method for Job costing

LIST OF EXPERIMENTS: (Minimum of 8 Experiments have to be performed)

1. Calculate the thread consumption of given woven sample
2. Calculate the thread consumption of given knitted sample
3. Calculate the thread consumption of given denim sample
4. Prepare a cost sheet for the given woven sample
5. Prepare a cost sheet for the given knitted sample
6. Prepare a cost sheet for the given denim sample
7. Prepare an operation bulletin for the given woven sample
8. Prepare an operation bulletin for the given knitted sample
9. Prepare an operation bulletin for the given denim sample
10. Prepare a specification sheet for the given woven sample
11. Prepare a specification sheet for the given knitted sample
12. Prepare a specification sheet for the given denim sample

COURSE OUTCOME: (Graduate to have)

1. An ability to understand Product development and costing.
2. An ability to understand the process of working on operation bulletins & Layout, consumption of materials
3. An ability to design the Operation bulletin for producing kids wear
4. An ability to evaluate the Operation bulletin for men and women's wear
5. An ability to derive the overall costing of Garments
6. An ability to create the yarn consumption and cost aspects for a new style

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	-	✓	✓	-	-	-	-	-	-	-	-
CO2	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO3	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO4	✓	✓	-	-	✓	-	-	-	-	-	-	-
CO5	✓	✓	-	✓	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-

PC 602 APP

APPAREL PRODUCTION PLANNING LAB

Instruction per week : [P-3] : 3 Hrs

CIE: 40

Duration of SEE: 4 Hrs

SEE: 60,

Credits :1.5

COURSE OBJECTIVES:

1. To educate the students about product development and execution of studies on costing and size chart.
2. To provide the knowledge on operation bulletin & Layout, consumption of materials.
3. To understand the concept of Size chart
4. To learn the operation bulletin for different sorts
5. To derive the elements of Garment costing
6. To develop the method for Job costing

LIST OF EXPERIMENTS: (Minimum of 8 Experiments have to be performed)

1. Calculate the thread consumption of given woven sample
2. Calculate the thread consumption of given knitted sample
3. Calculate the thread consumption of given denim sample
4. Prepare a cost sheet for the given woven sample
5. Prepare a cost sheet for the given knitted sample
6. Prepare a cost sheet for the given denim sample
7. Prepare an operation bulletin for the given woven sample
8. Prepare an operation bulletin for the given knitted sample
9. Prepare an operation bulletin for the given denim sample
10. Prepare a specification sheet for the given woven sample
11. Prepare a specification sheet for the given knitted sample
12. Prepare a specification sheet for the given denim sample

COURSE OUTCOME: (Graduate to have)

1. An ability to understand Product development and costing.
2. An ability to understand the process of working on operation bulletins & Layout, consumption of materials
3. An ability to design the Operation bulletin for producing kids wear
4. An ability to evaluate the Operation bulletin for men and women's wear
5. An ability to derive the overall costing of Garments
6. An ability to create the yarn consumption and cost aspects for a new style

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	-	✓	✓	-	-	-	-	-	-	-	-
CO2	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO3	✓	✓	✓	-	✓	-	-	-	-	-	-	-
CO4	✓	✓	-	-	✓	-	-	-	-	-	-	-
CO5	✓	✓	-	✓	-	-	-	-	-	-	-	-
CO6	✓	✓	✓	-	-	-	-	-	-	-	-	-

PC603PS

**PROJECT SEMINAR
(PART-A)**

Instruction per week : [P-4] 4Hrs

Credits : 2

CIE: 100 Marks

(R-60 P-60)

Course Objectives :

Students to learn

1.	to collect information from literature regarding a chemical Product from different processes
2.	to perform basic engineering design for a given Process
3.	to carry out economic feasibility of a given product production.

Each Student has to work on any **one** of the following projects allotted by the Department and submit a comprehensive typed and bound report (2 copies) at the end of the eighth semester

Idea Based Projects:

Students themselves identify a real-world problem and develop its solution by implementing their ideas and present the report in innovative way.

Process Based Project : Manufacture of a Product

The report shall consist of collection of literature, study of the various processes available, Selection of the process, Calculation of material and energy balances, Design of important equipment, Cost estimation, Plant location and lay out, Safety aspects, Summary and Conclusions, Bibliography

Equipment Based Project: Detailed design of the novel equipment for a given capacity

The report shall consist of collection of literature, selection of the process & process equipment indicating all design considerations, detailed process design and mechanical design of equipment, drawings of the equipment with design data, material of construction of each part of the equipment, summary and conclusions, Bibliography

Experiment Based/Simulation Projects: Experimental investigation/Simulation of basic applied research problems

The report shall consist of objectives of proposed study, collection of literature, detailed design of experimental set-up, materials and methods, design of experiments, experimental observations, Modelling and Simulation studies, results & discussion, conclusion, Bibliography.

Each student is expected to complete about one third of project work during this semester like:

In case of process based project, to complete up to calculation of mass and energy balances

In case of equipment based Project, to complete up to Process & Mechanical design of equipment

In case of experimental based Project, to complete up to Materials and Methods

In case of simulation type Project, to complete up to Mathematical Modelling and Simulation

Each Student has to give seminar presentation regarding his or her progress of project work.

Evaluation is done by internal evaluation committee as given below

- Marks for Report : **60**
- Marks for Seminar talk : **60**

The balance of the project work will be completed in the 8th semester and it is submitted for the external evaluation.

COURSE OUTCOME: (Graduate to have)

1. An ability to plan for a Project area
2. An ability to carryout the required Literature review
3. An ability to frame the aims and objectives of the study considered
4. An ability to plan for the materials required for the study
5. An ability to apply the testing methods
6. An ability to evaluate the usefulness of the study and its impact to society

Mapping of Course Outcomes with Program Outcomes:

PO /CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓					✓	✓
CO2	✓	✓	✓	✓		✓					✓	✓
CO3	✓	✓		✓		✓					✓	✓

University College of Technology, ,OU,HYD-7
R-23 B.Tech(TT) Approved in Academic Council meeting held on 16 th July .,2024
SCHEME OF INSTRUCTION, EXAMINATION AND SYLLABI (AICTE)

B. Tech . (Textile Technology)
(For the Batch admitted in Academic Year 2023-24)

VIII Semester

S.NO	Code	Course Title	SCHEME OF INSTRUCTION HOURS PER WEEK			SCHEME OF EXAMINATION			CREDITS
			L	T	P	Duration Hrs	CIE	SEE	
Practicals									
4	PC 851 PROJECT	Project work (Part-B)	-		16		40 Internal R-20 P-20	60 R-30 P-30	8
		Total	-	-	16		40	60	8

R- Report; P-Presentation and Viva-Voce

PC 851 PROJECT

PROJECT WORK

(PART -B)

Instruction per week : 16Hours

Duration of SEE :

Credits : 8

CIE: 40 Marks(R-20, P-20)

SEE :60 Marks (R-30,P-30)

	Project Objectives
1.	To learn to analyze and improve a chemical process or a chemical plant.
2.	To provide alternative methods to reduce energy requirements and raw materials requirement.
3.	To design a virtual chemical plant using computer softwares.
4.	To create a comprehensive technical report

The final Project report will be submitted in the bounded book (2 copies). The Report will be evaluated by external examiner by Viva-voce exam.

	Project Outcomes
1.	Able to analyze and improve a chemical process or a chemical plant.
2.	Able to provide alternative methods to reduce energy requirements and raw Materials requirement.
3.	Able to design a virtual chemical plant using computer softwares.
4.	Able to write a comprehensive technical report



[Re-Accredited by
NAAC with 'A' Grade]

UNIVERSITY COLLEGE OF TECHNOLOGY(A)
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27098472**

Project – PO Mapping

Project Title:

Guide(s):

Student Name(s):

Academic Year:

Name of Course from which Principles are applied in this project	Related Course Outcome Number	Description of the application, page number in the report	Attained PO

Guide Signature
