

Syllabus for B.Tech(Textile Technology) up to Fourth Year

Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011)



Second Year – Third Semester

A.Theory							
Sl.No	Paper Code	Subjects	Contact Hours / Week				Cr.Points
			L	T	P	Total	
	HU-301	Values & Ethics in Profession	2	0	0	2	2
	PH-301	Physics-2	3	1	0	4	4
	CH-301	Basic Environmental Engineering & Elementary Biology	3	0	0	3	3
	TT-301	Instrumentation & Control	3	0	0	3	3
	TT-302	Textile Fibre	3	1	0	4	4
	TT-303	Yarn Formation-I	3	1	0	4	4
Total Theory			17	3	0	20	20
B.Practical							
Sl.No	Paper Code	Subjects	Contact Hours / Week				Cr.Points
			L	T	P	Total	
	PH-391	Physics-2 Lab	0	0	3	3	2
	TT 391	Instrumentation & Control Lab	0	0	3	3	2
	TT-392	Textile Fibre Lab	0	0	3	3	2
	TT-393	Yarn Formation Lab-I	0	0	3	3	2
Total Practical			0	0	12	12	8
Total Semester			17	3	12	32	28

Second Year – Fourth Semester

A.Theory							
Sl.No	Paper Code	Subjects	Contact Hours / Week				Cr.Points
			L	T	P	Total	
	M(CS)-401	Numerical Methods	2	0	0	2	2
	M-402	Mathematics-3	3	1	0	4	4
	TT-401	Theory of Machines	3	0	0	3	3
	TT-402	Fabric Formation-I	3	1	0	4	4
	TT-403	Textile Chemical Processing-I	3	1	0	4	4
Total Theory			14	3	0	17	17
B.Practical							
Sl.No	Paper Code	Subjects	Contact Hours / Week				Cr.Points
			L	T	P	Total	
	HU-481	Technical Report Writing & Language Lab Practice	0	0	3	3	2
	M(CS)-491	Numerical Methods Lab	0	0	2	2	1
	TT-491	Theory of Machines Lab	0	0	3	3	2
	TT-492	Fabric Formation Lab-I	0	0	3	3	2
	TT-493	Textile Chemical Processing Lab-I	0	0	3	3	2
Total Practical			0	0	14	14	9
Total Semester			14	3	12	31	26

Third Year – Fifth Semester

A.Theory							
Sl.No	Paper Code	Subjects	Contact Hours / Week				Cr.Points
			L	T	P	Total	
1.	HU-511	Principles and Practice of Management	2	0	0	2	2
2.	TT-501	Yarn Formation-II	3	1	0	4	4
3.	TT-502	Fabric Formation-II	3	1	0	4	4
4.	TT-503	Textile Chemical Processing-II	3	0	0	3	3
5.	TT-504A/ TT-504B	Free Elective-I (Statistical Quality Control /Total Quality Management)	3	0	0	3	3
Total Theory			14	2	0	16	16
B.Practical							
Sl.No	Paper Code	Subjects	Contact Hours / Week				Cr.Points
			L	T	P	Total	
6.	TT-591	Yarn Formation-II Lab	0	0	3	3	2
7.	TT-592	Fabric Formation-II Lab	0	0	3	3	2
8.	TT-593	Textile Chemical Processing-II Lab	0	0	3	3	2
9.	TT-594A/ TT-594B	Free Elective-I Lab (Statistical Quality Control /Total Quality Management)	0	0	3	3	2
Total Practical			0	0	12	12	8
Total Semester			14	2	12	28	24

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Third Year –Sixth Semester

A.Theory							
Sl. No	Paper Code	Subjects	Contact Hours / Week				Cr. Pts
			L	T	P	Total	
	HU-611	Production & Operations Management	2	0	0	2	2
	TT-601	Yarn Formation-III	3	1	0	4	4
	TT-602	Fabric Formation-III	3	1	0	4	4
	TT-603	Textile Testing	3	0	0	3	3
	TT-604	Textile Elective-I (Theory of Textile Structure / Theory of Elasticity of Textiles)	3	0	0	3	3
	TT-605	Free Elective-II A: Colour Science/ B:Introduction to Java Programming (IT)/ C: Introduction to Microprocessors (ECE)	3	0	0	3	3
Total Theory			17	2	0	19	19
B.Practical							
Sl. No	Paper Code	Subjects	Contact Hours / Week				Cr. Pts
			L	T	P	Total	
	TT-691	Yarn & Fabric Formation-III Lab	0	0	3	3	2
	TT-692	Textile Testing Lab	0	0	3	3	2
	TT-693	Textile Elective-I Lab (Theory of Textile Structure Lab / Theory of Elasticity of Textiles Lab)	0	0	3	3	2
	TT-694	Free Elective-II Lab: A:Colour Science Lab /B: Java Programming Lab (IT)/ C: Microprocessors Lab (ECE)	0	0	3	3	2
Total Practical			0	0	12	12	8
Total Semester			19	0	12	31	27

Fourth Year – Seventh Semester

A. Theory							
Sl.No	Paper Code	Subjects	Contact Hours / Week				Cr.Points
			L	T	P	Total	
1	TT-701	Textile chemical Processing-III	3	1	0	4	3
2	TT-702	Design & structure of fabrics	3	0	0	3	3
3	TT-703	Textile Elective-II: A.Wool Technology/ B. Apparel Technology/ C. Advanced Chemical Processing/ D. Application of CAD CAM in Textiles)	3	0	0	3	3
4	TT-704	Textile Elective-III: A. Technical Textiles/ B. Smart Textile/ C. Production of Manmade fibres & Texturing)	3	0	0	3	3
5	TT-705	Free Elective-III(A. Introduction to Soft Computing / B. Image Processing)	3	0	0	3	3
Total Theory			15	1	0	16	16
B. Practical							
Sl.No	Paper Code	Subjects	Contact Hours / Week				Cr.Points
			L	T	P	Total	
1	HU-791	Group Discussion	0	0	3	3	2
2	TT-791	Textile chemical Processing-III Lab	0	0	3	3	2
3	TT-792	Textile elective-II Lab (A. Wool Technology Lab/B. Apparel Technology Lab/ C.Advanced Chemical Processing Lab/ D.Application of CAD/CAM in Textiles Lab)	0	0	3	3	2
4	TT-793	Free Elective-III Lab (Introduction to Soft Computing Lab / Image Processing Lab)	0	0	3	3	2
5	TT-794	Industrial Training (Viva Voice on training Report)	During 6 th -7 th sem break				2
6	TT795	Project part 1	0	0	6	6	2
Total Practical			0	0	12	18	12
Total Semester			15	0	12	34	27

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Fourth Year – Eighth Semester

A. Theory							
Sl No.	Paper Code	Subjects	Contact hrs/wk				Cr. pts
			L	T	P	Total	
1	HU801A	Organisational Behaviour	3	0	0	3	2
2	TT 801	Textile Elective-IV: A. Process control in Mechanical Processing of Textiles B. Process control in Chemical Processing of Textiles C. Textile Mill Planning & Organisation	3	0	0	3	3
3	TT 802	Free Elective-IV (A. Mechatronics/ B. Supply Chain Management / C. Introduction to Biotechnology	3	0	0	3	3
Total Theory			9	0	0	9	8
B. Practical							
Sl No	Paper code	Subjects	Contact hrs/wk				Cr. pts
			L	T	P	Total	
1	TT 891	Product – Design Lab	0	0	6	6	4
2	TT 892	Project - II	0	0	12	12	6
3	TT 893	Grand Viva	0	0	2	2	3
Total Practical			0	0	20	20	13
Total Semester			8	0	20	28	21

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Syllabus SEMESTER-III

VALUES & ETHICS IN PROFESSION				
HU-301				
L		T	P	Credits
3		0	0	3
Serial No.	Chapters/Units	Description	Lectures in hour	
1)	Introduction	Science, Technology and Engineering as knowledge and as Social and Professional Activities	3	
2)	Effects of Technological Growth:	Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: sustainable development	2	
		Energy Crisis: Renewable Energy Resources.	2	
		Environmental degradation and pollution, Eco-friendly Technologies, Environmental Regulations. Environmental Ethics	2	
		Appropriate Technology Movement of Schumacher; later developments.	2	
		Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis.	2	
		Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.	2	
3)	Ethics of Profession	Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond, Case studies.	5	
4)	Profession and Human Values	Values Crisis in contemporary society	2	
		Nature of values: Value Spectrum of a good life	2	
		Psychological values: Integrated personality; mental health	2	
		Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution.	3	
		Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity.	2	
		Moral and ethical values: Nature of moral judgements; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.	4	
			Total Lectures=	35
Text Books and Articles:				
1. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley & Sons, New York 1994 (2nd Ed)				
2. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 1991.				
3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996.				

PHYSICS-2				
PH-301				
L		T	P	Credits
3		1	0	4
Serial No.	Chapters/Units	Description	Lectures in hour	
1)	Module 1: Vector Calculus:	1.1 Physical significances of grad, div, curl. Line integral, surface integral, volume integral - physical examples in the context of electricity and magnetism and statements of Stokes theorem and Gauss theorem [No Proof]. Expression of grad, div, curl and Laplacian in Spherical and Cylindrical co-ordinates	2	
2)	Module 2 : Electricity	2.1 Coulombs law in vector form. Electrostatic field and its curl. Gauss's law in integral form and conversion to differential form . Electrostatic potential and field, Poisson's Eqn. Laplace's eqn (Application to Cartesian, Spherically and Cylindrically symmetric systems – effective 1D problems) Electric current, drift velocity, current density, continuity equation, steady current.	5	
		2.2 Dielectrics-concept of polarization, the relation $D = \epsilon_0 E + P$, Polarizability. Electronic polarization and polarization in monoatomic and polyatomic gases.	3	
3)	Module 3: Magnetostatics & Time Varying Field:	3. Lorentz force, force on a small current element placed in a magnetic field. Biot-Savart law and its applications, divergence of magnetic field, vector potential, Ampere's law in integral form and conversion to differential form. Faraday's law of electro-magnetic induction in integral form and conversion to differential form	3	
4)	Module 4: Electromagnetic Theory:	4.1 Concept of displacement current Maxwell's field equations, Maxwell's wave equation and its solution for free space. E.M. wave in a charge free conducting media, Skin depth, physical significance of Skin Depth, E.M. energy flow, & Poynting Vector.	6	

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5)	Module 5: Quantum Mechanics:	5.1 Generalised coordinates, Lagrange's Equation of motion and Lagrangian, generalised force potential, momenta and energy. Hamilton's Equation of motion and Hamiltonian. Properties of Hamilton and Hamilton's equation of motion. <i>Course should be discussed along with physical problems of 1-D motion</i>	4
		5.2 Concept of probability and probability density, operators, commutator. Formulation of quantum mechanics and Basic postulates, Operator correspondence, Time dependent Schrodinger's equation, formulation of time independent Schrodinger's equation by method of separation of variables, Physical interpretation of wave function ψ (normalization and probability interpretation), Expectation values, Application of Schrodinger equation – Particle in an infinite square well potential (1-D and 3-D potential well), Discussion on degenerate levels.	9
6)	Module 6: Statistical Mechanics:	6.1 Concept of energy levels and energy states. Microstates, macrostates and thermodynamic probability, equilibrium macrostate. MB, FD, BE statistics (No deduction necessary), fermions, bosons (definitions in terms of spin, examples), physical significance and application, classical limits of quantum statistics Fermi distribution at zero & non-zero temperature, Calculation of Fermi level in metals, also total energy at absolute zero of temperature and total number of particles, Bose-Einstein statistics – Planck's law of blackbody radiation	7
Total Lectures=			39

Text Books and Articles:

1. Perspectives of Modern Physics: A. Baisier
2. Modern Physics and Quantum Mechanics E.E. Anderson
- 2.Refresher course in B.Sc. Physics (Vol. III): C.L. Arora
- 3.Fundamentals of Physics (Vol. III): Haliday, Resnick & Krane
- 4.Engineering Physics: R.K. Kar
- 5.Classical Mechanics: a) A.K. Roychaudhuri
b) R.G. Takwal & P.S. Puranic
6. Quantum Mechanics: a) Eisberg & Resnic ;b) A.K. Ghatak & S. Lokanathan;c) S.N. Ghoshal
- 7.Statistical Mechanics and Thermal Physics: a) Sears and Salinger;b) Avijit Lahiri;c) Evelyn Guha
- 8.Solid State Physics: a) A.J. Dekker;b) C. Kittel;c) Ashcroft & Mermin;d) S.O. Pillai

BASIC ENVIRONMENTAL ENGINEERING AND ELEMENTARY BIOLOGY			
CH-301			
L		T	P
3		0	0
Serial No.	Chapters/Units	Description	Credits Lectures in hour
1)	General	Basic ideas of environment, basic concepts, man, society & environment, their interrelationship.	1
		Mathematics of population growth and associated problems, Importance of population study in environmental engineering, definition of resource, types of resource, renewable, non-renewable, potentially renewable, effect of excessive use vis-a-vis population growth, Sustainable Development.	2
		Materials balance: Steady state conservation system, steady state system with non conservative pollutants, step function.	1
		Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and control/management; Anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and Engineering.	2
2)	Ecology	Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function.	1
		Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban); Food chain [definition and one example of each food chain], Food web.	2
		Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur].	1
		Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity.	2
3)	Air pollution and control	Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere, Tropopause and Mesopause.	1
		Energy balance: Conductive and Convective heat transfer, radiation heat transfer, simple global temperature model [Earth as a black body, earth as albedo], Problems	1
		Green house effects: Definition, impact of greenhouse gases on the global climate and consequently on sea water level, agriculture and marine food.Global warming and its consequence, Control of Global warming. Earth's heat budget.	1
		Lapse rate: Ambient lapse rate Adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion).	2
		Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height,	2

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		smokestack plumes and Gaussian plume model.	
		Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant. Sources and effect of different air pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN.	2
		Smog, Photochemical smog and London smog. Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other green house gases, effect of ozone modification.	1
		Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP, cyclone separator, bag house, catalytic converter, scrubber (ventury), Statement with brief reference).	1
4)	Water Pollution and Control	Hydrosphere, Hydrological cycle and Natural water. Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds.	2
		River/Lake/ground water pollution: River: DO, 5 day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river[deoxygenation, reaeration], COD, Oil, Greases, pH.	2
		Lake: Eutrophication [Definition, source and effect].	1
		Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only)	1
		Standard and control: Waste water standard [BOD, COD, Oil, Grease], Water Treatment system [coagulation and flocculation, sedimentation and filtration, disinfection, hardness and alkalinity, softening] Waste water treatment system, primary and secondary treatments [Trickling filters, rotating biological contractor, Activated sludge, sludge treatment, oxidation ponds] tertiary treatment definition.	2
		Water pollution due to the toxic elements and their biochemical effects: Lead, Mercury, Cadmium, and Arsenic	1
5)	Land Pollution	Lithosphere; Internal structure of earth, rock and soil	1
		Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes; Recovery and disposal method- Open dumping, Land filling, incineration, composting, recycling. Solid waste management and control (hazardous and biomedical waste).	2
6)	Noise Pollution	Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise, neighbourhood noise]	1
		Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level, L_{10} (18hr Index) , $n L_d$. Noise pollution control.	1
7)	Environmental Management	Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol.	2
Total Lectures=			39

Text Books and Articles:

1. Masters, G. M., "Introduction to Environmental Engineering and Science", Prentice-Hall of India Pvt. Ltd., 1991.
2. De, A. K., "Environmental Chemistry", New Age International.

INSTRUMENTATION & CONTROL

TT-301

L		T		P		Credits	
3		0		0		3	
Serial No.	Chapters/Units	Description				Lectures in hour	
8)	Basic concepts of measurements	Introduction, idea of a generalized measurement system, basic characteristics of measuring devices - accuracy, precision error, hysteresis, resolution, threshold , repeatability , reliability , span , dynamic accuracy, calibration; Transducer and Sensors: classification, basic requirements;				4	
9)	Displacement measurement	Idea of servo potentiometers , differential inductors and transformers , capacitive , shaft encoders, hall effect devices , proximity devices and digital transducers .				3	
10)	Velocity measurement	D.C.Tachogenerators, A.C. drag-cup tachogenerators, digital velocity transducers.				2	
11)	Temperature measurement	Introduction, concept of transmitters, liquid in glass thermometers, liquid filled systems, Resistance type temperature sensors, thermistors, thermocouples, solid state sensors, quartz thermometers, temperature measurement by radiation method, optical pyrometers.				3	
12)	Force and torque	Introduction, strain gauges and load cells, concept of different configurations, digital force transducers, concept of electronic weighing systems, concept of torque measurement				4	
13)	Pressure measurement	Introduction, diaphragms, capsule, Bourdon tube, potentiometric devices, strain gauges devices, LVDT & capacitive devices, solid state devices (piezo-junction & piezo-resistance).				3	

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14)	Special measurements	Idea of transducers for measurement of .pH, humidity, density and thickness	3
15)	Measurement accessories	Brief concept of instrumentation amplifiers, signal generation and processing, data acquisition and conversion, input-output devices and displays.	4
16)	General test equipment	Brief review of general-purpose electronic test equipment - CRO, digital multimeters, counters, signal generators, regulated power supplies.	4
17)	Control systems and engineering	Introduction, open and closed loop systems, idea of mathematical modelling of simple physical systems, concept of transfer functions, types of control action - ON-OFF, proportional, derivative, integral and PID, concept of time response analysis with respect to instrumentation systems - zero order systems, first order systems and its step, ramp frequency response, second order systems and its step, ramp response.	10
Total Lectures=			40

Text Books and Articles:

1. Instrumentation & Control by Rangan, Mani & Sharma,
2. Transducers & Instrumentation by D.V.S. Murty, PHI Learning Pvt. Ltd.
3. Control Systems Engineering by Nagrath and Gopal, New Age International
4. Doebelin E. O., Measurement Systems : Application and Design, 4th edition McGraw Hill , New York, 1992.
5. Patranabis D, Principle of Industrial Instrumentation, 2nd edition Tata McGraw Hill , New Delhi, 1997.
6. Ogata K., 2002, Modern Control Engineering 4th Ed., Prentice Hall .
7. Kuo B.C., Golnaraghi F., 2003, Automatic Control Systems, 8th Ed., Wiley .

TEXTILE FIBRES

TT-302

L		T		P		Credits
3		1		0		4
Serial No.	Chapters/ Units	Description				Lectures in hour
1)	Introductory Concepts	General classification of textile fibres, difference between natural and synthetic fibres according to their composition and properties, longitudinal and cross sectional view of different textile fibres and their impact on physio-mechanical properties like tenacity, elongation, initial modulus, yield point, toughness, elastic recovery, moisture sorption etc.				3
2)	Fibre forming polymers and Structure	Essential and desirable characteristics of fibre forming polymers, chemical structure and bonding of natural and synthetic fibres, Macro and micro structure of cellulosic, protein and synthetic fibres, orientation and crystallinity, Glass transition temperature and its significance. measurement of crystals by X-ray diffraction, thermal analysis of fibrous polymers by DSC, TGA and DTA, Structural study by FTIR and NMR.				6
3)	Natural Fibres	Classification, grading, structure and properties and end uses of natural fibres like a) Vegetable (bast, leaf and seed fibres), b) animals (wool and silk) and c) mineral (glass, asbestos and metallic fibres). d) cotton: concept of varieties; definition of grading, distinctive properties and end uses, e) jute:- varieties, distinctive properties and end uses, f) flax and pineapple fibres:- brief introduction and uses, g) protein fibres:- wool:- classification, distinctive properties and end uses, silk:- classification, distinctive properties and end uses.				10
4)	Regenerated Fibres	a) Classification, b) regenerated fibres-acetate, viscose & diverse forms of viscose, cu-prammonium, alginate, lyocell. - general properties, end uses, main features of the production of some important regenerated fibres-viz., viscose, cellulose-acetate, lyocell etc.				7
5)	Synthetic fibres	a) Classification, principles of polycondensation with reference to polyesters, polyamides and polyurethanes, principles of poly addition with reference to acrylics, polyolefins, polyvinyl chlorides and co-polymers, aramid fibers d) chemical properties & end uses of polyester, polyamide and poly				12

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		acrylonitrile fibres, e) introduction to the production of synthetic fibres: f) principles of melt spinning details of melt spinning process with special reference to polyester-parameters near spinneret, LOY, MOY & POY, g) dry spinning and h) wet spinning; i) viscosity of melts and solutions, j) equipments of manmade fibre production, k) main features of the production of some important manmade fibres-viz., polyamides, polyesters, polypropylene and poly acrylic fibres, l) concept of quenching operation and finish application .	
6)	Fibre forms and Characteristics	Continuous and Staple fibres, heat setting and drawing of fibres, concept of micro denier fibre.	2
Total Lectures=			40
Text Books:			
1. Manmade Fibres by R.W. Moncrieff,			
2. Textile Chemistry, Vol. I, by R.H. Peters,			
3. Fiber Chemistry by M. Lewin and E.M. Peare,			
4. Man-made Fibres Science and Technology, Vol. 1,2,3, by H.F. Mark, S.M. Atlas and E. Cernia,			
5. Polyester Fibres Chemistry and Technology by H. Ludwig,			
6. Textbook of Polymer Sci-ence by F.W. Billmeyer.			
7. Textile Science by E.P.G. Gohl and L.D. Vilensky			
8. Textile fibre, S.N. Murthy			

YARN FORMATION – I			
TT-303			
L	T	P	Credits
3	1	0	4
Serial No.	Chapters/Units	Description	Lectures in hour
1)	Introductory Concepts	Introduction to the terms ‘Textiles’, ‘fibres/filaments’, ‘Yarns’ and ‘fabrics’. General classification of textile fibres. Understanding different fibre characteristics and assessment of essential and desirable characteristics for producing yarns. Basic operations involved in yarn production – a brief conception. Yarn numbering systems and their conversion.	2
2)	Staple Yarn Conversion	Yarn classification and their general comparison. Process flow chart involved in conversion of fibres/filaments to yarns by presently available yarn formation systems with brief objectives of each process. Process flow chart of carded and combed spun yarn. Atmospheric processing conditions at different stages of material preparation.	3
3)	Ginning and baling	Impurities in natural fibres and their removal during pre-bailing operation; Concept of Ginning and its Performance on yarn quality; Objectives of baling for yarn preparation	2
4)	Blowroom	Rudiments of opening, cleaning, blending and mixing along with their sequential implementation in yarn preparatory stage. Classification of opening devices and opening variants; elements of grid as cleaning components; interaction of feed assembly, opening element and grid; Principles of opening and cleaning methods in blowroom and carding; Factors influencing opening and cleaning action. Principles and methods of mixing and blending with their merits and demerits. Idea of accessories and associated equipment (dust removing and disposing devices; material transport devices, material flow control devices, metal extractors, fire eliminator); Sequence of opening and cleaning machineries in modern blow room and their brief study; Process Performance of blow room (viz. cleaning efficiency, degree of opening, waste, etc.)	10
5)	Carding	Mechanism of feeding into a card; Principles of action in different zones of carding; Concept of card clothing; Overview of various types of designs of carding machines; General Elements of a carding machine along with their maintenances and settings; mechanism of material condensing in carding Process	13

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		performance of carding (cleaning efficiency, wastes, nep formation, sliver unevenness etc) .	
6)	Draw Frame	Objectives and principles of equalizing and drafting process; An idea of drafting theory; Study on drafting arrangements – requirements, elements, forms etc.; Mechanism of material condensing in drawing. Process Performance assessment of draw frame.	7
7)	Autolevelling & recent Trends	Causes of mass variation of fibrous assembly, their monitoring and control – concept of autolevellers. Productivity of parallel fibre assembly of preparatory stage machines. Recent trends and developments including automation.	3
Total Lectures=			40
<p>Text Books:</p> <ol style="list-style-type: none"> 1. The Technology of Short Staple Spinning by W. Klein 2. A Practical Guide to Opening & Carding, W. Klein 3. A Practical Guide to Combing & Drawing by W. Klein, 5. Manual of Cotton Spinning (Opening & Cleaning) by C. Shrigley, 6. The Principle of Roller Drafting & The Irregularity of Drafted Materials by G. A. R. Foster, 7. Spun Yarn Technology by Eric Oxtoby, 8. Fundamentals of spun yarn technology by Carl A. Lawrence 9 Spun Yarn Technology (Vol-1 & Vol-2) by A Venkatasubramani 			

PHYSICS LAB-2 PH-391

L	T	P	C
0	0	3	2

Contacts: (3P)

Credit: (2)

Group 1: Experiments on Electricity and Magnetism

1. Determination of dielectric constant of a given dielectric material.
2. Determination of resistance of ballistic galvanometer by half deflection method and study of variation of logarithmic decrement with series resistance.
3. Determination of the thermo-electric power at a certain temperature of the given thermocouple.
4. Determination of specific charge (e/m) of electron by J.J. Thomson's method.

Group 2: Quantum Physics

5. Determination of Planck's constant using photocell.
6. Determination of Lande's g factor using Electron spin resonance spectrometer.
7. Determination of Stefan's radiation constant
8. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
9. Determination of Rydberg constant by studying Hydrogen/ Helium spectrum

Group 3: Modern Physics

10. Determination of Hall co-efficient of semiconductors.
11. Determination of band gap of semiconductors.
12. To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells.
 - a) A candidate is required to perform 3 experiments taking one from each group. Initiative should be taken so that most of the Experiments are covered in a college in the distribution mentioned above. Emphasis should be given on the estimation of error in the data taken.
 - b) In addition a student should perform one more experiments where he/she will have to transducer the output of any of the above experiments or the experiment mentioned in c) into electrical voltage and collect the data in a computer using phoenix or similar interface.
 - c) Innovative experiment: One more experiment designed by the student or the concerned teacher or both.

Note:

- i. Failure to perform each experiment mentioned in b) and c) should be compensated by *two* experiments mentioned in the above list.
- ii. At the end of the semester report should sent to the board of studies regarding experiments, actually performed by the college, mentioned in b) and c]
- iii. Experiment in b) and c] can be coupled and parts of a single experiment.

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INSTRUMENTATION & CONTROL LAB.

TT-391

L	T	P	C
0	0	3	2

Contacts: (3P)

Credit: (2)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

- 1) Study of Displacement measurement
- 2) Study of Velocity measurement
- 3) Study of Temperature measurement
- 4) Study of Force and torque
- 5) Study of Pressure measurement
- 6) Study of Relative Humidity, PH measurements
- 7) Study of Inductive and Optical Proximity sensors
- 8) Study of General test equipment: CRO, digital multimeters, counters, signal generators, Stroboscope, Photo Diodes ,regulated power supplies.

Study of Control systems and engineering

- 9) Familiarization with MATLAB control system tool box & Simulink tool box
- 10) Determination of Step response for first order and second order system with unity feedback on CRO and calculation of control system specification: Time constant, percentage peak overshoot, settling time from the response.
- 11) Determination of Step response and Impulse response for type-0, type-1 and type-2 system with unity feedback using MATLAB/PSPICE.
- 12) Determination of Root locus, BODE plot, Nyquist plot for 2nd order system & determination of different control system specification from the plot using MATLAB.
- 13) Determination of PI, PD and PID controller action for first order simulated processes.
- 14) Study of practical position control system and determination of control system specification for different system parameters.

TEXTILE FIBRE LAB

TT-392

L	T	P	C
0	0	3	2

Contacts : 3P

Credits : 2

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

List of Experiments (At least 10 experiments should be conducted):-

A . Identification of Textile fibres

Identification of common textile fibres like cotton, wool, silk, jute, flax, ramie, viscose rayon, nylon, polyester, acylic, polypropylene, glass, by longitudinal and cross-sectional views & by Burning test

Identification of common textile fibers (as mentioned above) by solubility test.

B. Fibre dimension and other physical test

1. To prepare a Baer sorter diagram and determine the following:

- a) Effective Length
- b) Mean Length
- c) Dispersion percentage
- d) Short fibre percentage

2. To determine 2.5% span length, 50% span length and uniformity ratio of a given Cotton using fibro graph. Construct a fibrogram by re-setting the counters for various S.L. between 5% to 90%. Compare the fibrogram of manmade fibre with cotton.

3. To determine micronaire value of given cotton sample by Airflow method. Convert the result into SI unit and give a suitable rating to the fibre sample.

4. To determine maturity coefficient and maturity ratio of given cotton sample by caustic soda method. Give appropriate rating to the sample.

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5. To determine the bundle strength and elongation at break of a cotton fibre using Stelometer instrument. Study the effect of rate of loading on tensile properties of the fibre.
6. To determine moisture content/regain of a fiber sample by desiccators/hot air method.
7. To determine crimp (arcs/cm and crimp%) of a given manmade fibre sample.
8. To determine fibre fineness of manmade fibers/filaments by:
Whole fibre method, Microscope

YARN FORMATION LAB - I TT-393

L	T	P	C
0	0	3	2

Contacts : 3P

Credits : 2

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

List of Experiments (At least 10 experiments should be conducted):-

1. A study of different types of tools and gadgets used in yarn forming process such as various types of spanners, Calipers, Hammers (Nylon, Brass & Iron hammers), Gauges (leaf gauge & filler gauge), Screw driver, Torque wrench, Pliers (Cir. clip Pliers - outer & inner), Pullers, Oiling and greasing equipment etc.
2. A Study of different types of drives viz. Belt drive - Flat and V, Open and Cross, Gear Drive, Simple carrier, compound carrier, Helical, Bevel, Chain and sprocket wheel drive. Worm and worm wheel drive, Timer belts. Importance of safety gears. Simple examples of speed calculation, energy consumption (Slippage), cross checking the calculated speed by using tachometer.
3. Introduction to the knowhow of spinning process, sequence, machineries (carded/combed) used in yarn formation industry (mainly cotton system) from bale of fibres including explanation of objects of each machine. A mill visit (if accessible) may be conducted in this regard starting from cotton godown and finished in yarn go-down.
4. Demonstration of processes related to opening, cleaning, mixing, blending, carding, doubling and drafting, consolidation mechanism during yarn spinning preparatory stage (upto draw frame stage). Evaluation of hank of respective output materials from different machines.
5. Preparation of a flowchart of conventional and modern Blow room line along with machine positioning. Mill visits (if accessible) may be conducted to knowhow the differences of blowroom line between modern and conventional one.
6. Determination of openness of tufts.
7. Determination of trash content in cotton.
8. Study and sketch the working mechanism of a card with respect to flow of material and their dimensions.
9. Study of different zones responsible for feeding and carding action of a carding machine.
10. Study of the web collection and delivery zones of a carding machine
11. Determination of different drafts, production and their respective constants of a carding machine
12. Determination of cleaning efficiency of a card.
13. Determination of transfer coefficient of a card.
14. Study and sketch the working mechanism of draw frame with respect to flow of material along with dimension of a draw frame machine.
15. Study of different zones of a draw frame machine including creeling, drafting and delivery zone.
16. Study of different drafts and their calculations of a draw frame machine.
17. Study and understand the generation of drafting wave.

SEMESTER-IV

NUMERICAL METHODS				
M (CS)-401				
L		T	P	Credits
2		0	0	2
Serial No.	Chapters/Units	Description	Lectures in hour	
1)	Approximation in numerical computation:	Truncation and rounding errors, Fixed and floating-point arithmetic, Propagation of errors.	4	
2)	Interpolation:	Newton forward & backward interpolation, Lagrange's and Newton's divided difference Interpolation.	5	
3)	Numerical integration:	Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule.	3	
4)	Numerical solution of a system of linear equations:	Gauss elimination method, Matrix inversion, LU Factorization method, Gauss-Jacobi and Gauss-Seidel iterative methods.	6	

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5)	Numerical solution of Algebraic equation:	Bisection method, Secant method, Regula-Falsi method, Newton-Raphson method.	4
6)	Numerical solution of ordinary differential equation:	Taylor's series method, Euler's method, Runge-Kutta methods, Predictor-Corrector methods and Finite Difference method.	6
Total Lectures=			28

Text Books:

1. C.Xavier: C Language and Numerical Methods.
2. Dutta & Jana: Introductory Numerical Analysis.
3. J.B.Scarborough: Numerical Mathematical Analysis.
4. Jain, Iyengar, & Jain: Numerical Methods (Problems and Solution).

References:

1. Balagurusamy: Numerical Methods, Scitech.
2. Baburam: Numerical Methods, Pearson Education.
3. N. Dutta: Computer Programming & Numerical Analysis, Universities Press.
4. Soumen Guha & Rajesh Srivastava: Numerical Methods, OUP.
5. Srimanta Pal: Numerical Methods, OUP.

MATHEMATICS-3			
M-402			
L	T	P	Credits
3	1	0	4

Note 1: The whole syllabus has been divided into five modules.

Note 2: Structure of the question paper

There will be three groups in the question paper. In Group A, there will be one set of multiple choice type questions spreading the entire syllabus from which 10 questions (each carrying one mark) are to be answered. From Group B, three questions (each carrying 5 marks) are to be answered out of a set of questions covering all the three modules. Three questions (each carrying 15 marks) are to be answered from Group C. Each question of Group C will have two or three parts covering not more than two modules. Sufficient questions should be set covering the whole syllabus for alternatives.

Serial No.	Chapters/Units	Description	Lectures in hour
1)	Module I Fourier Series:	Introduction, Periodic functions, Even and odd functions, Special waveforms, Eulers formulae for Fouriers coefficients, Dirichlet's conditions and sum of the Fourier series, Half range Fourier series, Parseval's identity (Statement only). Fourier Transform: Fourier Transform and its properties, Inverse Fourier Transform (Statement only), Fourier Transform of derivatives (Statement only), Convolution theorem (Statement only). Related problems.	8
2)	Module II Calculus of Complex variable:	Functions, Limit and Continuity, Analytic functions, Cauchy-Riemann equations (Statement only) and related problems, Analytic continuation, Complex integration and Cauchy's theorem (Statement only), Cauchy's integral formula (Statement only), Taylors and Laurent series, Zeros of an analytic function, Poles, Essential singularities, Residue theorem (Statement only) and its application to evaluation of definite integrals (Elementary cases only), Introduction to Conformal Mapping.	12
3)	Module III Probability:	Axiomatic definition of probability, Conditional probability, Independent events, Related problems, Bayes theorem (Statement only) & its application. One dimensional random variable, Probability distributions-discrete and continuous, Expectation, Binomial, Poisson, Uniform, Exponential and Normal distribution. Problems on Binomial, Poisson and Normal distribution only.	12
4)	Module IV Partial Differential Equations:	Solution of one dimensional wave equation, One dimensional heat-conduction equation, Laplace equation in two dimension by the methods of 1: Separation of variables 2: Integral Transforms (Laplace and Fourier Transforms)	6
5)	Module V Series solution of Ordinary Differential equation:	Introduction, validity of series solution of an ordinary differential equation, general method to solve equation of the type: $P_0y'' + P_1y' + P_2y = 0$, related problems, Bessel's equation, properties of Bessel's function, Recurrence formula for Bessel's function of first kind, Legendre's equation, Legendre function; Recurrence formula for Legendre function ($P_n(x)$); Orthogonality relation.	10
Total Lectures=			48

Text Books:

1. Brown J.W and Churchill R.V: Complex Variables and Applications, McGraw-Hill.
2. Das N.G.: Statistical Methods, TMH.
3. Grewal B S: Higher Engineering Mathematics, Khanna Publishers.
4. James G.: Advanced Modern Engineering Mathematics, Pearson Education.
5. Lipschutz S., and Lipson M.L.: Probability (Schaum's Outline Series), TMH.

References:

1. Bhamra K. S.: Partial Differential Equations: An introductory treatment with applications, PHI

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2. Dutta Debashis: Textbook of Engineering Mathematics, New Age International Publishers.
3. Kreyzig E.: Advanced Engineering Mathematics, John Wiley and Sons.
4. Potter M.C, Goldberg J.L and Aboufadel E.F.: Advanced Engineering Mathematics, OUP.
5. Ramana B.V.: Higher Engineering Mathematics, TMH.

THEORY OF MACHINES			
TT-401			
L		T	P
3		0	0
Credits			3
Serial No.	Chapters/Units	Description	Lectures in hour
1)	Basic concepts	Kinematics and Kinetics ;Introduction to mechanisms; Difference between Machine , Mechanism and Structure; Classification of Pairs of Elements; Links, Frames and Kinematic Chains; Pairs, Higher Pairs, Lower Pairs and Linkages Types of joints in a chain; Four & six -bar linkage: motions of links, Grashof's criterion of movability; Degrees of freedom for plane Mechanisms, Gruebler's criterion for plane mechanism; Introduction to Kinematic inversions.	6
2)	Velocity and Acceleration in Mechanisms	Velocity analysis in Mechanisms: Relative velocity method – slider crank mechanism, four bar mechanism, Crank and slotted lever mechanism; Instantaneous centre method –Kennedy's theorem; Acceleration analysis: Acceleration Images, Klein's construction, analytical expression of velocity & acceleration.	5
3)	Mechanisms with Lower Pairs	Study of lower pair Mechanisms- Pantograph, Parallel linkage mechanisms, Straight line mechanism, Hooks joint.	3
4)	Belt, Rope and Chain Drives	Belt Drives, Rope Drives and Chain Drives: -description and analysis.	4
5)	Cams	Introduction, Cam Mechanisms, Classification of Cam Mechanisms; Follower Arrangement- In-line, Offset ;Cam Shape -Plate cam or disk cam, Grooved cam or closed cam , Cylindrical cam or barrel cam ,End cam ;Constraints on the Follower; Cam Nomenclature- Trace point, Pitch curve, Working curve, Pitch circle, Prime circle (reference circle, Base circle, Stroke or throw, Follower displacement, Pressure angle ;Motion events- Constant Velocity Motion, Constant Acceleration Motion, Harmonic Motion , cycloidal motion ; Cam Design- Parameters, Cam profile design principle, Design equations , manual drawing examples of some textile cams.	5
6)	Gears	Gear terminology, Laws of gearing, types of gears – Spur, Bevel, Helical, Worm; tooth profile, interference; Gear trains – simple, compound, epicyclic gear train; Speed-torque analysis of gear trains.	5
7)	Friction & other Mechanisms	1.Introduction., 2.Efficiency of Inclined Plane.,3. Screw Friction.,4. Screw Jack.,5. Friction of a V-thread. ,6. Friction in different types of bearing - Friction Circle. ,7. Brakes and Clutches.1. Ratchet Mechanisms, Intermittent Gearing, 2. The Geneva Wheel, 3. The Universal Joint,4. Flywheel.	6
8)	Balancing of Masses	Introduction to Balancing of Rotating Masses and Balancing of Reciprocating Masses.	
9)	Vibrations	a) Longitudinal and Transverse Vibrations: Introduction.,Terms Used in Vibratory Motion., Types of Vibratory Motion., Types of Free Vibrations., Natural Frequency of Free Longitudinal Vibrations. , Natural Frequency of Free Transverse Vibrations. , b)Introduction to Torsional Vibrations	4
			Total Lectures=
			40

Text Books:

1. Theory of Machines – R.S.Khurmi & J.K.Gupta, S. Chand Publisher, Delhi
2. Theory of Machines – S S Rattan, Tata McGraw Hill
3. Theory of Mechanisms & Machines – A.Ghosh & A.K.Mallik, AEWP
4. Design of Machinery – R.L.Norton, Tata McGraw Hill
5. Mechanism & Machine Theory – Rao, R.V. Dukkupati, Wiley
6. An introduction to textile mechanisms. Author, P. Grosberg. Publisher, Benn, 1968
7. Theory of Machines and Mechanisms, by Shigley, J. E. and Uicker, J. J., Jr., McGraw-Hill, New York, 1980.

FABRIC FORMATION-I			
TT-402			
L		T	P
3		1	0
Credits			4
Serial No.	Chapters/Units	Description	Lectures in hour

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1)	Introduction	a) The fabric, b) methods of fabric formation, c) phases in the formation of fabric by weaving, d) a technical introduction to weaving: basic motions, principal mechanisms of a loom, path of warp through a loom, e) Idea of Preparatory processes: Single-end Warp Winding, Single-end Weft Winding, Multi-end Winding/Warping, Sizing, Entering & Knotting etc., f) parameters affecting performance of warp yarns during weaving.	2
2)	Single –end Warp Winding	a) Introduction -sequence of processes, Single and multi-end winding, b) need for warp winding, c) cleaning, clearing, d) standard package formats packages and different types of package builds, package requirements, e) winding principles-random, precision, sectional and combined, f) winding parameters: winding rate, wind and traverse ratio, gain, winding angle, g) winding faults; pattern formation, principles of pattern breaking, h) winding operation, i)unwinding- side and over end withdrawal, j) winding machines-basic function, classification of winding machines, spindle and drum driven machines, commercial automatic and non-automatic machines. k) yarn traversing- reciprocating mechanisms, rotating mechanisms, l) yarn faults m) yarn clearing-mechanical and electronic types, knotting, splicing etc. n) tensioning devices, o) stop motions and auxiliary functions (creeling, piecing, doffing etc.), p) winding economics- Efficiency , Productivity , future etc.	10
3)	Single –end Weft Winding	a) Introduction b) need, c) shape and build of the pirn, c) basic requirements, d) elements of the pirn winding machines, e) concept of basic terms-pirn density, cohesion, consistency of pirn diameter, bunch building, chase, winding and binding coils, yarn tails and back wind, spindle speed, direction of rotation, etc., f) principal features of a pirn winding machine with respect to a latest commercially available automatic and non-automatic machines. g)Unifil-winder, h) calculation of Efficiency , Productivity , etc.	3
4)	Multi-end Winding/Warping	a) Introduction, b) principal methods of warping, c) warping process, d) warping creels- continuous chain creel, truck creel, magazine creel, automatic creel, unrolling creel e) yarn tension in warping, f) stop motions and measuring motions, g) leasing and beaming, h) beam warping or direct warping- process, machines, i) section warping- process, machines, section building and relating drum storage capacity to beam flange diameter, j) speciality warping machines, k) speciality machines, l) Calculation of Efficiency and Productivity	8
5)	Sizing	a) Introduction, b) sizing process, c) size ingredients, d)size recipe, preparation of size recipe, e) factors which affect the properties of sized yarns, Sizing–Weaving Curve, f) preparation of the size paste-formulation and equipments, g) techniques of sizing, h) types of sizing- normal/slasher sizing, single-end sizing, draw warping and sizing, draw sizing, foam sizing, dye sizing, ball sizing, hank sizing etc. i) concept of factors governing the pick up of size, j) principal machine components- Creels—unwinding zone, Size boxes—sizing zone, Drying cylinders—drying zone, Bust rods—splitting zone, Head stock—weaver’s beam preparation zone, Controls and instrumentations, k) controls in sizing:-control of size pick-up, determination of size pick up in a beam, control of sizing conditions, control of yarn stretch control of moisture in sized yarns, control of size losses, l) sizing of different yarns, j) performance of sized yarns-dependence of weavability , effect of sizing, k)Calculation of Efficiency and Productivity.	10
6)	Elements of woven design, Drawing-in and Tying -in	a) Idea of fabric structure; methods of fabric representation; repeat of weave; drafts; requirements of drawing in; weaving plan; lifting plan; relationship between weave; draft and lifting plan; construction of weaving plan from a given weave; construction of weave from a given draft and lifting plan; construction of draft from a given lifting plan and weave;b) General characteristics; plain weave; twill weaves; satin and sateen weaves c)Introduction to Drawing-in-draft (DID) and Tying-in, need, manual and mechanized methods	4
Total Lectures=			40

Text Books:

1. Principles of Weaving by Marks & Robinson,
2. Textiles (The Motivate Series) by A.Wynne,
3. Weaving Conversion of Yarn to Fabric by Lord & Mohammed,
4. Textile Maths Volume III by Booth,
5. Yarn Preparation-by R. Sengupta, Popular Prakashan, Bombay
6. Handbook of Weaving Preparation by D.S. Verma,
7. Winding – Silver Jubilee Monograph by BTRA,
8. Sizing – Materials, Methods, Machinery by Ajoankar, Talukdar & Wadekar,
9. Weaving – Machinery, Mechanisms, management by Talukdar, Sriramalu & Ajoankar.,

TEXTILE CHEMICAL PROCESSING-1			
TT-403			
	L	T	P
	3	1	0
Serial No.	Chapters/Units	Description	Credits
1)	Introduction	Overview of colouration and finishing or chemical processing of textile materials, overview of different stages, preparation of cotton/cellulosic materials, prelims of preparation: grey checking-grey	3

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		testing-stamping-mending-stitching-shearing/cropping.	
2)	Chemical processing equipment	Principles of functions of different machines used in preparatory processing including padder, J-box, washing machine, kiers, different mercerising machines, equipments for water removal – contact and non-contact type of dryer, hydroextractor, construction, schematic diagram, function, speed, capacity etc.	5
3)	Singeing	Objectives, materials suitable, singeing methods-mentioning of plate and roller singeing machine, details of gas singeing machine, merits, demerits, precautions, advancement, bio-singeing.	3
4)	Desizing	Objective, ingredients of size, brief chemical nature and process of removal-chemistry of starch and its hydrolytic and oxidative decomposition, methods of desizing-hydrolytic & oxidative, brief glimpse of rot steep and acid steep; enzymatic desizing, classification of amylases used in desizing-according to hydrolytic action & according to origin, factors of enzymatic desizing, methods of enzymatic desizing, some commercial names of enzymes, merits and demerits over other desizing processes, precautions, bromite desizing, factors, methods of bromite desizing, advancement, if any; method of evaluation of desizing efficiency.	5
5)	Scouring	Objective, impurities of cotton fiber-their chemical nature and possible methods of removal, merits and demerits of each process, importance of alkali scouring, surfactants, concept of micelle, critical micelle concentration, HLB value, cloud point, their classification –according to chemical nature, action, mechanisms of wetting, detergency and emulsification, factors of scouring, methods of scouring, different scouring equipment e.g., High pressure kier, combi-steamer, their construction, working principle, capacity, solvent scouring, method of evaluation of scouring efficiency, enzymatic scouring.	5
6)	Mercerisation	Objective, action of alkali on the morphological/fine structure of cellulose, methods- cold and hot, relative merits and demerits, evaluation	2
7)	Bleaching	Objective, classification of bleaching methods, different bleaching agents, their relative merits and demerits, hypochlorite, chlorite, peroxide bleaching, their mechanisms, bleaching parameters, methods of bleaching, role of chemicals used in bleaching, method of evaluation of bleaching efficiency including objective, principle/mechanism, properties, and method of application of optical whitening agents.	5
8)	Treatment with liquid ammonia	Objective, methods, relative merits and demerits, evaluation	2
9)	Preparation of coloured materials	Nature of problems associated with the preparation of coloured goods, causes and remedies	3
10)	Preparation of silk and wool	Impurities present, degumming/scouring, bleaching, optical whitening of wool and silk.	2
11)	Preparation of jute	Impurities present, scouring, bleaching, optical whitening	2
12)	Preparation of synthetic fibres, blends	Impurities present, heat-setting: objective, different setting methods, i.e., with/without swelling agents, hot air, infra-red etc., different heat-setting sequences like loom-state, intermediate and after-setting, their relative merits and demerits, singeing of man made fibres, their blends; scouring, bleaching, optical whitening.	3
Total Lectures=			40

Textbooks and References:

1. Textile Chemistry, Vol. II by R.H. Peters,
2. Textile Scouring and Bleaching by E.R. Trotman
3. Technology of Bleaching and Mercerising by V.A. Shenai,
4. Engineering in Textile Colouration by C. Duckworth,
5. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman,
6. Handbook of Fiber Science and Technology, Vol. I, Fundamentals and Preparation, Part A and B by M. Lewin and S.B. Sello,
7. Chemical Technology of Fibrous Materials by F. Sadov, M. Korchagin and A. Matetsky,
8. Mercerisation by J.T. Marsh,
9. Surfactants in Textile Processing by A. Datyner,
10. The Preparation and Dyeing of Synthetic Fibres by H.U. Schmidlin,
11. Chemical Technology in the Pre-treatment Processes of Textiles by S.R. Karmakar,
12. Textile Processing and Properties by T.L. Vigo,

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13. Colorants and Auxiliaries, Vol. 2 by J. Shore.
14. Encyclopedia of Textile Finishing by H. K. Rouette.

TECHNICAL REPORT WRITING & LANGUAGE LAB PRACTICE

L	T	P	C
0	0	3	2

Code: HU-481

Credit-2

Guidelines for Course Execution:

Objectives of this Course: This course has been designed:

1. To inculcate a sense of confidence in the students.
2. To help them become good communicators both socially and professionally.
3. To assist them to enhance their power of Technical Communication.

Detailed Course Outlines:

A. Technical Report Writing : 2L+6P

1. Report Types (Organizational / Commercial / Business / Project)
2. Report Format & Organization of Writing Materials
3. Report Writing (Practice Sessions & Workshops)

B. Language Laboratory Practice

1. Introductory Lecture to help the students get a clear idea of Technical Communication & the need of Language Laboratory
Practice Sessions 2L

2. Conversation Practice Sessions: (To be done as real life interactions) 2L+4P

a) Training the students by using Language Lab Device/Recommended Texts/cassettes /cd's to get their Listening Skill & Speaking Skill honed

b) Introducing Role Play & honing over all Communicative Competence

3. Group Discussion Sessions: 2L+6P

a) Teaching Strategies of Group Discussion

b) Introducing Different Models & Topics of Group Discussion

c) Exploring Live /Recorded GD Sessions for mending students' attitude/approach & for taking remedial measure

Interview Sessions; 2L+6P

a) Training students to face Job Interviews confidently and successfully

b) Arranging Mock Interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in a formal situation for effective communication

4. Presentation: 2L+6P

a) Teaching Presentation as a skill

b) Strategies and Standard Practices of Individual /Group Presentation

c) Media & Means of Presentation: OHP/POWER POINT/ Other Audio-Visual Aids

5. Competitive Examination: 2L+2P

a) Making the students aware of Provincial /National/International Competitive Examinations

b) Strategies/Tactics for success in Competitive Examinations

c) SWOT Analysis and its Application in fixing Target

Books – Recommended:

Nira Konar: English Language Laboratory: A Comprehensive Manual
PHI Learning, 2011

D. Sudharani: Advanced Manual for Communication Laboratories &
Technical Report Writing

Pearson Education (W.B. edition), 2011

References:

Adrian Duff et. al. (ed.): Cambridge Skills for Fluency

A) Speaking (Levels 1-4 Audio Cassettes/Handbooks)

B) Listening (Levels 1-4 Audio Cassettes/Handbooks)

Cambridge University Press 1998

Mark Hancock: English Pronunciation in Use

A. 4 Audio Cassettes/CD'S OUP 2004

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NUMERICAL METHODS LAB

M(CS) 491

L	T	P	C
0	0	2	1

Contacts : 2P

Credits : 1

1. Assignments on Newton forward & backward, Lagrange's interpolation.
2. Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule.
3. Assignments on numerical solution of a system of linear equations using Gauss elimination, Matrix inversion, Gauss-Jacobi, and Gauss-Seidel iterations.
4. Assignments on numerical solution of Algebraic Equation by Bisection, Secant, Regular-falsi and Newton Raphson methods.
5. Assignments on ordinary differential equation: Taylor series, Euler's, Runge-Kutta and Finite difference methods.
6. Introduction to Software Packages: Matlab / Scilab / Labview / Mathematica.

THEORY OF MACHINES LAB

TT-491

L	T	P	C
0	0	3	2

Contacts : 3P

Credits : 2

1. Study of Inclined Plane/ sliding friction
2. Study of Pressure Distribution in a Journal Bearing
3. Study of various links and mechanisms.
4. Study and draw various inversions of 4- bar chain and single slider crank chain
5. Draw velocity and diagram of crank mechanism using graphical methods including Klein's construction.
6. Study of governors
7. Study of gyroscopic couple
8. Study of Balancing of rotating masses
9. Study of vibration characteristics of free and forced spring mass system with and without damping.
10. Study of Cam profile analysis (graphical method)
11. Study of gear- train value of compound gear trains and Epicyclical gear trains. Measurement of gear characteristics of Helical, Bevel, Worm gear
12. Study of chain and belt drives. Study of Braking system in a Textile machines
13. Study of characteristics of Needle, Ball, Rroller bearing used in the textile machines
14. Study of special mechanisms (Universal joint , Flywheel Brakes and Clutches ,Geneva wheel etc.)

FABRIC FORMATION LAB- I

TT-492

L	T	P	C
0	0	3	2

Contacts : 3P

Credits : 2

(Any six selecting two from each category)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

Category A;

1. To study the working of an Automatic winding machine and prepare a bobbin.
2. To study the working of a Beam warping.

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3. To study the working of a Sectional warping.
4. To study the passage of yarn on a sizing machine and the features of various parts/mechanisms of the sizing machine.

Category B:

1. To perform simple Reaching in, Drawing in and warp tying.
2. To prepare a bobbin on a pirn winding machine with standard settings
3. To convert some ring bobbins to cone/cheese by adjusting the tension and slub catcher.
4. To prepare a size paste for a given sort.

Category C

1. To study the principal mechanisms of a precision winder.
2. To study the working of an automatic knitter/ splicer on a winding machine,
3. To study the principal mechanisms of a random winder.
4. To have practice of synchronising body movements for shedding, picking and beat-up on the handloom by producing a metre of fabric with least fabric faults.

Category D

1. To study the working of a Loom
2. To study making of a plain fabric on a handloom or semi-automatic loom

CHEMICAL PROCESSING OF TEXTILES LAB- I TT-493

L	T	P	C
0	0	3	2

Contacts : 3P

Credits : 2

(All)

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

1. Desizing of cotton material.
2. Scouring of cotton material.
3. Bleaching of cotton material:
 - a) hypochlorite bleaching
 - b) chlorite bleaching
 - c) peroxide bleaching
4. Blueing/optical whitening of cotton material.
5. Degumming of silk material.
6. Bleaching of silk material.
7. Optical whitening of silk material.
8. Mercerisation of cotton material.

SEMESTER-V

Principles & Practices of Management				
HU-511				
L		T	P	Credits
2		0	0	2
Serial No.	Chapters/Units	Description		Lectures in hour
5)	Module I: Management	Definition, nature, importance, evolution of management thoughts – pre & post scientific era, contributions made by Taylor, Fayol, Gilbreth, Elton Mayo, McGregor, Maslow –covering Time & Motion Study, Hawthorne Experiments; Is management a science or art? Functions of manager, ethics in managing and social responsibility of managers.		4
6)	Module II: Planning & Control	Why Management process starts with planning, steps in planning, planning premises, types of planning, barriers to effective planning, operational plan, strategic planning, Mckinsey's 7's Approach, SWOT analysis, Controlling- concept, Planning- control relationship, process of control, human response to control, dimensions of control, MBO.		4
7)	Module III: Decision Making & Organizing	Nature, process of decision making, decision making under Certainty and Uncertainty, decision-tree, group-aided decision, brain-storming. Organizing – concept, nature and process of organizing, authority and responsibility, delegation and empowerment, centralization and decentralization, concept of departmentation.		4

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8)	Module IV: Staffing & Motivation	Concept, Manpower planning, Job design, recruitment & selection, training and development, performance appraisal, motivation, motivators and satisfaction, motivating towards organizing objectives, morale building.	3
9)	Module V: Leadership & Communication	Defining leadership and its role, should managers lead, leadership style, leadership development, Leadership behavior. Communication- Process, Bridging gap-using tools of communication, electronic media in Communication.	3
10)	Module VI: Financial Management	Financial functions of management, Financial Planning, Management of Working Capital, Sources of Finance.	3
11)	Module VII: Marketing Management	Functions of Marketing, Product Planning & Development, Marketing Organization, Sales Organization, Sales Promotion, Consumer Behaviour, Marketing Research and Information.	3
Total Lectures=			24

Suggested Readings: Text & References:

1. Robbins & Cautler – Management (Prentice Hall of India, 8th Edition)
 2. John R.Schermerhorn– Introduction to Management (WILEY-INDIA EDITION,10th Edition)
 3. Koontz – Principles of Management (Tata McGraw Hill, 1st Edition 2008)
 4. New Era of Management, 10th Edition by Richard L. Daft published by Cengage Learning
 5. Stoner, Freeman, Gilbert. Jr. – Management (Prentice Hall of India, 6th Edition)
 6. Koontz, weihrich – Essentials of Management (TMH, 5th Edition)
 7. D.Chandra Bose– Principles of Management and Administration (PHI)
 - 8.Kiran Nerkar, Vilas Chopde & Kogent Learning Inc– Principles and Practices of Management (Dreamtech Press)
 9. Parag Diwan – Management Principles and Practices (Excel Books, New Delhi)
 10. Management of Principles and Practices by Joseph M Putty
 11. Principles of Management" - 10 e/d by Richard. L.Daft; Cengage Learning
 - 12.Management Principles and Practices by Joseph M Putti
- Publisher- Macmillan

Yarn Formation - II

TT-501

L	T	P	Credits
3	1	0	4
Serial No.	Chapters/ Units	Description	Lectures in hour
1.	Combing	Aim & Objectives of combing. Preparation of fibre assembly for Combing. Fibre fractionation and combing. Sequence of operations in a rectilinear comber. Comber machine elements and modern developments. Theory of fibre fractionation. Quality aspects in combing.	9
2.	Roving Operation	Objectives of roving operation. Machine elements of speed frames. Flyer twisting; types and design aspects of flyers. Drafting systems in speed frames. Differential gear drives in Speed frame. Package building in speed frames. reversing of bobbin rail, shortening of the lift, gear train & accessories; monitoring devices. Novel features of a modern roving frame and automation possibilities; Calculations pertaining to speed, production, draft and twist, coils/inch etc. Quality aspects in speed frame. .	11
3.	Ring Spinning:	Aim and objectives of ring spinning. Machine elements of ring frames. Principles of drafting systems. Twisting and winding operation; design aspects of spindles, rings and travellers. Methods of driving ring frame, variable, dual motor and inverter drive. Study of package building. Spinning geometry. Analysis of forces on yarn and traveller. End breaks during spinning. New developments and automation in ring frames. Quality aspects in ring spinning. Principles of Siro, Compact and Solo Spinning.	15
4.	Doubling/twisting	Principle of doubling and twisting of yarns. Methods of doubling: Ring, Two-for-One and Three-for-One twisting. Quality aspects in doubling and twisting.	2
5.	Processing of manmade fibres in the short staple mill:	Speed frame, Ring frame (material preparation, processing guidelines, problems, settings, modifications required, processing environment)	2
6.	Conversion of filaments to fibres	Principles of stretch breaking and cutting, tow to top and tow to yarn converters.	2
Total Lectures=			41

Text Books:

1. W. Klein, The Technology of Short Staple Spinning, Manual of Textile Technology – Vol-1, by The Textile Institute, Manchester, UK.
2. W. Klein, Man-Made Fibres and Their Processing, Manual of Textile Technology – Vol-6, by The Textile Institute, Manchester, UK.

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3. W. Klein, A Practical Guide to Combing and Drawing, Manual of Textile Technology – Vol-3, by The Textile Institute, Manchester, UK.
4. W. Klein, A Practical Guide to Ring Spinning, Manual of Textile Technology – Vol-1, by The Textile Institute, Manchester, UK.
5. K.R.salhotra, Spinning of man Made Fibres and Blends on Cotton System – The Textile Association (India)
6. Carl A. Lawrence “Fundamentals of Spun Yarn Technology” CRC Press

Fabric Formation -II			
TT-502			
L	T	P	Credits
3	1	0	4
Serial No.	Chapters/Units	Description	Lectures in hour
1)	Introduction	a) Classification of looms, b)Principle of Operation of a loom, c) Different motions on a loom, d) methods of indicating loom timing, e) history of loom development.	2
2)	Shedding	a) Introduction b) geometry of the shed, forms and other consideration-bending factor, shed depth curve, shed troughing etc. c) shedding mechanisms- idea of tappet, dobby and jacquard shedding and their scope, Cam or tappet shedding- a)idea of different types of cam used in shedding, b)positive and negative tappet, c) shedding with negative cams, d) a simplified idea of arrangement of cams and other elements on the loom,e) idea of designing a simple cam f) i) shedding with positive tappets, grooved and matched cam shedding arrangements j) limitations of tappet shedding, k) split shedding or heald staggering - definition, purpose, methods, l)different types of healds. Dobby shedding: a)classification, b)principle of single lift and double lift dobbies,c) negative dobby-introduction, climax dobby; – working principle, timing diagram, idea of pegging the lags, modern negative dobby with minimal pivot points, d)positive dobby:- introduction, gear dobby – working principle, paper dobby—working principle, rotary dobby- working principle, Jacquard Shedding: a)classification and other considerations, b)concept of single lift single cylinder, double lift single cylinder and double lift double cylinder jacquards; c)fine pitch jacquard- working principle of a modern Verdol jacquard, d)electronic jacquard –working principle, e)jacquard harness -- introduction to systems of harness mounting and harness ties. e-shedding: a)Introduction, b)principle of operation, c)scope. Shedding timing with respect to crank shaft rotation, Early and late shedding	10
3)	Picking	a) Introduction, b) classification of picking methods, c) shuttle picking, the shuttle types etc. shuttle projection, shuttle acceleration, d)principal types of mechanism for imparting motion to the shuttle (macro and micro/projectile), e)nominal and actual displacement, catapult action, profile of picking cams (linear, parabolic, sinusoidal etc.), f) conventional picking mechanisms-brief description of cone over pick, cone under pick, side shaft & side-lever mechanism; g)Shuttle checking-General consideration of checking.	6
4)	Beat-up	a) Introduction, b) construction of crank based & cam based sley mechanism, c) eccentricity of sleys motion in crank based mechanisms, d) expressions for sley eccentricity in terms of crank arm and crank radius e) cloth fell position in the loom, relation between weaving resistance and fell displacement, bumping conditions, f) multiple beat up mechanisms- double beat up, g) terry beat up mechanism for shuttle loom	4
5)	Warp and cloth control	a) Introduction to pick spacing and pick density, b) causes of variations in pick spacing, c)The Take-up motions, negative and positive take-up, Intermittent and continuous, 5 wheel take-up ,7 wheel take-up, Shirley, 4 wheel combination take-up of Sulzer and Picanol and electronic take-up. d) Warp Let-off: negative friction let-off; semi positive and positive let-off, brief description and principle of operation of Rütli-C let- off, Saurer let-off, hunts let-off and one electronics let-off, e) temples- introduction, brief description of different types- ring, roller and full width.	8
6)	Auxiliary mechanisms	Introduction, weft stop motions, warp stop motions and warp protector motions	3
7)	Weft mixing in shuttle loom	2 X 1, 2 X 2 and 4 X 1 box changing system, their limitations; Pattern making for box changing with specific example; Concept of weft mixing in circular box mechanism	4
8)	calculations	a) Reed and heald calculations, b) Production calculation, c) GSM calculation, d) Calculations related to shed geometry e) Calculations related to shuttle acceleration/retardation etc; f) Take up calculation	6
Total Lectures=			43
Text Books:			
1.Principles of Weaving by R. Marks and A.T.C. Robinson,			
2. Weaving Mechanisms vol. I & II- N.N. Banerjee,			
3. Weaving – conversion of yarn to fabric by Lord and Mohammed,			
4. Weaving- Machines, Mechanisms, Management by Talukdar, Sriramalu and Ajoankar.			
5.Shuttleless Looms, Talavasek and Svaty,			
6.Modern Preparation and Weaving Machinery by A. Ormerod,			

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7. Shuttleless Looms by J.J. Vincent.,
 8. Handbook of Weaving- S.Adanur. CRC Publisher
 9. Textiles- Motivate Series by A. Wynnes,
 10. Suttleless Weaving-Duxbury & Wray

Textile Chemical Processing - II

TT-503

	L	T	P	Credits
	3	0	0	3
Serial No.	Chapters/Units	Description		Lectures in hour
1)	Introduction to Dyes:	Dyes and pigments, essential properties of dyes for being suitable for application on textile material. The relation between colour and chemical constitution, Classification of dyes according to chemical constitution and application, concept and utility of Colour Index		2
2)	Dyeing Equipment:	General principles of functions of different machines used in dyeing including package dyeing machine, jigger, winch, jet dyeing machine, padding mangles, garment dyeing machines, stenter, thermosoling units, continuous dyeing range etc. construction, schematic diagram, function, speed, capacity etc.		3
3)	Direct Colours:	General properties, classification, dyeing mechanism, general method of application, after-treatment, reasons, a few brand names, role of bath additives. Banned amines and dyes.		3
4)	Azoic colours:	General properties, dyeing mechanism, general properties of naphthols and bases, their classification, stabilisation of bases, objective, methods, brand name of different stabilised bases, application by batchwise, semi-continuous and continuous process, preparation of naphthol and base, after-treatment, reasons, a few brand names, role of bath additives.		5
5)	Vat & Solubilised vat colours:	General properties of vat colours, classification: application method, dyeing mechanism, importance of concept and significance of redox potential in vat colouration, different reducing agents and their merits and demerits, general methods of application: application by batchwise, semicontinuous and continuous process, after-treatment, reasons, a few brand names, special problems associated with vat dyes, reasons, prevention/correction, role of bath additives. General properties of Solubilised vat colours, dyeing mechanism, general method of application.		7
6)	Sulphur colours:	General properties, various brands including solubilised, dyeing mechanism, general method of application-preparation of stock solution, after-treatment, a few brand names, special problems associated with sulphur dyes, reasons, prevention/correction, role of bath additives.		3
7)	Reactive colours:	General properties, classification, dyeing mechanism, general method of application of triazine, vinyl sulphone, homo and hetero-bifunctional reactive dyes, application by batchwise, semi-continuous and continuous process, a few brand names, role of bath additives		5
8)	Disperse colours:	General properties, classification, dyeing mechanism, methods of application, after-treatment, a few brand names, role of bath additives, concept of rapid dyeing, problems with oligomers.		4
9)	Cationic/basic colours:	General properties, classification, dyeing mechanism, general method and principle of application on acrylic fibres, a few brand names, role of bath additives		4
10)	Acid colours, Acid mordant dyes & Metal complex colours	General chemistry, structural difference from direct dyes, classification and properties, dyeing mechanism, methods of application, after-treatment, a few brand names, role of bath additives General properties and merits-demerits of Acid mordant dyes, dyeing mechanism, various methods of application, a few brand names, role of bath additives General structure and properties of 1:1 and 1:2 metal complex dyes, classification, dyeing mechanism, general method of application, after-treatment, reasons, a few brand names, role of bath additives		6
Total Lectures=				42

Text Books:

1. Textile Chemistry Vol. III by R.H. Peters,
2. The Dyeing Of Textile Materials by J. Cegarra, P. Puente, J. Valldeperas,
3. Engineering in Textile Colouration by C. Duckworth,
4. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman,
5. Textile Preparation and Dyeing by A. K. Roy Choudhury (The Society of Dyers & Colourists.
6. Basic Principles of Textile Coloration by . Arthur D Broadbent,
7. Colorants and Auxiliaries, Vol. 1 by J. Shore, 2010).
8. Handbook of textile and industrial dyeing: Volume 1: Principles, processes and types of dyes, ISBN 1 84569 695 6, <http://www.woodheadpublishing.com/en/book.aspx?boo.kID=1894>.
9. Handbook of textile and industrial dyeing: Volume 2. Applications of dyes, ISBN 1 84569 696 4, <http://www.woodheadpublishing.com/en/book.aspx?bookID=1895>.

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Free Elective-I Statistical Quality Control			
TT-504A			
	L	T	P
	3	1	0
Serial No.	Chapters/Units	Description	Credits
			4
1)	Quality Management:	Definition of quality and its importance, different approaches to quality, Description of Deming's fourteen points and Ishikawa's seven tools of quality, utility of statistical method for quality control and improvement, concept of Total Quality Management (TQM), ISO 9000 Standards, Quality Function Deployment (QFD) and Quality Costs.	6
2)	Basic Approaches to Statistical Quality Control:	Population and sample, descriptive and inductive statistics, discrete and continuous variables, subjective tests, collection and classification of data, frequency distributions, measures of central tendency, measures of dispersion, random variables and probability distribution, differences and applications of normal, binomial, Poisson's and other form of distribution.	6
3)	Statistical Analysis for Continuous Function:	Population and sampling distribution of mean, statistical estimation theory, points estimates, concept of single tail and double tail test, Student's t distribution, confidence limit, statistical decision theory, tests of hypotheses and significances, type I and type II errors, difference between two sample means. Test for single variance, Chi-square test, the F distribution, test for the difference between two variances, confidence limits for variance and ratio of two variances, choice of sample size.	8
4)	Statistical Analysis for Discrete Function:	Application of binomial and Poisson's distribution, normal approximation, test for a single proportion and difference between two proportions, application of χ^2 distribution, contingency table.	5
5)	Subjective Tests:	Rank correlation, tied rank, coefficient of concordance.	3
6)	Acceptance Sampling:	Basic idea about acceptance sampling, OC curve, producer's risk and customer's risk.	3
7)	Control Charts:	Advantages using quality control charts, random and assignable causes, action and warning limits, \bar{X} , R, p , $n p$ and c chart, Process Capability Ratio (CP and CPK), concept of 6 sigma process control, brief idea about CUSUM and EWMA chart.	4
8)	ANOVA and Regression:	Some basic concept of Analysis of Variance, method of least squares, linear regression methodology, correlation and standard error.	5
Total Lectures=			40
Text Books:			
1. Montgomery D C, "Introduction to Statistical Quality Control", Fourth Ed., John Wiley & Sons (Asia) Pte. Ltd., Singapore, 2004.			
2. Mehta P V, "Quality Management: An Overview", in 'Testing and Quality Management', Vol. 1, Ed. V K Kothari, IAFL Publication, New Delhi, 1999.			
3. Spiegel M R and Stephens L J, "Schaum's Outlines Statistics", Third Ed., Tata McGraw Hill, New Delhi, 2000.			
4. Leaf G A V, "Practical Statistics for the Textile Industry", Part-I and II, The Textile Institute, U.K, 1984.			
5. Walpole R. E. and Myers R.H., "Probability and Statistics for Engineers and Scientists", McMillan Publishing Company, New York, 1985.			

Free Elective-I Total Quality Management			
TT-504B			
	L	T	P
	3	1	0
Serial No.	Chapters/Units	Description	Credits
			4
1)	Introduction	Definition of Quality, Small q & Big Q, Quality characteristics- weaves, Dimensions, determinants, Quality Planning, Quality & profitability - idea, Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.	6
2)	Quality & Management Philosophies	Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement: Deming Philosophy- Chain reaction, 14 points for management, triangle theory of variance, deadly diseases & sins, Demings wheel. Juran Philosophy- 10 steps for quality improvement, quality trilogy, universal breakthrough sequence. Crosby Philosophy- Crosby's 6 C's, Absolutes of quality, Crosby's 14 points for quality, Crosby triangle. Comparison of 3 major quality philosophies, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.	8
3)	Managing Quality	Traditional Vs Modern quality management, the quality planning, road map, the quality cycle. Cost of	6

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		quality- Methods to reduce cost of quality, Sampling plans, O.C. curve.	
4)	Quality Control	Objectives of quality control, seven tools of quality, Strategy & policy. Company wise quality control. Quality Assurance- Definition, concepts & objectives. Economic models for quality assurance. Statistical methodology in quality assurance. Process capability ratio, Concept of six sigma, New seven Management tools.	7
5)	TQM Tools	Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.	7
6)	Quality Systems	Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.	6
Total Lectures=			40
Text Books:			
<ol style="list-style-type: none"> Dale H. Besterfield, et al., “Total Quality Management”, Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6. James R. Evans & William M. Lidsay, “The Management and Control of Quality”, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5). Feigenbaum, A. V. “Total Quality Management”, McGraw-Hill, 1991. Oakland, J. S. “Total Quality Management”, Butterworth Heinemann Ltd., Oxford, 1989. Narayana V. and Sreenivasan, N. S. “Quality Management – Concepts and Tasks”, New Age International 1996. Zeiri. “Total Quality Management for Engineers”, Wood Head Publishers, 1991. 			

YARN FORMATION LAB - II TT-591

L	T	P	C
0	0	3	2

Contacts: 3P

Credits: 2

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

List of Experiments (Any six selecting two from each category to be conducted):-

Category I (Combing):

- General study of comber machine.
- Study of the gearing diagram and calculation of mechanical draft and draft constant of comber.
- Determination of operating speed and production from the gearing plan of a comber.
- An estimation of noil extraction (between head and overall) in a comber machine.

Category II (Roving Operation):

- Study of various components of speed frame and their functions.
- Study of gearing diagram of speed frame and calculation of speeds of various components.
- Calculation of mechanical draft and draft constant of speed frame.
- Calculation of mechanical twists and twist constant of speed frame.
- Study the working of building motion and differential drive of speed frame

Category III (Ring Spinning & Doubling/twisting):

- Study of gearing diagram of a Ring frame and calculation of speeds of various components.
- Calculation of mechanical draft and draft constant of Ring frame.
- Calculation of mechanical twist and twist constant of Ring frame.
- To study the working of building motion of Ring frame
- Determination of coils per inch and coils per inch constant from the gearing plan of a Ring frame.
- To study the effect of twist on the yarn strength.
- To study the effect of Ring frame draft on the yarn quality.
- General study of the gearing diagram of Two for One Twister/ ring doubler-calculations involved.
- To study the influence of assembly winding on quality of ply yarn
- To study the working principle of Two-for-one twister/Doubling m/c. by producing samples

FABRIC FORMATION LAB-II TT-592

L	T	P	C
0	0	3	2

Contacts: 3P

Credits: 2

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

List of Experiments (Any six to be conducted):-

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1. Passage of warp through the weaving machine; Name and functions of different elements of loom/weaving machine.
2. Study on tappet shedding mechanism; Calculation of heald lift and tappet lift; To find shed geometry from loom and to calculate yarn extension for both top and bottom line of warp for different sheds and to understand symmetric and asymmetric shed concept. Shedding timing w.r.t crank shaft rotation.
3. Study on picking mechanism, Shuttle box; Shuttle checking, Shuttle dimension and weight. Picking timing; To find interference factor/bending factor at entry and exit. Displacement of shuttle in shuttle box w. r. t crank shaft motion.
4. Study of Dobby loom, function of different elements and there timing. Dobby design and pegging.
5. Study of Single lift, Double lift.
6. Study of four bar beat up system and to find out displacement, velocity, acceleration curve actual and calculated. Comparison with SHM curve.
7. Study of 7-wheel take up motion and to calculate theoretical and practical loom constant. Driving system of take up motion.
8. Study of negative and positive/automatic let off system.
9. Study of auxiliary motions like warp protector, weft detector and warp stop motion.
10. Study of box changing motion.

CHEMICAL PROCESSING OF TEXTILES LAB-II

TT-593

L	T	P	C
0	0	3	2

Contacts: 3P

Credits: 2

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

List of Experiments (All experiments to be conducted):-

1. Dyeing of cotton with
 - a) direct dyes
 - b) azoic colours
 - c) vat dyes
 - d) sulphur dyes
 - e) reactive dyes
2. Dyeing of wool, silk and nylon fibre with
 - a) direct dyes
 - b) acid dyes
 - c) metal complex dyes
4. Dyeing of polyester fibre with disperse dyes using
 - a) carrier
 - b) HT-HP
5. Dyeing of polyacrylonitrile fibre with cationic dyes
6. Identification of dyestuff on different substrates

STATISTICAL QUALITY CONTROL LAB

TT-594

L	T	P	C
0	0	3	2

Contacts: 3P

Credits: 2

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

List of Experiments (All experiments to be conducted):-

1. Preparation of frequency distribution and histogram ,calculation of average ,median,mode,variance,standard deviation ,minimum ,maximum,range,lower quartile,upper quartile interquartile range
2. Statistical inference testing for mean with variance known ,variance unknown,inference on the variance ,Study of OC curves,Type I and II error,producers risk,consumers risk
3. Rank correlation,coefficient concordance;preparation of control chart for xbar,R,process capability,study of correlation coefficient and regression equation
4. Study of simple 2 factorial design,Development of regression model,practical interpretation ,response surface plot,study of moving average control charts;
5. Use of Excel and Statistical software.

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TOTAL QUALITY MANAGEMENT LAB

TT-594

L	T	P	C
0	0	3	2

Contacts: 3P

Credits: 2

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

1. Experimental planning, analysis, design of experiments
2. Study of Pareto analysis
3. Preparation of scatterplot
4. Preparation control charts, flow chart for industrial process taking textile or garment industry
5. Cause effect chart, Fishbone, Ishikawa Diagram for cause-effects, development of check sheets, check sheet, check list

Syllabus SEMESTER 6

Production & Operations Management			
HU-611			
L	T	P	Credits
2	0	0	2
Serial No.	Chapters/Units	Description	Lectures in hour
1)	Introduction :	System concept of production; Product life cycle; Types and characteristics of production system; Productivity; Process and product focused organization structures; Management decisions – strategic, tactical and operational.	3
2)	Forecasting :	Patterns of a time series – trend , cyclical, seasonal and irregular; Forecasting techniques : moving average, simple exponential smoothing, linear regression; Forecasting a time series with trend and seasonal component.	4
3)	Materials Management and Inventory Control :	Components of materials management; Inventory control : EOQ model, Economic lot size model, Inventory model with planned shortages, Quantity discounts for EOQ model; ABC analysis; Just-in-time inventory management.	4
4)	Materials Requirement Planning :	MRP concept – bill of materials (BOM), master production schedule; MRP calculations.	3
5)	Machine Scheduling :	Concept of Single machine scheduling – shortest processing time (SPT) rule to minimize mean flow time, Earliest due date (EDD) rule to minimize maximum lateness, Total tardiness minimizing model; Minimizing makespan with identical parallel machines; Johnson's rule for 2 and 3 machines scheduling.	3
6)	Project Scheduling :	Activity analysis; Network construction; critical path method (CPM); Crashing of project network.	3
7)	Quality Assurance :	Meaning of Quality; Quality assurance system; choice of process and quality; Inspection and control of quality; Maintenance function & quality; Process control charts : x-chart and R-chart, p-chart and c-chart; Acceptance sampling : Operating characteristic (O.C) curve, Single sampling plan, Double sampling plan, Acceptance sampling by variables; concept of Six Sigma.	4
Total Lectures=			24
Suggested Readings: Text & References:			
1. Buffa and Sarin, Modern Production/Operations Management, John Wiley & Sons.			
2. R. Panneerselvam, Production and Operations Management, PHI.			
3. Russell & Taylor, Operations Management, PHI.			
4. Adam and Ebert, Production and Operations Management, PHI.			
5. Production & Operations Management by Starr, Cengage Learning India			

Syllabus for B.Tech(Textile Technology) up to Fourth Year

Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011)



Yarn Formation - III			
TT- 601			
L	T	P	Credits
3	0	0	3
Serial No.	Chapters/ Units	Description	Lectures in hour
1.	Introduction to New spinning processes	a) Summary of new spinning processes, possibilities of use of various spinning processes; b) open-end spinning processes: the basic principle of yarn formation, operating principles of rotor, electrostatic, air vortex, and friction spinning; comparison; c) twist spinning: concept of rubbing (self twist) techniques-concept of Reppo spinning, concept of wrap spinning; false twist process- principle of jet spinning, principle of PLYfil spinning; d) Twistless Spinning: adhesive process - concept of Twilo, Pavena and Bobtex process, comparison; e) Recent Trends in the development of New Spinning System; f) commercially popular systems.	8
2.	Rotor spinning:	a) Overview : tasks of the rotor spinning machine, Principle of operation, raw material requirements and preparation: b) opening unit: sliver infeed, opening by means of an opening roller, clothing of the opening roller, trash removal, fibre guide passage, (feed tube); c) yarn formation: fibre flow into the rotor, formation of a coherent fibre strand, back doubling, formation of the yarn, the false twist effect, wrapping fibres, the rotor, influence of the rotor, form and raw material, rotor groove, rotor diameter, combination of rotor diameter and rotor groove, rotor bearing, rotor revolutions, cleaning the rotor, yarn withdrawal and winding, direction of withdrawal, navel, formation of the navel, withdrawal tube. d) Package: requirements for the package, the winding process. Automation in rotor spinning. Technical data of modern rotor spinning machine. Yarn characteristics - structural difference between rotor spun and ring spun yarns, techno-economic aspects of rotor spinning.	12
3.	Friction spinning	Operating principles, classification, raw material, technological interrelationships, yarn structure and characteristics, techno-economic aspect, trends in the development. Features of DREF spinning system, Master Spinner with latest development.	6
4.	Jet spinning	Operating principles of MJS, MTS and MVS spinner, classification, raw material, technological interrelationships, yarn structure and characteristics, techno-economics, development trends.	6
5.	Speciality & Textured yarns:	Overview of Fancy Yarns: Introduction and classification; different forms of fancy yarns (spiral; diamond; multifold; gimp; mock chenille; cloud; knop; loop; snarl; spiral; stripe; slub; eccentric; folded chenille etc.); basic principle of fancy yarn production systems using ring system (slubs, marl, loop, gimp, boucle, spiral, corkscrew, eccentric, button etc), fancy doubling system (spiral, loop, knop, caterpillar, marl, gimp, snarl etc.), Hollow spindle process (Gimp, mock chenille, chenille, spiral etc), Rotor spinning system (slub and lopp yarn). Coloured yarns: solid shades; gill mixing; re-combing. Melange yarns. Speciality coloured yarns: twist shades; single marl; marl; half marl; double marl; single mottle etc Overview of Sewing threads: Introduction and Technology of Sewing threads manufacturing Process. Overview of Textured yarns: Introduction and classification of textured yarns. Different texturing methods and brief working principles. Principles of false twist texturing, air-jet texturing etc. and properties of false twist textured, air-jet textured yarns; Objectives and different methods of producing bulk yarns. Principles of manufacturing high bulk yarn. Testing and evaluation of textured yarns.	8
Total Lectures=			40
Text Books:			
<p>1. W. Klein, New Spinning System, Manual of Textile Technology – Vol-5, by The Textile Institute, Manchester, UK. 2. Open End Spinning by Rohlena 3. P R Lord Spinning in the 70's 4. Open End Spinning by R Niels 5. Martinedale, Goswami & Scardino Textile Yarns, Technology, Structure and Applications, Wiley Interscience publication, 1977, U.S.A. 6. Eric Oxtoby, Spun Yarn Production, Butterworths London 7. Carl A. Lawrence "Fundamentals of Spun Yarn Technology" CRC Press USA 2003. 8. R H Gong and R M Wright, Fancy Yarns- Their Manufacture and Applications, Woodhead Publishing Limited Cambridge England 1st edition 2002 9. Vaidya A A, "Production of Synthetic Fibres" 1st Ed., Prentice Hall of India, New Delhi, 1988. 10. G R Wray, "Modern Yarn Production".</p>			

Fabric Formation-III
GROUP-A
 (Modern Weaving)

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Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011)



TT-602

L	T	P	Credits
3	1	0	4
Serial No.	Chapters/Units	Description	Lectures in hour
1)	Automation in looms	a) Introduction, b)Automatic shuttle looms, c) essential features weft replenishment, d) weft feelers ,types of feeler, principles of working of mechanical, electrical, mechatronic feelers etc.; e) shuttle changing looms (concept only) f) single shuttle automatic bobbin change looms- principle of operation, g) bobbin loaders-principle of operation; h)loom winders- principle of operation(Uni-fill); i) comparison among the three systems of bobbin changing) Automation in shuttleless looms.	3
2)	Picking	i. Micro-shuttle/projectile picking: a) introduction, perspective of development (technological, engineering and environmental) b) principles of mono and multi projectile looms, c)picking mechanisms- concept of torsion bar picking system (Sulzer) ,d)mechanics of torsion bar e)phases of weft insertion ,f)guide in the shed, g)picking and projectile flight through the warp, h)projectile checking and related activities. Introduction to selvage formation, types of selvedges and methods of formation	12
		ii. Rapiet picking: a) introduction, b) detailed classification of rapiet looms with respect to insertion and withdrawal of rapiet in the shed, c) the gripper heads- basic types , idea of commercially available heads, general principle of operation, principal elements, d)rapiet drives- basic types, two commercially popular mechanisms, general principles of operation., e) phases of weft insertion on a divided rigid rapiet tip transfer loom , f) flexible rapiet and rapiet guides in the warp shed.	
		iii. Fluid jet picking: a) introduction, types, idea of fundamental difference with other systems of insertion, i) the range of application of fluid jet picking systems, A. air jet picking: essential requirements, principal elements of the air jet picking system and general description, principle of operation, character of air velocity during picking and weft motion, systems for maintaining the jet integrity, classification of air jet looms, phases of operations in air jet picking.	
		B. water jet picking: essential requirements, principal elements of the water jet picking system and general description, principle of operation, phases of weft insertion, types of loom configurations, fundamental problems of water jet loom, prospect of water jet looms, comparison with air jet looms.	
iv. Direct weft picking: Introduction, general description, principle of operation, different techniques of insertion, fundamental problems, prospects.			
3)	Continuous weft insertion	Introduction, types; i) circular weaving: general description, principle of operation, range of application, prospects; ii) flat multiphase weaving: classification, principles of operation, commercially tested shedding mechanisms of weft way and warp way shed looms, fundamental problems, prospects.	3

Syllabus for B.Tech(Textile Technology) up to Fourth Year

Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011)



Fabric Formation-III GROUP-B (Knitting Technology and Nonwoven Technology)			
1)	B	Introduction to Knitting:	Process, History of knitting, comparison of weaving and knitting, warp and weft knitting, classification of weft knitting machines.
2)		Weft Knitting Elements:	Knitting needles, sinkers, cam systems, type of feeding systems, tensioning devices, stop motions.
3)		Weft Knitted Structures:	General terms in weft knitting; Machine pitch and gauge, Loop, Face loop and back (reverse) loop, Single-faced structures and double-faced structures, Single jersey and double jersey fabrics, Courses, wales and stitch density, Loop length and course length, Different situations in loop formation, Stitch notation, Held loop, Tucking and tuck loop, Floating and float Loop (or missing and miss loop), Drop or press-off stitch, Timing of knitting in circular double jersey machine, Properties and uses of basic weft knitted structures- Plain, Rib, Interlock and Purl along with their derivatives. Different types of stitches. Devices for patterning in circular knitting machine Electronic needle selection.
4)		Circular weft knitting machine and mechanism:	Knitting machine, Frame, Drive, Creel, Tensioner, Guides, Feed plate, Methods of yarn feeding, Principles of yarn feeding, Number of feeders and feeder density, Stop motions, Take-down mechanism, Fabric spreader or stretcher board, Open width cloth winding, Sinkersless knitting machine, Speed factor,
5)		Flat-bed Knitting Machines:	Process of loop formation, cam track, features, and structures produced.
6)		Science of Knitting:	Objectives of studying knitting science, Fields of study, Importance of knitted loop length and loop shape, Loop length, Robbing back, spirality, Parameters of a knitted fabric, Constants of a knitted fabric, Some useful relations, Relation between properties and geometry of a loop, Geometry of weft knitted loop, Tightness factor of knitted fabrics, Relaxation of knitted fabrics, Prediction of finished weight and shrinkage of cotton knits
7)		Warp Knitting:	Machines and mechanism, Principles of loop formation in warp knitting, Needle bar movement, Guide bar movements, Lapping diagram, Tricot machine knitting cycle with bearded needle, Raschel machine knitting cycle with latch needle, Fabric take-down, Warp let-off, Patterning mechanisms, Displacement of various knitting elements during loop formation; Types of stitches and structures; idea of Double needle bar warp knitting machines.
8)		Knitting Calculations	Properties, parameters and production calculations
9)		Nonwoven Technology	i) Overview of Nonwovens, Definition of Nonwoven, Classification of Nonwoven. Steps of making nonwoven. ii) Polymer based Technology : Meltblown, Spunbond, SMS iii) Staple fibre based Technology: a) Formation of Web: Carding, Air laid, Randoweb, Wet laid b) Bonding Technique: Mechanical (needle punching, Stitch bonding), Thermal bonding, Chemical Bonding, Water jet Bonding (SPUNLACE), Application of Nonwoven.
Total Lectures=			45

Text Books:

1. Principles of Weaving by R. Marks and A.T.C. Robinson,
2. Weaving Mechanisms vol. I & II- N.N. Banerjee,
3. Weaving – conversion of yarn to fabric by Lord and Mohammed,
4. Weaving- Machines, Mechanisms, Management by Talukdar, Sriramalu and Ajoankar.
5. Shuttleless Looms, Talavasek and Svaty,
6. Modern Preparation and Weaving Machinery by A. Ormerod,
7. Shuttleless Looms by J.J. Vincent.,
8. Handbook of Weaving- S.Adanur. CRC Publisher
9. Textiles- Motivate Series by A. Wynnes,
10. Shuttleless Weaving-Duxbury & Wray

11. Spencer D J, “Knitting Technology”, 2nd edition, Pergamon Press, 1989
12. Sadhan Chandra Ray, Fundamentals and advances in knitting technology, (Woodhead Publishing India)
13. Ajoankar D B, “Knitting Technology”, Universal Publishing Corporation, 1998.
14. Booth J E, “Textile Mathematics”, Vol. 3, Textile Institute, Manchester, 1977.
15. Reichman Charles, Lancashire J B and Darlington K D, “Knitted Fabric Primer”,
16. National Knitted outwear Association, New York, 1967.

Syllabus for B.Tech(Textile Technology) up to Fourth Year

Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011)



17. Iyer C, Mammel B & Schach W, "Circular Knitting", Meisenbach Bamberg
 18. Russell Stephen, Hand Book of Nonwoven, Woodhead Publishing in Textile

Textile Testing

TT-603

L	T	P	Credits
3	0	0	3

Serial No.	Chapters/Units	Description	Lectures in hour
1)	Data Analysis & Review of statistical techniques	Selection of samples for testing, random and biased samples, review of statistical techniques	2
2)	Fibre Testing	Measurement of fibre length: length and its variability measurement, cumulative frequency diagram, fibre length distribution, wt. distribution curve, methods of measurement and associated parameters: fibre fineness: technical significance, various parameters of measurement, gravimetric, optical, air flow and vibroscopic method; determination of maturity of cotton: significance, maturity ratio, maturity coefficient, degree of thickening, methods of measurement- air flow, dye method, polarising light method and NaOH method; crimp : significance, methods of determination; foreign matter content of fibres: significance, methods of determination; moisture in fibres: relative and absolute humidity, standard atmosphere and testing atmosphere, effect of moisture on fibres, moisture content and regain , moisture estimation methods; tensile testing of fibres: comparative stress-strain diagrams of different fibres, tensile testing of single fibre, bundle strength testing, principles of operation of CRL, CRT , CRE and accelerated rate of loading type of tensile testers;HVI and AFIS testing and their parameters.	12
3)	Yarn testing	Yarn dimensions and numbering: linear density, yarn numbering systems, determination of yarn count, conversion from one system to another, measurement of yarn diameter; measurement of twist: twist, diameter and count relation, twist factor, optimum twist, effect of twist on fabric properties, methods of twist measurement; yarn strength: the concept of yarn rupture, types of tests- single thread, lea and ballistic test, types of testers and their principles of working (pendulum, spring, inclined plane, strain gauge etc.), types of testing (CRT,CRL,CRE and ARL), the effect of gauge length (the weak link theory etc.), automation in tensile testers; evenness testing: idea of the theory of random assemblies of fibres, theoretical best evenness possible, the V(l) and B(l) curves, periodic variations(drafting wave, machine imperfections), evenness testing of laps, slivers, rovings and yarns, Spectrogram, analysis of periodic variations in mass per unit length. Yarn appearance and grading, Uster Classimat; hairiness of yarn: methods of testing and implications for further processing; grading of yarn, special testing of interlaced and textured yarns.	12
4)	Fabric testing	Fabric parameters and dimensions: analysis of cloth- design, ends spacing, picks spacing, count of warp and weft, warp and weft crimp, fabric weight, fabric thickness; fabric strength: influence of fabric structure on strength, types of tests (raveled strip, grab, weakened strip etc.) types of testing (CRT, CRL, CRE and ARL), two dimensional tests(bursting strength etc.), tear strength; comfort properties: fabric handle and drape, bending, shear and compressional properties of fabrics, stiffness, crease recovery and wrinkle behaviour; air, water and vapour transmission through fabrics, thermal resistance of fabrics, abrasion resistance of fabrics and durability: abrasion resistance, pilling resistance of fabrics, seam slippage, water repellency and shrinkage, Kawabata and FAST systems,special tests for carpets and nonwoven fabrics.	13
Total Lectures=			39

Text Books:

1. Principles of Textile Testing by J. E. Booth,
2. Textile Testing by Skinkle,
3. Physical Properties of Textile Fibres by W.E. Morton and J.W.S. Hearle,
4. Testing and Quality Management by V.K. Kothari
5. Physical testing of textiles, [B. P. Saville](#), [Textile Institute](#), Woodhead Publishing, England,
6. Textile Testing: Physical, Chemical, and Microscopical , [Skinkle, John H.](#)
7. Fabric testing, Edited by Jinlian HU, Woodhead Publishing.

TT 604 : Textile Elective - I

Theory of Textile Structure

Textile Elective - I

TT-604A

L	T	P	Credits
3	0	0	3

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Serial No.	Chapters/Units	Description	Lectures in hour
1	Introduction:	Basic concepts of yarn and fabric structure.	1
2	Yarn structure:	Types of yarn, the idealized helical yarn structure, yarn count and twist factors, twist contraction and retraction, packing of fibres in yarn, effect of fibre properties on the diameter and density of yarn, measurement of yarn diameter, density and specific volume, empirical formulas for the determination of yarn diameter.	5
3	Morphology of single yarn:	The arrangement of fibres in a unitary yarn, ideal migration, characterization of migration behaviour, techniques of determining the position of fibre in a yarn, migration in blended yarns, mechanisms of migration, effect of various parameters on migration behaviour.	4
4	Continuous filament yarns:	Analysis of tensile behaviour, effect of traverse force and lateral components of continuous filament yarns. extension & breakage of spun yarn.	3
5	Staple fibre yarns:	Introduction, fibre obliquity and slippage, influence of fibre length, fibre fineness and friction.	4
6	Blended yarns:	composition of fibres in cross section of blended yarns, blend irregularity, distribution of blend components, strength of blended yarns, introduction of Hamburger's model.	4
7	Woven structure:	Cloth setting theories, study of Peirce's model and its applicable formula; limiting structures :modifications due to deviation from circular cross-section of yarn, cover and crimp interchange in woven fabrics with respect to simple geometry, shrinkage analysis..	6
8	Knitted and Non-woven structures:	Geometry of weft Knitted structures., relationship with loop for plain knitted fabric., Areal density of plain knitted fabric.,Tensile properties of Knitted fabric.,Nonwoven structures., Tensile behaviour of non-woven fabric.	5
9	Fabric Properties:	An elementary idea about tensile, buckling, bending, shear, compression and drape behaviour of fabric..	6
Total Lectures=			37

Text Books:

1. Hearle J W S, Grosberg P and Backer S, "Structural Mechanics of Fibres Yarns and Fabrics", Wiley Interscience, New York, 1969.
2. Goswami B C, Martindale J G and Scardino F, "Textured yarn technology, structure and applications", Wiley Interscience Publisher, New York, 1995.
3. Peirce F T and Womersley J R, "Cloth Geometry", reprint, The Textile Institute, Manchester 1978.
4. Hearle J W S, Thwaites J J and Amirbayat, "Mechanics of Flexible Fibre Assemblies", Sijthff and Noordhoff International Publishers BV, Alphen aan den Rijn, Netherlands 1980.
5. Journals: Textile Research Journal, Princeton, USA and Journal of Textile Institute, Manchester, UK
6. Newton A (1993), Fabric Manufacture: A Hand book, Intermediate Technology Publications, London.
7. Grosicki Z (1988), Watson's Textile Design and Colour, Newnes Butterworths.
8. Weiner L (1971), Textile Fabric Design Tables, Technomic, Stamford, USA.
9. Seyam, A M (2002), Textile Progress, The Textile Institute, Vol. 31, No. 3. Jinlian HU, Structure and Mechanics of Woven Fabric, Woodhead Publication.
10. Kemp A (1958), J. Text. Inst., 49, T 44.
11. Love L (1954), Text. Res. J., 24, 1073.

Theory of Elasticity for Textiles

Textile Elective-I

TT-604B

L	T	P	Credits
3	0	0	3

Serial No.	Chapters/Units	Description	Lectures in hour
1)	Introduction	Introduction and Historic Overview	1
2)	Introduction to Tensor Algebra:	a. Summation Convention, b. Kronecker's Delta and the permutation Tensor, c. Coordinates and Tensors Transformation, d. Derivatives Convention	4
3)	Stress:	a. Notion of Stress, b. Stress in Cartesian Coordinates, c. Shear Stresses, d. Stress at a Point, e. Principal Stresses and Principal Coordinates, f. Maximum Shearing Stresses, g. Stress Ellipsoid, h. Hydrostatic and Deviatoric Stress Tensors, i. Equilibrium Equations and Boundary Conditions	6
4)	Strain:	a. Displacements and Strains, b. Strain at a Point, c. Principal Strains and Principal Coordinates, d. Local Rotation, e. Hydrostatic and Deviatoric Strain Tensors, f. Compatibility Equations,	4
5)	Constitutive Equations	a. Generalized Hooke's Law, b. Relationships between Elastic Moduli	2
6)	General Formulation of Elastic Problem:	a. Boundary-Value Problems in Elasticity, b. Navier's Equations, c. Beltrami-Michell's Equations, d. Principle of Superposition, e. Saint-Venant's Principle, f. Uniqueness of Solution	4
7)	Three-Dimensional Problems:	a. Bar Stretched by its Own Weight, b. Torsion of a Circular Shaft, c. Bending of a Prismatic Bar	4

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8)	Two Dimensional Elasticity:	a. Plane Strain, b. Plane Stress, c. Airy's Stress Function	2
9)	Plane Problem in Cartesian Coordinates:	a. Solution by Polynomials	2
10)	Plane Problem in Polar Coordinates:	a. General Solution, b. Thick-Walled Cylindrical Pressure Vessel (Lamé's problem), c. Pure Bending of a Curved Beam, d. Stress Concentration around a Circular Hole (Kirsch's problem), e. Rotating Disks, f. Concentrated Line-Force on a Plane, (Flamant's problem), g. Force Acting at the End of a Wedge, h. Shrink Fit	5
11)	Torsion:	a. Torsion of a uniform circular shaft, b. Torsion of non circular cylindrical Bars, c. Torsion of Hollow Bars, d. Membrane Analogy	3
12)	Strain Energy:	a. Strain Energy Density, b. Strain Energy Density Function, c. Betti-Maxwell Reciprocal Theorem	3
13)	Thermoelasticity:	a. General Approach, b. Plane Thermoelastic Problem in Polar Coordinates	2
Total Lectures=			42
Text Books:			
[1] Timoshenko, S.P., and Goodier, J.N., Theory of Elasticity, McGraw-Hill (1970).			
[2] Sokolnikoff, I.S., Mathematical Theory of Elasticity, Krieger Publishing Company (1983).			
[3] Shames, I.H., Mechanics of Deformable Solids, Krieger Publishing Company (1983).			

Free Elective-II

COLOUR SCIENCE

TT-605A

L	T	P	Credits																																				
3	0	0	3																																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Serial No.</th> <th style="width: 15%;">Units</th> <th style="width: 70%;">Description</th> <th style="width: 10%;">Lecture hours</th> </tr> </thead> <tbody> <tr> <td>1)</td> <td>Basic concept</td> <td>Concept of colour and brief idea about the relation between colour and chemical constitution</td> <td style="text-align: center;">3</td> </tr> <tr> <td>2)</td> <td>Visual measures</td> <td>Visual description of colour, hue, chroma, value colour order systems – Munsell system</td> <td style="text-align: center;">3</td> </tr> <tr> <td>3)</td> <td>Transmission & scattering</td> <td>Interaction of light with object – reflection, transmission and scattering, factors governing transmission, Beer's law, Lambert's law, scattering of light, Kubelka-Munk function</td> <td style="text-align: center;">6</td> </tr> <tr> <td>4)</td> <td>Instruments</td> <td>Concept and definition of source, illuminant, concept of colour temperature colour measuring instruments – colorimeters, spectrophotometers and their components.</td> <td style="text-align: center;">6</td> </tr> <tr> <td>5)</td> <td>Instrumental measures</td> <td>Instrumental measures of colour, standard observers functions, tristimulus value, chromaticity coordinates and chromaticity diagram, uniform colour scales, colour difference equations. Instrumental, pass-fail criteria. Measurement whiteness, evaluation of optical whitening</td> <td style="text-align: center;">8</td> </tr> <tr> <td>6)</td> <td>Matching</td> <td>Brief idea of computer colour matching and formulation</td> <td style="text-align: center;">6</td> </tr> <tr> <td>7)</td> <td>Appearance</td> <td>Metamerism, metameric indices, Brief idea about chromatic adaptation.</td> <td style="text-align: center;">4</td> </tr> <tr> <td colspan="3" style="text-align: right;">Total</td> <td style="text-align: center;">36</td> </tr> </tbody> </table>				Serial No.	Units	Description	Lecture hours	1)	Basic concept	Concept of colour and brief idea about the relation between colour and chemical constitution	3	2)	Visual measures	Visual description of colour, hue, chroma, value colour order systems – Munsell system	3	3)	Transmission & scattering	Interaction of light with object – reflection, transmission and scattering, factors governing transmission, Beer's law, Lambert's law, scattering of light, Kubelka-Munk function	6	4)	Instruments	Concept and definition of source, illuminant, concept of colour temperature colour measuring instruments – colorimeters, spectrophotometers and their components.	6	5)	Instrumental measures	Instrumental measures of colour, standard observers functions, tristimulus value, chromaticity coordinates and chromaticity diagram, uniform colour scales, colour difference equations. Instrumental, pass-fail criteria. Measurement whiteness, evaluation of optical whitening	8	6)	Matching	Brief idea of computer colour matching and formulation	6	7)	Appearance	Metamerism, metameric indices, Brief idea about chromatic adaptation.	4	Total			36
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Total			36																																				

Text Books:

1. R. McDonald Colour Physics for Industry, SDC publication
2. A.K. Roy Choudhury, " Modern Concept of Color and Appearance", published jointly by Science Publishers, Inc., Enfield, NH 03748, USA, pp. 326, [ISBN 1-57808-078-9] and Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi
3. M L Gulrajani, Colour Measurement: Principles, advances and industrial applications. Edited by Woodhead Publishing Series in Textiles No. 103, ISBN 1 84569 559 3,

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4. A.K. Roy Choudhury, Principles of Colour and Appearance Measurement, . Woodhead Publishing Series in Textiles
5. Committee on Colorimetry of the Optical Society of America, *The science of color*, Thomas Y. Cromwell, New York, 1953.
6. K McLaren, *The Colour Science of Dyes and Pigments*, Adam-Hilger, Bristol (U.K.), 1983.
7. Kurt Nassau, *The Physics and Chemistry of Colour*, Wiley-Interscience, New York, 1983.
8. H. S. Shah and R. S. Gandhi, *Instrumental colour measurements and computer aided colour matching for textiles*, Mahajan, India, 1990.
9. R W G Hunt, *Measuring Colour*, Ellis Horwood, Chichester (U.K.), 1987.
10. D.B. Judd and G. Wyszecki, *Color in business, science and industry*, 2nd.Ed., John Wiley & sons, New York, 1963.

INTRODUCTION TO JAVA PROGRAMMING			
TT-605B			
L	T	P	Credits
3	0	0	3
Serial No.	Chapters/Units	Description	Lectures in hour
1.	Introduction	Introduction to Programming Languages and algorithms, The Evolution of Java, Object-Oriented Programming Concepts and Java, Differences between C++ and Java, The Primary Characteristics of Java, The Architecture, Programming with Java,	3
2.	JAVA Fundamentals	Tokens, Identifiers, Keywords, Literals, Separators, Comments and Whitespaces, Operators; Expressions; Using Data Types, Primitive Data Types, Reference Data Types; Declarations; Control Flow, Blocks and Statements, Conditional Statements, Looping Statements	7
3.	JAVA Classes, Packages and Interfaces	Introduction, Classes-Defining simple class, Class Variables, Class Methods, Return Types, Method Modifiers, Declaring Method Security and Accessibility, Overloading Methods; Working with Objects, Creating Objects, Destroying Objects, Constructor; Packages, Declaring a Package, Accessing Other Packages, Package-Naming Conventions, The CLASSPATH Environment Variable, Overview of the Standard Packages; Inheritance, Sub-classing, Method Overriding; Interfaces, Declaring an Interface, Implementing Interfaces, Modifiers, Using an Interface	10
4.	JAVA Streams	Data Flow with Java Streams, Input Streams, Output Streams,	4
5.	Exception Handling in JAVA	Introduction, Exception Methods, java . lang Exceptions,	4
6.	JAVA Threads	Introduction; Creating Threads; The Life Cycle of a Thread; Thread Methods; Using Threads, Declaring Threads, Creating and Starting the Thread Object new and the Instantiation of Threads, Stopping the Thread, Destroying a Thread, Naming a Thread; Synchronization of Threads, Producer/Consumer Example, Locking an Object, Synchronized Blocks, Using the notify All and wait Methods, Deadlocks	6
7.	JAVA Applets	Introduction, Applet Examples, The java.applet.Applet Class, The Five Stages of an Applet's Life Cycle, Methods for Adding UI Components, Methods for Drawing and Event Handling,	4
8.	JAVA AWT	Introduction, Control Classes-component, layout and menu classes	1
Total Lectures=			39
Text Books:			
<ol style="list-style-type: none"> 1. Introduction to Java Programming, 6th Edition , Y. Daniel Liang (2007) ,Pearson Prentice Hall, 2. Schaum's Outlines of Programming with Java [Paperback] J. R. Hubbard ,Hubbard, Schaums 3. Thinking in Java 3rd ed- Bruce Eckel, Publisher: Prentice Hall 4. Java Gently, 3rd Edition: by Judith Bishop 5. Sams Teach Yourself Java 1.1 in 24 Hours: Rogers Cadenhead, Laura Lemay, and Charles Perkins 6. LEARNING JAVA by Rich Raposa, Wiley Publications 7. Who's Afraid of Java? ,by Steve Heller ,Publisher: AP Professional 8. Java: How to Program with an Introduction to Visual J++ ,by Harvey M. Deitel, Paul J. Deitel ,Publisher: Prentice Hall 9. Java by Example, 2nd Edition ,by Jerry Jackson, Alan L. McClellan ,Publisher: Sunsoft Press/Prentice Hall 10. Java for Dummies, 2nd Edition ,by Aaron E. Walsh,Publisher: Dummies Press/IDG Books 			

INTRODUCTION TO MICROPROCESSORS			
TT-605C			

Syllabus for B.Tech(Textile Technology) up to Fourth Year

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	L	T	P	Credits
	3	1	0	4
Serial No.	Chapters/Units	Description		Lectures in hour
1.	Introduction to Digital Computers	Computer & Digital Computers , Architecture of Digital Computers ;Elements of a General Digital Computers , Input Devices , Output Devices , Microprocessors , Semi-conductor Memories ; Introduction to the Programming ,Assembly Language , Instructions , Programs ; Programming Systems , Instruction Decoder Unit , Machine Cycle Encoder Unit ; Introduction to Addressing Modes , Addressing , Addressing Modes ; Higher Level Language .		4
2.	Buses and CPU Timings:	* Introduction to the Buses , Types of Buses , Address Bus , Data Bus ,Control Bus ,Supporting Elements for Buses , Tri-state Logic ;Buffer ; Machine Cycles Assembly Language ; Timing Diagrams .		2
3.	Microprocessor Development Systems :	Introduction to the Microprocessor; General Architecture of Microprocessors; Elements of Microprocessors ; Registers; ALU; Control Unit; Evolution of Microprocessors , First Generation Microprocessors ,Second Generation Microprocessors , Third Generation Microprocessors , Fourth Generation Microprocessors ; Data Transfer, Data Transfer Schemes , Programmed Data Transfer Scheme ,DMA Data Transfer ,Advancement Schemes for Microprocessors.		6
4.	8-bit Microprocessors :	Introduction to 8-bit Microprocessors , Characteristics of a General Microprocessor; Specifications of an 8-bit Microprocessors ,Pin configuration of 8085 Microprocessor; Architecture of 8085 Microprocessor , Register Organization ,Arithmetic and Logical Unit (ALU) , Interrupt Controller, Serial Communication Controller , Timing and Control Unit , Instruction Decoder and Machine Cycle Encoder Unit, Address/Data Buffer , Incrementer/Decrementer Latch		6
5.	Instructions of 8085 Microprocessors:	Introduction to the Instructions ; Instruction-set ;Addressing Modes , Register , Direct ,Immediate, Implicit , Register Indirect ; Types of Instructions ,Byte ; Classification of Instructions , Data Transfer Group ,Arithmetic Group ,Logical Group , Branching Group ; Stack Control , Machine Control Group.		3
6.	16-bit Microprocessors:	Introduction to 16-bit Microprocessors , Specifications of 16-bit Microprocessors , Pin Configuration of 8086 Microprocessor; Architecture of 8086 Microprocessor, Execution Unit ,Bus Interface Unit , Memory Segmentation , Physical Address Generation , Operating Modes ,Interrupts of 8086 Microprocessor		3
7.	Instructions of 8086 Microprocessor:	Introduction to the Instructions ,Instruction-set ,Addressing Modes , Register ,Direct ,Immediate ,Implicit ,Register Indirect ,Relative ,Based ,Indexed ,Based-indexed ,Based-indexed-relative ,String ,Scalar ,Classification of Instructions , Data Transfer Group , Arithmetic Group , Logical Group , Branching Group , Process Control , String Operation Group		4
8.	Fundamentals of Programming:	Assembly Language Programming ,Steps for Assembly Language Programming ,Defining the Problem ,Algorithms ,Flow Charts ,Programs ,Result ,Example of a Program ,Machine Coding ,		3
9.	Assembler Level Programming:	Assembler Level Programming ,Memory Space Allocation ,Assembler Directives		2
10.	Peripheral Interfacing:	Introduction to the Peripheral Devices ,Types of I/O Devices ,Memory Mapped I/O ,I/O Mapped I/O ,Interrupt Driven I/O ,DMA I/O ,Interfacing ,Hardware ,Software , Interfacing Steps ,Interfacing Devices ,Programmable Timer/Counter (8253/8254,Function ,Pin Configuration ,Architecture ,Control Word ,Functions of Control Word ; Programmable Peripheral Interface (8255) ,Function ,Pin Configuration ,Architecture ,Control Words Functions of Control Word ;Universal Synchronous Asynchronous Receiver and Transmitter (USART)(8251) , Function ,Pin Configuration ,Architecture ,Control Words Functions of Control Word ;Programmable Interrupt Controller (8259) ,Function ,Pin Configuration ,Architecture ,Control Words Functions of Control Word ;Programmable DMA Controller (8257) ,Function ,Pin Configuration ,Architecture ,Control Word ,Functions of Control Word ;RS 232-C ,Function ,Pin Configuration ,Parallel Printer Interface ,Function,Pin configuration ,USB ,Function ,Pin Configuration ,		6
11.	Data Conversions :	Modular Programming ,Assembler ,Linker ,Data Conversions ,Data Conversion using Keyboard ,Data Conversion using Video Display ,Introduction to the 8087 ,Data Formats of 8087 ,		2
Total Lectures=				41
Text Books:				
1. Introduction to Microprocessors , Vibhav Kumar Sachan, Neelesh Ranjan Srivastava , Acme Learning Private Limited; First Edition edition (February 3, 2011)				
2. Introduction to Microprocessors ,A.P. Godse, Technical Publications; SECOND edition (January 1, 2011)				
3. Introduction to Microprocessors , McGraw-Hill Europe; 3rd edition (January 1990)				
4. Inside the Machine: An Illustrated Introduction to Microprocessors and Computer Architecture , Jon Stokes , No Starch Press; 1 edition (November 30, 2006)				
5. Introduction to Microprocessors and Microcontrollers , John Crisp , Newnes; 1 edition (January 15, 2004)				
6. Introduction to Microprocessors with the INTEL 8085 by John A. Seeger (Jun 8, 1995) , Oxford University Press, USA				
7. Microprocessor Architecture, Programming, and Applications with the 8085 (5th Edition) by Ramesh S. Gaonkar (Feb 11, 2002) , Prentice Hall; 5 edition				

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TT 691 : YARN AND FABRIC FORMATION LAB - III

List of Experiments (Selecting at least 3 from each category)			
L	T	P	Credits
0	0	3	2
1.	Yarn Formation Module: Open end Spinning, Friction, Jet and Other advanced Spinning	<ol style="list-style-type: none"> 1. General study of O.E. rotor spinning machine (flow of material, different components of machines and their function). 2. Determination of speeds of various machine components of rotor spinning frame 3. Estimation of twist loss as well as minimum twist required to spin yarn continuously in a rotor spinning machine 4. Studies on twist-strength relationship of rotor spun yarn. 5. General Study of Open-End Friction Spinning Machine (Dref – II, etc.). 6. General Study of False-twist Friction Spinning Machine (Dref – III, etc.) 7. General Study of Air-jet Spinning Machine 8. General Study of Compact/Solo/Vortex spinning Machines 	
2.	Fabric Formation Module: Automatic Loom, Shuttleless Loom, Non- woven and Knitting.	<ol style="list-style-type: none"> 1. Study of weft replenishment mechanism and its timing with respect to crank shaft in automatic loom. 2. Study of driving system of a Rapier loom 3. Study of weft insertion and transfer in Rapier loom 4. Study of weft selection mechanism in a Rapier loom 5. Study of torsion bar mechanism in projectile loom. 6. Study of Weft insertion mechanism and Crank beat-up in projectile loom. 7. Study of selvage formation mechanism on a shuttleless loom 8. Study of non-woven fabric formation (any type). 9. Study of Flat bed and Circular Knitting machine. 10. Study of Single Jersey circular knitting machine 	

TT 692 TEXTILE TESTING LAB - III

1. Determination of linear density and CV of sliver, roving,
2. Determination of twist of single and ply yarn and calculation of twist factor
3. Determination of strength of single thread,lea strength of yarn
4. Study of yarn unevenness U%, yarn imperfection, short term, long term variability of spun yarn
5. Study of yarn unevenness of yarn by visual method
6. Determination of hairiness of yarn
7. Determination of fabric end and picks density, count of yarn from fabric, GSM, thickness, crimp of yarn and calculation of cover factors
8. Determination of course per inch, wales per inch, thickness, GSM, loop length, count of yarn from knitted fabric and tightness of the fabric
9. Determination of design of weave and of knitted fabric
10. Determination breaking load elongation of woven fabric and study of load elongation curve
11. Determination of bending length, crease recovery Drape coefficient of woven fabric.
12. Determination of tearing strength/tearing energy of fabric
13. Determination of bursting strength of a knitted/woven fabric
14. Determination of shrinkage of woven/knitted fabric.
15. Determination of abrasion resistance of woven fabric
16. Determination of pilling resistance of woven fabric

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17. Determination of air permeability of fabric
18. Estimation of handle property of fabric by FAST method
19. Analysis of design of plain, simple twill and sateen woven fabric;

TT 693: TEXTILE ELECTIVE- I LAB **TT 693 A Theory of Textile Structure Lab**

1. Determination of packing fraction and specific volume of a yarn
2. Determination of twist to break of spun/filament yarn
3. Determination of contraction due to twist
4. Determination of migration parameters of spun yarn
5. Determination of load elongation curve of yarn and its analysis
6. Test for limiting conditions of geometry of woven fabric of simple weave (plain, twill, sateen, matt) and their prediction of maximum sett.
7. Determination of the weave value of woven fabric of simple weave (plain, twill, sateen, matt) and its prediction of sett of square fabric by using cloth setting theory
8. Determination of Poisson ratio of yarn
9. Determination of porosity and density of fabric
10. Study of crimp interchange of woven fabric.
11. Study of nature of load elongation property of woven, knitted and nonwoven fabric
12. Study of relationship between course, wales per inch and loop length, tightness factor, weight of weft knitted fabric Study of nature of air flow property of woven, knitted and nonwoven fabric
13. Analysis of shrinkage plain woven fabric.
14. Study of fabric shear and bending.

TT 693 B Theory of Elasticity of Textiles Lab

1. Determination of load-elongation of solid (thin filament like materials)
2. Analysis of the load elongation diagram for finding out young's modulus, yield point, yield strain, yield stress, breaking load, breaking strain, energy to break the specimen, toughness, true stress
3. Study of plastic deformation of solid
4. Determination of Poisson's ratio
5. Determination of bending deformation under three point load of a rod
6. Analysis of bending deflection and load curve and calculation of bending rigidity and modulus of the material
7. Determination of torque –angular displacement diagram of thin filament like material and analysis of the diagram to calculate torsional rigidity and shear modulus of the material
8. Determination of moment of inertia of known cross-section of thin rod like material (circular, elliptical, square, rectangular, hollow circular)
9. Determination of compressive load –deformation of a solid
10. Determination of buckling load –deformation of clamped rod and shell
11. Determination of load – deformation of ring
12. Study of failure of rod due to tensile loading

TT-694 : FREE ELECTIVE-II LAB

TT-694A : Colour Science Lab

- 1) Assessment of Colour defect tests of observers using Ishahara Plate test
- 2) Assessment of Colour defect tests of observers using Munsell-Farnsworth 100 hue test
- 3) Visual assessment of colour – hue, lightness and chroma using Munsell or Scotdic charts
- 4) Measurement of colour by spectrophotometer in both transmission and reflectance mode
- 5) Quality control of colour using colour difference equations
- 6) Brief idea about metamerism
- 7) Brief idea about computer colour matching.

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TT694B: Java Programming Lab

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than knowing.

Java Programming Lab			
TT- 694 B			
L	T	P	Credits
0	0	3	2
1.	Write a program to give the examples of Operators.		
2.	Write a program to give the example of Switch Statements.		
3.	Write a program to find the sum of command line arguments and count the invalid integers entered.		
4.	Write a program to check the Prime number.		
5.	Write a program to arrange the numbers in ascending order.		
6.	Write a program to give the example for 'this' operator and also use the 'this' keyword as return statement.		
7.	Write a program to give the example for method overriding concepts.		
8.	Write a program to give the example for 'super' key operator.		
9.	Write a program to create interface named test. In this interface the member function is square.		
10.	Write a program for example of try and catch block. In this check whether the given array size is negative or not.		
	Write a program to illustrate usage of try/catch with finally clause.		
11.	Write a program using modifiers.		
12.	Write a Applet program to display the "Hello World" in the browser.		
13.	Write a Applet program that automatically display the text with Font Style, Font Type.		
14.			

TT694C : Microprocessor Lab

The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

Microprocessor Lab			
TT- 694 C			
L	T	P	Credits
0	0	3	2
1.	Introduction to the architecture of 8085 microprocessor kit		
2.	Program to move a data block without overlap.		
3.	Program to execute ascending /descending order.		
4.	Program to perform addition of two 8 bit numbers using 8085 instruction set.		
5.	Program using 8085 for finding square root of a number.		
6.	Program to add BCD numbers using 8085 instruction set		
7.	Program to subtract two 16 bit numbers		
8.	Program to implement multiplication by successive addition method.		
9.	Program to implement 16 bit by 8-bit division.		
10.	Program to find the smallest of N numbers.		
11.	Program to implement binary to BCD conversion.		
12.	Program to implement square wave generation using DAC.		
13.	Program to display ASCII equivalent of the key pressed.		

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14.	Program to interface the ADC with 8255.
15.	Study of the architecture of 8086 microprocessor kit.
16.	Program using 8086 for addition of two 16 bit numbers.

Semester 7

Textile Chemical Processing - III

TT-701

	L	T	P	Credits
	3	1	0	4
Serial No.	Chapters/Units	Description		Lectures in hour
1)	Introduction to printing:	Definition of printing, difference between dyeing and printing, different methods printing and styles of printing.		2
2)	Ingredients of printing	Introduction, brief idea about different thickeners and their chemical nature, different methods of fixation of printing paste.		4
3)	Styles and methods of printing:	Styles of printing-viz., direct, resist, discharge, flock printing; roller printing and screen printing (flat bed and rotary) method, transfer printing, making of screens for flat bed and rotary screen printing machines. Different faults of printing and its remedies.		6
4)	Printing procedure of different fibres:	Printing of cellulosic, wool, silk, polyester, polyamide, polyacrylic and their blends with various classes of dyes like direct, acid, basic, azoic, vat, solubilised vat, reactive, disperse, pigment printing including aqueous with relevant after-treatments, faults of printing and their prevention.		6
5)	Introduction to finishing:	Objective of finishing, classification: mechanical, chemical, combination of the two, their significance		2
6)	Mechanical finishing	Mechanical - Objective, classification of different dry mechanical finishing processes like calendaring, embossing; sueding, raising, shearing, and wet mechanical finishing processes like wet calendaring, fulling, sanforising, decatizing, principle, methods		6
7)	Chemical finishing	Chemical - Objective, classification of different chemical finishing processes softening finishes, easy-care and durable press finishes of cellulose, repellent finishes, soil-release finishes, flame-retardant finishes, antistatic finishes, anti-pilling finishes, elastomeric finishes, antimicrobial finishes, insect resist and mite protection finishes, milling of wool, moth proofing of wool mechanism, methods.bio-finishes for cellulose, anti-odour finishes, carbonisation of polyester/ cellulosic materials, application of softeners, organdie finish.		10
8)	Evaluation of different fastness properties:	Objectives of fastness measurement, different methods of fastness namely, wash, light, rubbing, perspiration, other allied fastness properties, their estimation methods		4
Total Lectures=				40

Text Books:

1. Handbook of Fiber Science and Technology, Vol. II, 2. Chemical Processing of Fibers and Fabrics, Part A and B by M. Lewin and S.B. Sello, 3. Principles of Colour Technology, F.W. Billmeyer, 4. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman, 5. Textile Printing (second edition) by L.W.C. Miles 6. An Introduction to Textile Finishing by J.T. Marsh, 7. Technology of Textile Finishing by V.A. Shenai, 8. Methods of Test for Colour Fastness of Textiles and Leather by The Society of Dyers and Colourists, 9. ISI Handbook of Textile Testing by Bureau of Indian Standards, 10. Textile Finishing by A.J. Hall, 11. Colour Physics for Industry by R. McDonald, 12. Chemical After-Treatment of Textiles by H. Mark, N.S. Wooding and S.M. Atlas, 13. Instrumental Colour Measurement and Computer Aided Colour Matching for Textiles by H.S. Shah and R.S. Gandhi, 14. BS Handbook, Methods of Test for Textiles by British Standards Institution, Reference Books of Textile Technologies: Finishing by Pietro Bellini, Ferruccio Bonetti, Ester Franzetti, Giuseppe Rosace, Sergio Vago. 15 Textile Preparation and Dyeing – A. K. Roy Choudhury, SDC India publication.

Design and Structure of Fabric

TT-702

	L	T	P	Credits
	3	0	0	3
Serial No.	Chapters/Units	Description		Lectures in hour
1)	Elements of woven design:	Idea of cloth formation on loom; classification of fabrics; idea of fabric structure; methods of fabric representation; repeat of weave; drafts; requirements of drawing in; weaving plan; lifting plan; relationship between weave; draft and lifting plan; construction of weaving plan from a given weave; construction of weave from a given draft and lifting plan; construction of draft from a given lifting plan and weave.		2
2)	Basic weaves:	General characteristics; Method of construction, features and uses of plain weave and its derivatives, twill weave and its derivatives, Satin and sateen weaves and their derivatives, simple colour and weave effects; idea of compound colour and weave effects. Diamond and Diaper, hucka		10

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		back, mock leno, crepe, honeycomb, brighton honeycomb.	
3)	Special rib, Crepe and cord structure:	Construction of cork screw weaves; features of crepe weave method of preparation of crepe weave and derivatives; features of Bedford cord, construction of bed ford cords- idea of different types	6
4)	Backed cloth:	Warp backed cloth; weft backed cloth; backed cloth with wadding threads; warp and weft wadded cloths; reversible backed cloths.	3
5)	Figuring with extra threads:	Principles of figuring with extra materials; extra warp figuring-concept of simple techniques; extra weft figuring-concepts of simple techniques;	2
6)	Welts and piques:	Ordinary, wadded, fast back welts; piques; idea of loose back, half fast back and fast back fabrics.	2
7)	Double and multilayer cloths:	Classifications of double cloth construction; concept of self stitched; stitched by thread interchange; stitch by cloth interchange; centre stitched; alternate single-ply and double ply construction; idea of wadded double cloths; idea of treble cloth and multiply belting structure.	4
8)	Gauze and Leno structure:	Principles of leno structures; methods of producing leno and idea of simple constructions ; idea of Gauge with reference to Madras Muslin structures.	3
9)	Pile structures:	weft-pile introduction; concept of simple constructions; Terry pile introduction; formation of pile; simple terry weaves; idea of a terry pile forming mechanism ; velveteen; all over or plain west plushes; corded and figured velveteens; velvets;	5
10)	Calculations for fabric feeding:	Standard procedure of fabric calculation; fabric characteristics; dimension of fabric; density of warp and threads in grey fabrics; warp and weft characteristics; take up and crimp of yarn in fabrics; calculation of number of warp and weft threads in fabrics; selecting the selvages; type of weave and weaving plan; calculation of reed; calculation of harness and healds; calculation of yarn mass per unit area of fabric.	5
Total Lectures=			42

Text Books:

1. Groszicki Z J, "Watsons Textile Design and Colour", Newnes Butterworth, 1988.
2. Groszicki Z J, "Watsons Advanced Textile Design", Newnes Butterworth, 1989.
3. Klibbe J W, "Structural Fabric Design", Revised edition, 1965, North Carolina State University.
4. Nisbeth H, "Grammar of Textile Design", 3rd edition, D B Tarapore Wala sons and Co., 1994.
5. Gokarneshan N, "Fabric Structure and Design", New Age International, New Delhi, 2004.

Textile Elective – II (TT-703)

Wool Technology

TT-703A

L	T	P	Credits
3	0	0	3

Serial No.	Chapters/Units	Description	Lectures in hour
1)	Wool fibre and its properties	Morphological structure; components of fibre; fibre diameter, fibre contour, crimp, length, luster, specific gravity and refractive index; moisture relations, wetability; fibre mechanical properties; gross composition of raw wool, molecular structures; hauteur, barbe, CVH, CVB, romaine; principles of measuring different important fibre physical characteristics.	4
2)	Manufacturing wastes	Noils, soft wastes, hard wastes, finishing wastes, recovered wools, method of recovery, rag picking and garneting.	2
3)	Wool blends with manmade fibres	Purpose of blending, effect of blend composition on performance of fabrics.	2
4)	Woolen or carded Yarns	Process flow chart, [preliminary processes, blending or mixing, oiling of the stock, woolen carding, woolen spinning, yarn number and wool grade.	5
5)	Worsted top making and spinning of worsted yarn	Process flow chart, worsted carding, backwashing, oiling, gilling or preparing, worsted combing, tow-to-top conversion systems, worsted drawing, worsted yarn spinning, norms and modern developments.	5
6)	Manufacture of	Woven Fabrics produced by projectile and rapier weaving machines, knitted and nonwoven woolen fabrics, use of FAST in worsted garment manufacturing.	5

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	woolen fabrics		
7)	Chemical Processing	Objects and different methods of carbonizing of wool batch and continuous methods of scouring fibre, yarn and fabric; peroxide and per-acetic acid bleach of wool; production of anti-shrink wool, basic principle of treatment and parameters; dyeing, printing and finishing, testing and quality control of woollen processing.	6
8)	Wool Dyeing	Chemistry of dyeing wool and blend with acid, mordant, metal-complex and reactive dyes, Top and tip dyeing of wool.	3
9)	Wool Finishing:	Scouping, damping, decatizing and paper pressing of wool, Testing and Quality Control.	3
Total Lectures=			35

Text Books:

1. Blended Textiles, Textile Association (India), 1981.
2. Lepenkov Y, "Wool Spinning", Vol. 1 and 2, 1st Ed. Mir Publisher, Moscow, 1983.
3. Bergen W V, "Wool Handbook," vol. 1 and 2, 3rd Ed., Interscience publisher, London.
4. Teasdale D C, "The Wool Handbook", 4th Ed., 1996.
5. Trotman E R, "Dyeing and Chemical Technology of Textile Fibres", Charles Griffin and Co. Ltd., London, 1975

Apparel Technology			
TT-703B			
	L	T	P
	3	0	0
			Credits
			3
Serial No.	Chapters/Units	Description	Lectures in hour
1)	INTRODUCTION	Factors involved in the study of clothing, general functional descriptions of clothing.	5
2)	GARMENT INDUSTRY	General background, origin, location, and growth, structure of apparel industry in India.	5
3)	STUDY IN ANTHROPOLOGY	Basic understanding of 3-dimensional body form, fit and silhouettes, Study about anthropology in relation to size charts, ranges, and grading., Understanding of fit and balance of a garment. Draft basic blocks from measurements of body and dress form;	6
4)	PROPERTIES FOR COMFORT AND FIT	General functional description of clothing, Heat and moisture relations in clothing, physical properties of clothing and clothing materials in relation to comfort, thermal transmission or resistance, water and air-permeability or resistance, radiation exchange with clothing materials, influence of environmental conditions on the protective performance of garments, thermal protection of clothing, stiffness and bending properties, clothing fit and fabric shear, fabric friction, static electricity; aesthetic aspects of clothing, e.g., drape and wrinkle recovery, abrasion resistance, pilling resistance of fabrics, Tailor ability and sewability, water repellency and shrinkage.	6
5)	FIBRES AND THEIR INFLUENCES	Introduction, special for unusual stress environments, trends in fibre usage, influence of fibre yarn characteristic and fabric construction parameters on clothing comfort.	4
6)	STUDY OF CLOTHING	Current trends and new developments, new fibres ,materials and finishes, new techniques, new concepts, garment finishing.	6
7)	GARMENT MANUFACTURE	a)Introduction: Garment manufacture terms and definitions; b) Grading- system of grading, grading of bodice, sleeve, collar etc. and size charts, computer aided pattern making and grading; c) Garment construction- understanding of basic sewing machinery, cut, sew, construct and finish of high quality garments; d) Pattern making- Terminologies lay planning & marker planning, Spreading technology and quality control in pattern making, Application of computer in pattern construction and lay planning's e) Cutting Process: Marking and cutting Process, Reprographics, drilling and notching ,Methods of cutting and automatic cutting f) Sewing and stitching: Stitch classification and seam types, Basic principles and machinery for a variety of sewing operations e.g. chain/ lock/ blind/ multi-needles/ over-lock linking etc stitching machines, g) Trimming Operations: Trims, Operations, thread cutting, labeling, QC- check, etc. h) Finishing operations: Garment finishing and packing processes, i) Production Systems: Conventional and advanced garment production systems, Automation and CIM in garment manufacturing.	8
Total Lectures=			40
Text Books:			
1.Principles of Textile Testing by J E Booth.,			

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2. Performance of Textiles by Lyle,
3. The Technology of Clothing Manufacture by Carr, Harold & Lotham Barbara,
4. Apparel Production Management by Solinger,
5. An Introduction to Quality Control for Textile Industry by P. V. Mehta,
6. Introduction to Clothing Production Management- A.J.Chuter,
7. Garment Technology for fashion designers-Garry Covkem,
8. Knitted Clothing Technology- Terry Breakenbury

Advanced Chemical Processing of Textile

Textile Elective: TT-703C

L	T	P	Credits
3	0	0	3

Sr. No.	Chapters/Units	Description	Lectures in hour
1)	Bio-processing of textiles	Application of enzyme in textile preparatory processes, bio-scouring, bio-polishing etc.	3
2)	Modern development	Modern development in textile preparatory processes. Modern development in textile processing machinery: Soft overflow dyeing machine, continuous bleaching and dyeing processes.	4
3)	Surfactant	Surfactant, role in textile processing and classification according to their chemical nature, concept of micelle, critical micelle concentration, HLB value, cloud point, action, and mechanism of wetting, detergency and emulsification.	4
4)	Textile washing and drying	Washing machines, equipment of water removal- mechanical, thermal and radiation. Relative merits and demerits of conventional and radiation dyeing.	4
5)	Mass colouration	Objective, principle, method, for different man-made fibre, advantages and disadvantages	1
6)	Colouration of blends	Dyeing of polyester/cellulose, polyester/wool, wool/polyamide, wool/acrylic blends by batchwise, semi-continuous and continuous methods	2
7)	Garment dyeing	Different types of Garment-dyeing machinery, their working principles, garment dyeing methods – direct, reactive and pigment.	4
8)	Modern development in printing	Foam printing, Ink-jet printing etc.	3
9)	Low Add-on technique	Different low add-on techniques, foam application, objective, range of application, principle, ingredients of a foam system, half life of foam, blow ratio, foam generator, foam applicator, merits and demerits.	4
10)	Plasma finishing	Brief introduction to plasma, different types of plasma, i.e. vacuum plasma, cold plasma, and atmospheric plasma and their characteristic, advantages and disadvantages, textile application.	2
11)	Nano finishing	Brief introduction, characteristic of nano particles, different approaches of nano particle generation, textile application.	2
12)		Total	35

Text Books:

1. Handbook of Fiber Science and Technology, Vol. II, 2. Chemical Processing of Fibers and Fabrics, Part A and B by M. Lewin and S.B. Sello, 3. Principles of Colour Technology, F.W. Billmeyer, 4. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman, 5. Textile Printing (second edition) by L.W.C. Miles 6. An Introduction to Textile Finishing by J.T. Marsh, 7. Technology of Textile Finishing by V.A. Shenai, 8. Methods of Test for Colour Fastness of Textiles and Leather by The Society of Dyers and Colourists, 9. ISI Handbook of Textile Testing by Bureau of Indian Standards, 10. Textile Finishing by A.J. Hall, 11. Colour Physics for Industry by R. McDonald, 12. Chemical After-Treatment of Textiles by H. Mark, N.S. Wooding and S.M. Atlas, 13. Instrumental Colour Measurement and Computer Aided Colour Matching for Textiles by H.S. Shah and R.S. Gandhi, 14. BS Handbook, Methods of Test for Textiles by British Standards Institution, Reference Books of Textile Technologies: Finishing by Pietro Bellini, Ferruccio Bonetti, Ester Franzetti, Giuseppe Rosace, Sergio Vago. 15. Chemistry and Technology of fabric Preparation and Finishing by Charles Tomasino.

Application of CAD/CAM in Textiles

TT-703D

L	T	P	Credits
3	1	0	4

Sr. No.	Chapters/ Units	Description	Lecture hours
1.	Introduction to	Introduction to computer – Computer Systems: computer Software-operating-Programming	5

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	Computer Systems	Languages-general Software Features and trends. Data base management system: Data processing- Database Management system fundamentals-database design concepts . Introduction to Computer Algorithms and program logics.	
2.	Computerised Knitting & Weaving.	<p>Concepts of CAD/CAM in Fabric Manufacturing. Features of Electronic Dobby & Electronic Jacquards :- Electronic Dobby -- Working principle - Machine parameters – Microelectronics Design features - Drive arrangement - Systems for pattern data transfer - Design development.</p> <p>Electronic Jacquards :- Electronic Jacquard Working principle - Constructional variants - Various electronic jacquard systems - Selection system - Pattern data - Transfer and management</p> <p>Basics of Weaving Design Software. Algorithms of computerized Drafting, Lifting & Weft insertion Plan. Automatic Weft Colour selection. Computer Aided Fabric Design System Introduction to the operation of design software for woven, knitted and printed textiles – Exploration of basic structure, color and textural effects using design software. Development of Jacquard designs - Process of drafting - sketch design - Development of figures - Composition of design - Geometric ornamentation - Arrangement of figures - Weave simulation. Characteristics of Computerized Knitting Machines .</p>	15
3.	Computerised Embroidery Machines & Printing Machines	Features of Computerised Multi Head Embroidery Machines. Basics of Embroidery Design Software & Printing Design Software. Features of Computerised Printing Machines.	5
3.	Computerised Production Planning and process control	Computer aided production planning in Textile and Garment Manufacturing : Application of Computer for purchase, inventory control and sales, Computerized quality control and production control. Introduction to finite scheduling concept and fast react software. Creating product and order planning, concept of ERP, CIM, CAPP etc. updating. Elimination of late deliveries - General set up, Application of DBMS in Apparel Merchandising process. control mechanisms - critical path and time tables.	10
4.	Computerised Quality Control	Introduction to image processing and imaging system-Fabric defect identification using image processing-Artificial neural networks – Data acquisition and fault classification. Yarn Scanner . Yarn Fault Identification	5
Total Lectures=			40

References:

- 1.Alexis leon and Mathews leon"Fundamentals of Information Technology" Leon press,1999
 - 2.Dennis P Curtin "Information Technology",Tata McGraw hill Pvt Ltd 1999
 - 3.James A Senn"Information Technology in Business",Prentice Hall of India Pvt Ltd 1998.
- Windows office XP/MSSOFFICE/MSACCESS/
4. Stephen Gray " CAD / CAM in clothing and Textiles ", Gower Publishing Limited, 1998, ISBN 0-566-07673X.
 5. Compilation of papers presented at the Annual world conference Sep 26 -29, 1984 Hongkong, " Computers in the world of textiles ", The textile Institute ISBN: 0-0900739-69X.
 6. W.Aldrich, " CAD in clothing and Textiles ", Blackwell Science 2nd edition, 1992, ISBN: 0-63 -3893 - 4
 7. Jacob Solinger, " Apparel Manufacturing Handbooks ", Van no strand and Reinhold Company, 1980,ISBN:0-442-21904-0.

Textile Elective III (TT704)			
Technical Textiles			
TT-704A			
L	T	P	Credits
3	0	0	3

Serial No.	Chapters/Units	Description	Lectures in hour
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10)	Introduction	Definition, classification, products, market overview and growth projections of technical textiles. Fibres used in technical textiles, yarns and fabric structures in technical textiles and their relevant properties. Fibres used for technical textile - their characteristics and application areas. Technical Textile wheel.	3
11)	Agro Textile and Geotextiles	Textiles for crop covers, bird netting, shades, soil mats and silos. Types and application of geosynthetics. Functions and application areas of geotextiles. Fibres and fabric selection criteria for geotextile applications. Important characteristics of geotextiles and their evaluation.	6
12)	Medical Textiles	Textiles in various medical applications. Application oriented requirement of typical medical textiles. Materials used and Classification of Medical Textile: Textiles for implantations; Non-implantations textiles; textiles for extra-corporeal devices; Healthcare and hygiene textiles; Speciality fibre for medical application.	6
13)	Textile composites	Type of composites. Textile reinforcement requirement in different types of composites. Properties and uses of rigid composites and flexible composite. Manufacturing technique of producing rigid and flexible composite	4
14)	Protective clothing	Clothing requirements for thermal protection, ballistic protection, UV-protection, protection from electromagnetic radiation and static hazards, protection against micro-organisms, chemicals and pesticides. Design principles and evaluation of protective clothing. High visibility and electromagnetic shielding fabrics.	6
15)	Filter Fabric	Textile and other filter media for dry and wet filtration. Mechanisms of separation. Requirements for good filter media and filtration. Fibre and fabric selection for filtration. Characteristics and uses of woven and nonwoven fabrics.	4
16)	Automotive Textiles	Application of textiles in automobiles. Requirement and design for pneumatic tyres, airbags and belts. Methods of production and properties of textiles used in these applications.	2
17)	Sports Textiles	Sports clothing and Equipment-Scope and classification. Design and materials used in sports active wear. Textile components of sports shoes. Sport surfaces and Equipment.	2
18)	Textiles in miscellaneous industrial applications	introduction, paper makers felt, bearing and sealing materials, sound insulation, battery separators, electrical insulation, automotive application, structural applications Textiles in electronics; Banners and flags; textiles re-inforced products; Transports bags and sheets; Fabrics to control oil spills; Canvas cover and tarpaulins; Rope and nets etc..	4
Total Lectures=			35

Text Books:

1. Wellington Sears Handbook of Industrial Textiles by S. Adanur, 2.Performance of Textiles by Lyle.
2. Medical Textiles-International Conference on Medical Textiles, Bolton, Woodhead Publication, Cambridge, 1997
3. John, N.W.M "Geotextile" Blackie publication, Glasgow, 1987
4. Gulrajani, North India Textile Institute, New York 1992
5. Industrial Textiles – Horrocks

Textile Elective III			
Smart Textile			
TT- 704B			
L	T	P	Credits
3	0	0	3
Serial No.	Chapters/ Units	Description	Lectures in hour
1.	Smart technology for textiles and clothing	Introduction and overview	1
2.	Electrically active polymer materials	Polymer gel, application of non-ionic polymer gel and elastomers for artificial muscles	3
3.	Thermally sensitive textiles	Basics of Heat-storage, Thermally sensitive materials, designing and manufacture of thermo-regulated textiles and clothing, properties and applications	2
4.	Polymeric membranes	PVA and PAAc network, Polymers prepared by plasma and radiation grafting, Polymers for gas separation	3
5.	Fiber Bragg gratings	Fabrication of grating, Mechanical properties of FBG, Optical response of FBG sensors under various deformations, Applications, Smart textile composites integrated with fibre optic sensors	4
6.	Embroidery and smart	Adaptive and responsive textile structures (ARTS), Wearable motherboard: Manufacture,	4

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	textiles	Properties and Applications	
7.	Wearable technology	Wearable motherboard: Manufacture, Properties and Applications; Wearable technology for snow clothing	5
8.	Bio-processing for smart textiles and clothing	Wool, Cotton and synthetic fibres	4
9.	Tailor-made intelligent polymers for biomedical applications	Fundamental aspects of shape memory materials, Concept of biodegradable shape memory polymers, degradable thermoplastic elastomers having shape memory properties, degradable polymer networks having shape memory properties	6
10.	Textile scaffolds in tissue engineering	Ideal scaffold system, Scaffold materials, textile scaffolds - Micro structural aspects, Mechanical aspects	4
Total Lectures=			36

Text Books:

1. "Handbook of Industrial Textiles", Ed. Sabit Adanur, Technomic Publishing Co. INC
2. "Handbook of Technical Textiles", Ed. A R Horricks and S C Anand, Woodhead Publication Ltd, Cambridge, 2000
3. " Textiles for protection, Ed. Richard A. Scott, Woodhead Publication Ltd, Cambridge, U.K.
4. " Wearable Electronics and Photonics, Ed. Xiaoming Tao, Woodhead Publication Ltd, Cambridge
5. Zhang Y P, Hu H P, Kong X D., Phase Change Heat Storage Theory and Application, Hefei University of Science & Technology of China Publishing House, 1996

Textile Elective III	
TT-704C Production of Manmade Fibre Production Technology 3 credits (0-0-3)	Class allotted
Polymerization of nylon-6, nylon-66, poly(ethylene terephthalate), and polyacrylonitrile. Batch versus continuous Polymerisation. Polymer rheology, Shear flow through a capillary, elongational flow in a spinning line. Melt instabilities. Melt spinning lines. Spin draw process Stress induced crystallization in high speed melt spinning. Characteristic features of PET, polyamide and polypropylene spinning. Spin finish and its components. Wet and dry spinning processes. Effect of parameters on fibre breakage and fibre structure. Importance of dry jet wet spinning of PAN. Introduction to drawing and heat setting in thermoplastic fibres.	22
Principles of texturing and modern classification; False twist texturing process- mechanisms and machinery, optimization of texturing parameters, structure-property correlation of textured yarns; Draw-texturing- the need and fundamental approaches; optimization of quality parameters.	8
Air interlacement - Principle and mechanism, Air jet texturing - Principle, mechanisms, development of jets and machinery, process optimization and characterization	6
Total Hours	36

1. Fundamentals of Fibre Formation- The science of spinning and drawing, Andrzej Ziabicki,
2. Manufactured Fibre Technology, VB Gupta & V K Kothari
3. Man Made Fibre, Moncrieff
4. Handbook of Textile Fibres vol.2- Man made Fibres, J. Gordon Cook
5. Polyesters and Polyamides, Woodhead Publishing in Textiles, edited by B L Deopura, R Alagirusamy, M Joshi and B Gupta
6. Process of Fibre Formation, Zbigniew and Walczak
7. Textured Yarn Technology/Vol.1 ,Monsanto
8. Guide to Crimping, MANTRA, Dr R S Gandhi

Free Elective – III (TT-705)			
Introduction to Soft computing			
TT-705A			
L	T	P	Credits
3	0	0	3
Serial No.	Chapters/Units	Description	Lectures in hour

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1)	Introduction	Basics of Soft computing and artificial intelligence , basic differences with the traditional computing process . Necessity of soft computing. , Knowledge Representation–Reasoning, Issues and Acquisition: Propositional and Predicate Calculus Rule Based knowledge Representation. Symbolic Reasoning Under Uncertainty Basic knowledge Representation. Fundamentals of Heuristic model: Techniques for Heuristic search Heuristic Classification.	6
2)	Introduction to Fuzzy Logic.	Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Membership functions, interference in fuzzy logic, , Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzifications, fuzzy if-then rules and rule base , Fuzzy Controller, Application of Fuzzy logic in Textile Research.	7
3)	Fundamentals of Neural Network	Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.	8
4)	Neural Network (Back Propagation network)	Architecture: preceptor model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting back propagation training, applications.	6
5)	Applications of Artificial Neural network	Introduction, applications in prediction, pattern recognition, image processing, classification, fault diagnosis, machine control etc	4
6)	NEURO FUZZY MODELING	Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm– Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neurofuzzy Spectrum.	5
7)	Genetic algorithm	Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.	4
Total Lectures=			40
Text Books:			
<ol style="list-style-type: none"> 1. Introduction to Fuzzy Logic using MATLAB by S. N. Sivanandam, S. Sumathi and S. N. Deepa ,Springer 2. Fuzzy Logic: Intelligence, Control, and Information by John Yen and Reza Langari 3. Timothy J. Ross, "Fuzzy Logic with Engineering Applications, Third Edition" ,Wiley 2010 4. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India. 5. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press. 			
Reference Books:			
<ol style="list-style-type: none"> 1. Siman Haykin,"Neural Netowrks"Prentice Hall of India 2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India. 3. Kumar Satish, "Neural Networks" Tata Mc Graw Hill 			

Image Processing Technology			
TT-705B			
L	T	P	Credits
3	0	0	3
Serial No.	Chapters/Units	Description	Lectures in hour
1)	Introduction and fundamentals of Image Transform	Elements of digital image processing , Image model , Sampling and quantization , Relationships between pixels , Basic geometric transformations-Introduction to Fourier Transform and DFT – roperties of 2D Fourier Transform – FFT – Separable Image Transforms - Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – LoeveTransforms.	9
2	Image Enhancement Terchniques	Enhancement by point processing , Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging, Spatial filtering- Smoothing, sharpening filters – Laplacian filters – Frequency domain filters : Homomorphic filtering. , Enhancement in the frequency domain , Color Image Processing	9
3	Image restoration	Model of Image Degradation/restoration process – Noise models – Inverse filtering -Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition.	6
4	Image compression	Lossless compression: Variable length coding – LZW coding – Bit plane coding- predictive coding- DPCM. Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards: JPEG, MPEG,Basics of Vector quantization.	6

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5	Image Segmentation and Representation	Edge detection – Thresholding - Region Based segmentation – Boundary representation: chain codes- Polygonal approximation – Boundary segments – boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors –Simple descriptors- Texture	5
6	Morphological Image Processing	Dilation and Erosion , Opening and Closing , Some basic Morphological algorithms , Extensions to gray level images	5
Total Lectures=			40

TEXT BOOKS

1. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education 2003.

REFERENCES

1. William K Pratt, Digital Image Processing John Willey (2001)
2. Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Larniy (1999).
3. A.K. Jain, PHI, New Delhi (1995)-Fundamentals of Digital Image Processing.
4. Chanda Dutta Magundar – Digital Image Processing and Applications, Prentice Hall of India, 2000

HU 791 Group discussion

TT 791 Textile Chemical Processing Practical - III

1. Direct style printing of cotton fabric using
 - a) Reactive colour
 - b) Pigment colour
 - c) solubilised vat
 - d) Vat colour
2. Discharge style printing of cotton fabric using reactive colour
3. Batik printing (resist style of printing)
4. Application of functional finishes on cotton using
 - a) Crease recovery finish
 - b) Flame retardant finish
 - c) Water repellent finish
5. Estimation of fastness properties of dyed fabric
 - a) Fastness to Washing
 - b) Fastness to Light
 - c) Fastness to Rubbing

Textile Elective: TT-792

TT 792A wool technology Lab

1. Scouring of wool in the form of raw wool /woolen fabrics
2. Carbonization of wool in the form of raw wool / woolen fabrics
3. Study of Woolen/Worsted Card:
 - a. Study of different zones – Feed zone, carding zone, doffing zone
 - b. Draft calculation- Mechanical and actual draft
 - c. Waste calculation
 - d. Production calculation
4. Study of draw frame with gill pins:
 - a. Study of drafting system – pin drive, pin density, speed. depth of penetration etc.
 - b. Draft calculation
 - c. Production calculation
5. Study of rubbing roving frame:
 - a. Study of drafting system, calculation of draft
 - b. Study of rubbing mechanism
 - c. Production calculation
6. Study of woolen/worsted ring frame:
 - a. Study of drafting system- calculation of draft

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- b. Study of twisting mechanism- calculation of twist
- c. Production calculation

TT 792 B Apparel Technology Lab

1. Prepare basic patterns and do variations
 2. Grade the basic patterns
 3. Construct, finish and press the same using the drafted patterns
- A.Bodice
B.Cuffs
C.Sleeves.
D.Yokes
E.Pockets
F.Collars
G.Plackets
H.Skirts
I. Knitwear (Brief and Vest or Ladies T-Shirt)
J. Salwar-Kameez
4. Planning of Marker. Practical assignments to be given on Marker Planning and Marker Efficiency Calculation

TT 792C Advanced Chemical Processing of Textile Lab

1. Bio-scouring of cotton fabric
2. Bio-polishing of cotton fabric
3. Demonstration of various modern dyeing machines
4. Dyeing of cotton fabric with Pigment colour
5. a) Dyeing of polyester/cellulose,
b) Dyeing of polyester/wool,
c) Dyeing of wool/polyamide,
d) Dyeing of wool/acrylic blends
6. Some modern finishing

TT792 D. CAD CAM in Textiles Lab

APPLICATION OF CAD/CAM in Textile LAB

1. Job on COREL DRAW or PHOTOSHOP for Fabric Design plan and Garment Drawing and Designing
2. Job on WEAVING CAD --- Developing different Dobby designs like Twill , Plain , Matt , Satin , Sateen , Huckaback , Mock Leno etc , with Drafting & Lifting Plan.
3. Development of Jacquard Designs on Floral , Geometric and Damask or Paisley Motifs
4. Development of Simple embroidery designs on Embroidery softwares and running of samples on Machine.
5. Illustration of Printing Designs in Software.

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Free Elective – III Lab

TT 793A: Introduction to Soft Computing Lab

ARTIFICIAL NEURAL NETWORK

- 1: WRITE A PROGRAMME / PREPARE AN ANN MODEL TO IMPLEMENT AND FUNCTION USING ADALINE WITH BIPOLAR INPUTS AND OUTPUTS.
- 2: WAP TO IMPLEMENT AND FUNCTION USING MADALINE WITH BIPOLAR INPUTS AND OUTPUTS.
- 3: WRITE A MATLAB PROGRAM TO IMPLEMENT DISCRETE HOPFIELD NETWORK AND TEST FOR INPUT PATTERN.
- 4: WRITE A MATLAB PROGRAM / PREPARE AN ANN MODEL TO IMPLEMENT BACK PROPAGATION NETWORK FOR A GIVEN INPUT PATTERN.

FUZZY LOGIC

- P1: WRITE A MATLAB PROGRAM / PREPARE A FUZZY MODEL TO IMPLEMENT FUZZY SET OPERATION AND PROPERTIES.
- P2: WRITE A PROGRAM TO IMPLEMENT COMPOSITION OF FUZZY AND CRISP RELATIONS.
- P3:WRITE A PROGRAMME / FUZZY MODEL TO PERFORM MAX-MIN COMPOSITION OF TWO MATRICES OBTAINED FROM CARTESIAN PRODUCT.
- P4: PREPARE A FUZZY RULE BASE FOR THE RELATIONSHIP TAKING AT LEAST 3 INPUT PARAMETERS.

Genetic Algorithm

- P1: WRITE A MATLAB PROGRAM FOR MAXIMIZING $F(X)=X^2$ USING GA, WHERE X IS RANGES FROM 0 to 31 (perform 5 iterations.)

TT 793B: Image Processing Lab

List of Practicals

1. Write Matlab Program for generation and Manipulation of signal.
2. Write Matlab Program for convolution and correlation.
3. Write C/C++ Program for Discrete Fourier Transform.
4. Write Matlab Program for Histogram Processing
5. Write Matlab Program for Image smoothing.
6. Write Matlab Program for Image sharpening.
7. Write Matlab Program for Edge detection.
8. Write Matlab Program for Trimmed Average Filter.

TT 794 Industrial training.

Viva-Voce on Training Report

Semester 8

Organisational Behaviour

HU801A

L	T	P	Credits
3	0	0	2

Serial No.	Units	Description	Lectures in hour
1.	Organisational Behaviour	Definition, Importance, Historical Background, Fundamental Concepts of OB, Challenges and Opportunities for OB.	02
2.	Personality and Attitudes	Meaning of Personality, Personality Determinants and Traits, Development of Personality, Types of Attitudes, Job Satisfaction.	02
3.	Perception	Definition, Nature and Importance, Factors influencing Perception, Perceptual Selectivity, Link between Perception and Decision Making.	02
4.	Motivation	Definition, Theories of Motivation – Maslow’s Hierarchy of Needs Theory, McGregor’s Theory X & Y, Herzberg’s Motivation -Hygiene Theory, Alderfer’s ERG Theory, McClelland’s Theory of Needs, Vroom’s Expectancy Theory.	04
5.	Group Behaviour	Characteristics of Group, Types of Groups, Stages of Group Development, Group Decision Making.	02
6.	Communication	Communication Process, Direction of Communication, Barriers to Effective Communication	02
7.	Leadership	Definition, Importance, Theories of Leadership Styles	02
8.	Organisational Politics	Definition, Factors contributing to Political Behaviour.	02
9.	Conflict Management	Traditional vis-à-vis Modern View of Conflict, Functional and Dysfunctional Conflict.	02
10.	Organisational Design	Various Organisational Structures and their Effects on Human Behaviour, Concepts of Organisational Climate and Organisational Culture.	04
Total Lectures=			24

References:

1. Robbins, S.P. & Jdge, T.A. : Organisational Behaviour, Pearson Education, 15th Edition.
2. Luthans, Fred : Organisational Behaviour, McGraw Hill, 12th Edition.
3. Shukla, Madhukar : Understanding Organisations – Organisational Theory & Practice in India, PHI.
4. Fincham, R & Rhodes, P : Principles of Organisational Behaviour, OUP, 4th Edition.

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5. Hersey, P., Blanchard, K.H., Johnson, D.E. – Management of Organisational Behaviour Leading Human Resources, PHI, 10th Edition.

Process Control in Mechanical Processing of Textiles			
TT801A			
L	T	P	Credits
3	0	0	3
Serial No.	Units	Description	Lectures in hour
1.	Process control of spinning	Process control in blowroom processes, control of process parameters; Process control in carding: control of process parameters, control of card clothing, wire maintenance and card waste; common process control problems for blowroom and carding operations; Process control in drawing, combing and speed frame: The impact of drawing on yarn quality, common problems, key elements, the impact of combing on yarn quality and common problems arising from the process, key elements, Process control in speed frame operations; the impact of speed frame operations on yarn quality and common defects related to the process, future trends; Process control in ring and rotor spinning: Factors affecting spinning tension in ring spinning and end breakage rates, Control of end breakage rate in ring spinning, Control of fly generation and twist variations in ring spinning, Process control in rotor spinning, Control of end breakage rate and twist loss in rotor spinning, Future trends.	12
2.	Process control of weaving & knitting, nonwoven	Housekeeping and material handling. Statistical interpretation of data on waste and quality. Controls for quality, machine stoppage and productivity in winding, warping, sizing, drawing, prin winding and weaving. Standard norms for settings speeds and production rates. Fabric defects and their control. Control and norms of hard waste in various processes. Care, selection and consumption norms of accessories. Importance and types of maintenance, maintenance schedule in winding, warping sizing and loom shed. Machine audit: Energy norms in winding, warping sizing and loom Calculations pertaining to production, efficiency and machine allocation in winding, warping, prin winding, sizing and loom shed and scope of its control. Key control points in knitting process, Quality control of knitted fabrics, Control of knitted loop length, Common faults in knitted fabrics, Other process control factors in knitting, Future trends- online quality control;	18
Total			30
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Process Control in textile Manufacturing edited by A.Majumdar, A.Das, R.Aliguruswamy and VK.Kothari, WoodHead Publishing Limited, 2. Garde A R and Subramanian T A, "Process Control in Spinning ATIRA., Ahmedabad, 1989, 3. "Norms for spinning Mills" by SITRA, Coimbatore, 2007 4. Slater .K., "Yarn Evenness", Textile Progress, The Textile Institute, Manchester, 1986 5. Furter R., "Evenness Testing in yarn production", Part I & II, The Textile Institute, 1982. 6. Paliwal M C and Kimothi.P D, "Process Control in Weaving ", ATIRA Publication, Ahmedabad, 1983. 7. Ahmedabad Textile Industries Research Association Norms. 			

Process Control in Chemical Processing of Textiles			
TT801B			
L	T	P	Credits
3	0	0	3
Serial No.	Units	Description	Lectures in hour
1.	Process control of Chemical Processing	Process control in dyeing of textiles: Dyeing of cotton, Dyeing of synthetic materials, Dyeing of blends, Process control in batchwise and Continuous dyeing, Process control in printing of textiles, Direct printing, Discharge, resist and heat transfer printing, Process control in roller and screen printing, Inkjet printing , Product safety and low-carbon production; Process control in finishing of textiles, Instrumental control, Process control in basic finishing machines, Process control in stenter machines, Calendering , Surface raising and pre-shrinking finishes, Finishing with alkali, Softeners, Resin finishes, Protection from fire damage and water penetration, Anti-pilling finish, antistatic, soil release, antimicrobial and UV protection, Wool treatment and enzyme finishes, control of Low-liquor finishing, Plasma treatments, Future trends	20
2.	Process Control in fibre Production.	Process control in production, Evaluating fibre quality, Process control in polymerisation and fibre spinning, Post-spinning process control of drawing and heat setting.	10

Syllabus for B.Tech(Textile Technology) up to Fourth Year

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	<p>Text Books:</p> <ol style="list-style-type: none"> 1.Process Control in textile Manufacturing edited by A.Majumdar, A.Das, R.Aliguruswamy and VK.Kothari WoodHead Publishing Limited, 2. Doshi.S.M and Shah.H.A, "Quality and Process Control", Chemical Processing Tablet IX, The Textile Association, Bombay, 1984 3. Shenai.V.A., "Evaluation of Textile Chemicals" Sevak Publications, Bombay, 1990. 4. Shah H.S., and Gandhi R.S, "Instrumental Colour Measurements and Computer Aided Colour Matching for Textiles", Mahajan Publications, Ahmedabad, 1990. ISBN: 8185401004. 5. Ahmedabad Textile Industries Research Association Norms. 6. Vaidya.A.A, and Trivedi.S.S "Textile Auxiliaries and Finishing Chemicals", ATIRA, Ahmedabad, 1985 7. Textile Fibres: Developments and Innovations, Vol2, IAFL Publications 8. Manufactured Fibre Technology V. B. Gupta, V.K. Kothari 	
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Textile Mill Planning and Organisation			
TT – 801C			
	L	T	P
	3	0	0
Credits	3		
Serial No	Chapters/Units	Description	Lectures in hours
1	Introduction	Structure of the textile Industry, sectors of Industry, Product types and organization, Domestic industry, size of the industry, Export industry: Size and nature of the industry.	04
2	Location and Layout Planning	Factors affecting location, Plant layout, Different types of layouts, Plant location and Selection of site for a textile mill, Principles of machinery lay-outs and different flow plans of material for spinning, weaving and process house. Calculation for Balancing of machines for spinning and weaving mills and process house, Construction of building of a textile mill, Types of buildings, single and multistoried buildings. Fire hazards and their control.	15
3	Engineering services	System of Ventilation and lighting used in textile mill, Humidification systems used in Textile Mills, Developments in humidification systems, Humidifiers and dehumidifiers, Utilization of steam and power, Power consumption - Energy consumption in textile machines, Measures to reduce power consumption.	08
4	Material Handling	Importance of material handling, Methods and equipment employed-classification of material handling equipments, control of wastes.	05
5		Costing, elements of cost, fixed and variable cost, Knowledge of cost calculation for spinning, weaving and processing department. Viability evaluation of a project, Break even analysis.	08
Total			40
Text Books :			
<ol style="list-style-type: none"> 1. Industrial Engineering and Management by O. P. Khanna 2. Dudeja V D, "Management of Textile Industry", Textile Trade Press, Ahmedabad (1981). 3. Ormerod A, "Textile Project Management", The Textile Institute, Manchester UK (1992). 4. Talukdar M K, Sriramulu P K and Ajaokar D B, "Weaving – Machine, Mechanism and Management", Mahajan Publisher Private Ltd., Ahmedabad, India (1998). 5. Garde A R and Subramanian T A, "Process Control in Spinning", 3rd edition 6. Goal Directed Project Management by E.S. Andersen, K.V. Grude & Tor Hang, Coopers & Cybrant Publication. 7. Management of Textile Production, A. Ormerod. Newnes – Butter Worths Publication. 8. Plant location, Layout & Maintenance by Ruddele Reed. 9. Industrial Organisation & Engg. Economics T.R. Banga & S.C. Sharma, Khanna Publishers, Delhi. 10. Norms for Process Parameters, Productivity etc. ATIRA, BTRA, SITRA, NITRA, etc. 			

Free Elective IV: TT-802			
Mechatronics			
TT – 802A			
	L	T	P
	3	0	0
Credits	3		
Serial No	Chapters/Units	Description	Lectures in hours
1	Introduction	Definition of mechatronics. Mechatronics in manufacturing, products and design. Comparison between Traditional and Mechatronics approach..	02
2	Electronics and Mechatronics	Review of fundamentals of electronics, logic gates and their operations, Data conversion devices, sensors, microsensors, transducers, signal processing devices, relays, contactors and	08

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	elements	timers.	
3	Processors /controllers	Microprocessors, microcontrollers, PID controllers and PLCs, Time domain analysis, transient response of first and second order systems.	06
4	Drives and mechanisms of an automated system	Drives: stepper motors, servo drives. Ball screws, linear motion bearings, cams, electronic cams, indexing mechanisms and transfer systems.	07
5	Control Systems:	Open loop and closed loop control, block diagrams, transfer functions, Laplace transforms.	03
6	Hydraulic system	Hydraulic elements, actuators and various other elements. Design of hydraulic circuits.	06
7	CNC technology and Robotics	CNC machines and part programming., Industrial Robotics.	04
8	Mechatronics systems	Design and fabrication	04
Total			40
Text Books and References:			
<ol style="list-style-type: none"> 1. N.P. Mahalik, Mechatronics, Tata McGraw Hill Publication 2. W. Bolton, Mechatronics, Pearson Education 3. A. Smaili and F. Arnold, Mechatronics, Oxford University Press, Indian Edition 4. M.D. Singh and J.G. Joshi, Mechatronics, Prentice Hall of India Pvt. Ltd. 5. K.K. Appuu Kuttan, Mechatronics, Oxford University Press, New Delhi 6. HMT Ltd., Mechatronics, Tata McGraw Hill Publication 7. F.H. Raven, Automatic Control Engineering, McGraw Hill International. 8. K. Ogata, Modern Control Engineering, Prentice Hall 9. B.C. Kuo, Automatic Control Systems, Prentice Hall. 			

Supply Chain Management			
TT-802B			
L	T	P	Credits
3	0	0	3
Serial No	Chapters/Units	Description	Lectures in hours
1	Introduction to Supply Chain Management	Supply chain – objectives – importance – decision phases – process view, competitive and supply chain strategies – achieving strategic fit, supply chain drivers – obstacles – framework – Elements of supply chain.	05
2	Designing the supply chain network.	Designing the supply chain network; Designing the distribution network – role of distribution – factors influencing distribution – design options – e-business and its impact – distribution networks in practice – network design in the supply chain – role of network – factors affecting the network design decisions – modelling for supply chain.	08
3	Designing and Planning of Transportation and logistics Networks.	Role of transportation - modes and their performance – transportation infrastructure and policies - Just-in-time & Quick Response Logistics The Japanese Philosophy- Quick Response Logistics- Vendor Managed inventory- Logistics Information Systems logistics.	06
4	Sourcing and Pricing.	Sourcing – In-house or Outsource – 3rd and 4th PLs – supplier scoring and assessment, selection – design collaboration – procurement process – sourcing planning and analysis. Pricing and revenue management for multiple customers, perishable products, seasonal demand, bulk and spot contracts.	09
5	Information Technology in the supply chain	IT Framework – customer relationship management – internal supply chain management – supplier relationship management–transaction management– future of IT	05
6	Coordination in a Supply Chain	Coordination in a Supply Chain, Lack of supply chain coordination and the Bullwhip effect – obstacle to coordination – managerial levers – building partnerships and trust –continuous replenishment and vendor-managed inventories – collaborative planning, forecasting and replenishment. Measuring effectiveness of supply management, logistics engineering. Operations Research Models for operational and strategic issues in supply chain management.	07
Total			40
Text Books and References:			
I. Sunil Chopra, Peter Meindal, "Supply Chain Management (Strategy, Planning and Operation). Prentice Hall,2001			

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2. Benjamin S. Blanchard, "Logistics Engineering and Management". Inc Upper saddle river, New Jersey, 2003.
3. Donald J. Bowersox, Davis J. Closs "Logistical Management - The Integrated Supply Chain Process", Prentice Hall, 2002
4. Martin Christopher, "Chap.7 of Logistics & Supply chain Management - Strategies for Reducing cost & Improving Service", 2nd Edition, 2003.
5. Douglas M. Lambert, James R. Stotk, Lisa, M. Ellram, "Fundamentals of Logistics Management"., Prentice Hall, 2002.

Introduction to Bio Technology			
TT-802C			
L	T	P	Credits
3	0	0	3

Serial No.	Chapters/ Units	Description	Lectures in hour
1.	Bio technology	Introduction, overview, scope and areas of application of biotechnology. Biotechnology and Society. Principles and Processes, genetically modified (GM) organisms,	4
2.	Industrial bio-technology	Industrial microbial products – applications, primary metaboloids and secondary metaboloids, Enzymes & Proteins – sources and applications, cell and enzyme immobilization, Industrial plant products – production of enzymes and polysaccharides.	6
3.	Environmental bio-technology	Detailed study about pollution and its control in textile and similar processing industries. Waste water treatment systems – Anaerobic & Aerobic systems, Bio-degradation – Microorganism in pollution control; Bio mass production; waste as renewable sources of energy —Production of bio gas production of hydrocarbon – Hydrogen fuel.	8
4.	Application of Enzyme and Enzyme Technology	Brief Enzyme Overview; Classification & Nomenclature; Enzyme active site, Basic concept of enzyme-substrate reaction, General Characteristics; Environmental Effects on Enzyme Activity; Glycosidic Hydrolases; Cellulases. Pectic Enzymes, Proteolytic Enzymes, Esterases, Lipase, Oxidoreductases, Lipoxygenase. Stability of enzyme, strain selection, (thermophilic, halophilic, alkalophilic producer strain), Protein engineering to improve enzyme stability, Enzyme applications – (Industrial such as textile, analytical and similar processes), Enzyme reaction in non-aqueous medium, Synthesis with hydrolase enzymes, Chemical modification of enzyme to improve physico-chemical properties, Immobilization of enzymes, Various techniques.	14
5.	Applied Biotechnology	General Application in Healthcare, food, medicine, textile and similar fields; Environmental remediation, Public perception of biotechnology; Bio-safety and bioethics issues; Intellectual property rights in biotechnology	5
Total Lectures=			37

Text Books:

1. Text Book of Biotechnology by H K Dass Wley India Publications.
2. Biotechnology Expanding Horizon by B D Singh, Kalyani Publishers, 2007
3. Textbook of Biotechnology by R C Dubey
4. Principles of Biochemistry by Nelson and Cox, McMillan Publishers
5. Environmental Biotechnology by B C Bhattacharya and Ritu Banerjee, Oxford University Press, 2007
6. Enzymes by Trevor Palmer, East west press
7. Fundamentals of Enzymology by Nicolas C price & Lewis Stevens, Oxford University press
8. Biochemical Engineering and Biotechnology Handbook by B Atkinson & F marituna, The Nature Press, McMillan Publishers Limited
9. Tyndall R.M and Raligh N.C. AATCC Book of papers (1991)
10. Asfert L.O and Videback.T Intl Textile Bulletin – Dyeing / Printing / Finishing (1990)
11. Cavaco - Paulo, Gubitz, Textile Processing With Enzymes, Wood Head Publishing Ltd,UK,2003.
12. Ignacimuthu.S & Tata McGrawS.J, "Basic Bio-Technology",-Hill Publications,1995

TT 891 Product – Design Lab

Design of a fabric with given end use ; starting from selection of fibre ,yarn ,fabric along with details of suitable range of parameters required; Selection of wet processing for the fabric; Selection of yarn, fabric formation and wet processing methods (from preparatory to finishing) based on standard techniques with a consideration of product specification and quality.
Submission of design process in hard copy form to the department and presentation by a seminar and subsequent evaluation by group of faculty.