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**TOTAL CREDITS: 27**
# LIST OF PROFESSIONAL ELECTIVE COURSES

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REGISTRATION FOR ANY OF THESE COURSES IS OPTIONAL TO STUDENTS

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<td>TOTAL CREDIT</td>
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<td>72</td>
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COURSE OBJECTIVES:

- To understand the basics of random variables and point estimation with emphasis on the standard distributions.
- To apply the small and large sample tests through Tests of hypothesis.
- To understand the concept of analysis of variance and use it to investigate non-parametric model.
- To monitor a process and detect a situation when the process is out of control.
- To apply the concept of analysis of variance and use it to investigate factorial dependence.

UNIT I PROBABILITY DISTRIBUTION AND ESTIMATIONS 12
Applications of Binomial, Poisson, Normal, t, Exponential, Chi-square, F and Weibull distributions in textile engineering - Point estimates and interval estimations of the parameters of the distribution functions.

UNIT II HYPOTHESIS TESTING 12
Sampling distribution - Significance tests applicable to textile parameters – Normal test, t-test, Chi-square test and F-test - p-values - Selection of sample size and significance levels with relevance to textile applications - Acceptance sampling.

UNIT III ANALYSIS OF VARIANCE AND NON-PARAMETRIC TESTS 12
Analysis of variance for different models – Non-parametric tests - Sign test - Rank test - Concordance test.

UNIT IV PROCESS CONTROL AND CAPABILITY ANALYSIS 12
Control charts for variables and attributes - Basis, Development, Interpretation, Sensitizing rules, Average run length - Process capability analysis.

UNIT V DESIGN AND ANALYSIS OF EXPERIMENTS 12
$2^k$ full-factorial designs - Composite designs - Robust designs - Development of regression Models - Regression coefficients - Adequacy test - Process optimizations.

COURSE OUTCOMES:
At the end of the course, students will be able to

- Analyze the performance in terms of probabilities, distributions and point estimation achieved by the determined solutions.
- Apply the basic principles underlying statistical inference (estimation and hypothesis testing).
- Demonstrate the knowledge of applicable large sample theory of estimators and tests.
- Identify the applicable sample theory of estimators and tests.
- Obtain a better understanding of the importance of the methods in modern industrial processes.

REFERENCES:
UNIT I   FIBRE DISPERSION AND CLEANING  12
Necessity of fibre-individualization; fibre opening and cleaning in blow-room machinery; forces acting on the fibre during carding operation; the mechanism of fibre dispersion, fibre transfer, short fibre removal and trash removal; entanglement and disentanglement of fibres; the new approaches to improve fibre-dispersion in carding operation; mechanism of removal of short fibre and trash in combing.

UNIT II  FIBRE STRAIGHTENING, NEPS REMOVAL  12
Theory of hook formation; measurement of fibre extent, influence of fibre extent on yarn quality; improvement of fibre-extent by carding, drafting and combing actions; generation of neps, neplets removal in carding and combing

UNIT III  ATTENUATION  12
Principle of roller drafting and its application in yarn production; ideal drafting; factors affecting drafting force, fibre dynamics during drafting, drafting irregularities and their causes and remedies; amount of draft and draft distribution on strand irregularity; the function of aprons in roller drafting; limitation of apron-drafting and the scope for improvement; mechanism of wire-point drafting and its application in yarn production; merits and demerits of wire-point drafting; comparison of wire-point drafting with roller drafting

UNIT IV  TWISTING  12
Twisted yarn geometry, forces acting on fibre and yarn during twisting, effect of fibre helix angle on strength, parameters affecting optimum twist level; balloon and spinning triangle formation and their effects on yarn quality and productivity; fundamental requirement to create real twist in a strand, mechanism of twisting principles in ring spinning, separation of twisting and winding actions of yarn; ply twisting, twist balance; modified twisting principles - open end twisting, false twisting, air-jet twisting, air-vortex twisting, up-twisting, two-for-one twisting, hollow-spindle twisting; merits and demerits of modern twisting system.

UNIT V  FIBRE BLENDING AND LEVELLING  12
Importance of achieving homogeneous blending in fibre-mix; types of mixing during spinning preparatory process; lateral and longitudinal fibre blending; analysis of fibre blend index values; process parameters of spinning machinery for processing blended material; influence of intermediate product uniformity on yarn uniformity; different methods of levelling adopted during spinning processes.

TOTAL: 60 PERIODS

REFERENCES:
7. haw J., "Short-staple Ring Spinning", Textile Progress, The Textile Institute, Manchester, 1982

TX4102 ADVANCES IN FABRIC FORMATION L T P C 4 0 0 4

UNIT I WOVEN FABRICS 12

UNIT II KNITTED FABRICS 12
Advances in circular knitting – loop transfer, seamless knitting and sliver knitting techniques; 3- D knitted fabrics – circular and flat weft knit techniques, applications; spacer fabrics – weft and warp knit techniques, applications.

UNIT III BRAIDED FABRICS 12
Principle and production of 3-D braided structures – Cartesian braiding, rotary braiding, and hexagonal; advances in track and column braiding – production of tubular and bifurcated structure; applications.

UNIT IV NONWOVENS 12
Principle and Production of Complex nonwoven structures using various nonwoven production routes; Nonwovens with submicron fibres for technical applications

UNIT V SMART FABRICS 12
Definition and classifications; production and development of smart fibre and yarn; smart fabric structure and preparation – weaving, knitting and braiding technique; applications; Auxetic fabrics – principles, production and applications

TOTAL: 60 PERIODS

REFERENCES:
5. SavvasVassiliadis, Advances in Modern Woven Fabrics Technology, InTech publications, 2011,

TX4151 POLYMER AND FIBRE PHYSICS L T P C 3 0 0 3

UNIT I BASIC CONCEPTS 9
Synthetic fibre forming polymers, definition, terms and fundamental concepts of polymerization; molecular architecture in polymers-configuration and conformation, molecular weight and its influence on fibre formation

UNIT II POLYMER PROPERTIES 9
Glass transition temperature (Tg), factors affecting Tg, WLF equation; rubber elasticity; melting and crystallization, polymer solutions- solubility parameter and its significance to fibre spinning.
UNIT III FLUID FLOW AND MASS TRANSFER
Newton’s law of viscosity, velocity distribution in flow systems Newtonian and non-newtonian fluids; mass transfer operations: Fick’s law of diffusion, solid-liquid extraction and drying operations with application to polymer chips.

UNIT IV VISCOELASTICITY
Deformation of elastic solid, viscoelasticity and its measurement, non-linear viscoelasticity, yield behavior of solids and breaking phenomena.

UNIT V PROPERTIES OF FIBRES
Mechanical properties of natural and synthetic fibres; moisture sorption behavior of natural and synthetic fibres; Thermal, Frictional and optical properties of fibres

TOTAL: 45 PERIODS

REFERENCES:

RM4151 RESEARCH METHODOLOGY AND IPR L T P C
2 0 0 2

UNIT I RESEARCH DESIGN
Overview of research process and design, Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys.

UNIT II DATA COLLECTION AND SOURCES
Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data -Preparing, Exploring, examining and displaying.

UNIT III DATA ANALYSIS AND REPORTING
Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT IV INTELLECTUAL PROPERTY RIGHTS

UNIT V PATENTS

TOTAL : 30 PERIODS
REFERENCES:

TX4161 ADVANCED TEXTILE TESTING LABORATORY L T P C 0 0 6 3

LIST OF EXPERIMENTS
1. Determination / Analysis of Molecular weight determination using GPC
2. Rheological studies using viscometer
3. Determination of MFI
4. Determination / Analysis of Birefringence measurement
5. Determination / Analysis of Creep and Stress relaxation of filament
6. Determination / Analysis of DSC Thermogram of different fibres
7. Determination / Analysis of Thermograms using TGA
8. Analysis - FTIR and NMR graphs
9. Determination/Analysis of crystallinity by XRD
10. Determination of residual formaldehyde in fabrics
11. Evaluation of Flame retardant finish
12. Evaluation of Water repellent finish
13. Evaluation of conductivity of fabrics
14. Determination of surface tension of liquids
15. Determination/ Analysis of contact angle for porous substrates

TOTAL: 90 PERIODS

SEMESTER II

TX4201 WETTING AND WICKING OF TEXTILE MATERIALS L T P C 3 0 0 3

UNIT I FUNDAMENTALS ON WETTING 9
Surface tension of liquids and theories on its measurements; equilibrium state of a liquid on a solid; solid-liquid interaction in immersion, penetration, adhesion and spreading

UNIT II CHARACTERIZATION OF WETTING 9
Determination of wetting force and work of adhesion; measurement of contact angle using Goniometry and tensiometry; critical assessment of the above techniques

UNIT III WETTING OF FIBRES AND FABRICS 9
Wettability assessment of fibres and filaments using goniometry and tensiometry; importance of wetting of fabrics and its assessment

UNIT IV WICKING IN YARNS AND FABRICS 9
Fundamentals of wicking; wicking in yarns and its measurement; wicking in fabrics from an infinite and finite reservoirs; studies on factors affecting wetting and wicking in fibres and fibrous assemblies; mathematical models of wetting and wicking

10
UNIT V APPLICATION
Areas of wetting and wicking of fibrous materials; role of wetting and wicking on comfort behavior of textiles; significance of wetting and wicking in medical and hygiene products; usefulness of wetting and wicking in industrial and domestic products

TOTAL: 45 PERIODS

REFERENCES

UNIT I MASS VARIATION OF TEXTILE STRANDS
Depiction of mass variation of textile strands in time and frequency domain; interpretation and significance of U% and CV% for textile strands; irregularity index.

UNIT II VARIANCE LENGTH CURVE
Effect of specimen length and total length on mass variation measurements of textile strands; theory of construction of VL curve; analysis of variance length curves to understand and avoid the introduction of mass variation during the spinning operation

UNIT III SPECTROGRAM
Determination of periodic mass variation in the form of spectrogram; determination of theoretical wave length from spectrum; comparison between normal and ideal spectrum; type of faults and their representation in spectrogram; interpretation of superimposed waves in spectrogram

UNIT IV TENSILE PROPERTIES
Influence of testing factors on yarn tensile properties; measurement and application of yarn modulus; creep and stress relaxation of yarn; significance of estimating minimum yarn strength

UNIT V YARN DEFECTS
Classification and analysis of yarn faults created by mass variation, their causes and remedies; yarn faults in fabrics - causes and remedies; Hairiness of yarns

TOTAL : 30 PERIODS

LABORATORY:
Measurement and analysis of
1. U% of sliver, roving and yarn
2. Imperfections and hairiness of yarn
3. Tensile properties
4. Creep and stress relaxation
5. Yarn fatigue
6. Variance-length curve
7. Spectrogram
8. Yarn faults

TOTAL : 30 PERIODS

REFERENCES

<table>
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<tr>
<th>TX4203</th>
<th>FABRIC QUALITY ANALYSIS</th>
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UNIT I MECHANICS OF FABRIC FAILURE 6
Mode of fabric failure – tensile, tear, abrasion, slippage, bursting and fatigue; influence of fibre and yarn characteristics, and fabric structure on fabric failure

UNIT II LOW STRESS MECHANICAL PROPERTIES 6
Analysis and interpretation of low stress mechanical properties measured using Kawabata Evaluation System - tensile, compression, bending, shear and buckling deformation; influence of low stress mechanical properties of fabrics on fabric handle, tailorability and sewability

UNIT III COMFORT PROPERTIES 6
Influence of fibre and yarn characteristics, and fabric structure on air permeability, water vapour permeability, resistance to penetration of liquid water, resistance to flow of heat; static electricity measurement and control; influence on comfort properties

UNIT IV FABRIC APPEARANCE AND OTHER PROPERTIES 6
Role of drape, formability, crease recovery, wrinkle recovery, pilling resistance, dimensional stability on fabric appearance, spirality; influence of fibre and yarn characteristics, and fabric structure on the above fabric properties

UNIT V PROTECTIVE PROPERTIES OF TECHNICAL TEXTILES 6
Influence of fibre and yarn characteristics, and fabric structure on flame resistance, impact resistance, absorbency, water resistance, filtration efficiency, anti microbial properties, UV Protection

TOTAL: 30 PERIODS
LABORATORY
1. Measurement/ Analysis of KES data
2. Measurement / analysis of air permeability, filtration efficiency of fabrics
3. Measurement / analysis of tensile and flexural properties of textile materials
4. Measurement / analysis of water vapor permeability and thermal conductivity characteristics
5. Analysis of UV Protection Data

TOTAL: 30 PERIODS

REFERENCES:

TX4211       TEXTILE PRODUCT ENGINEERING LABORATORY       LT P C
            0 0 8 4

LIST OF EXPERIMENTS
Reverse engineering of textile products with an emphasis on testing protocols – minimum six products each for a student

TOTAL: 120 PERIODS

TX4311       PROJECT WORK I         LT P C
            0 0 1 2 6

OBJECTIVES
The course aims to enable the students to
• identify the problem/process relevant to their field of interest that can be carried out
• search databases and journals to collect and analyze relevant data
• plan, learn and perform experiments to find the solution
• prepare project report

TOTAL : 180 PERIODS

Individual students will identify a problem relevant to his/her field of study, collect and analyze literature, design, and carryout experiment, collect data, interpret the result and prepare the project report.
OUTCOMES:
At the end of the course the students will be able to

CO1 Identify the research/industrial problems
CO2 Collect and analyze the relevant literature
CO3 Design, conduct experiment and analyse the data
CO4 Prepare project report

TX4411 PROJECT WORK II

OBJECTIVES
The course aims to
• train students to analyze the problem/ think innovatively to develop new methods/product/process
• make them understand how to find solutions/ create products economically and in an environmentally sustainable way
• enable them to acquire technical and experimental skills to conduct experiment, analyze the results and prepare project report
• enable them to effectively think about strategies to commercialize the product.

TOTAL :360 PERIODS

Individual students will identify a problem relevant to his/her field of study, collect and analyze literature, design, and carryout experiment, collect data, interpret the result and prepare the project report.

COURSE OUTCOMES
At the end of the project the student will be able to

CO1 Formulate and analyze problems for developing new methods/solutions/processes.
CO2 Plan and conduct experiments to find solutions in a logical manner
CO3 Analyze the results, interpret and prepare project report/know the strategies for commercialization

TX4001 ALTERNATIVE SPINNING SYSTEMS

UNIT I ROTOR SPINNING I
Principle of open end spinning; description of the working of the rotor spinning; requirements of the raw materials; preparation of the sliver for rotor spinning; yarn formation and its structure; yarn withdrawal and winding

UNIT II ROTOR SPINNING II
Design of rotor, opening roller, transport tube, navel and their implications on production and yarn quality; developments in rotor spinning machine; production limits; process control; techno economic comparison with ring spinning; structure property relationship

UNIT III FRICTION SPINNING
Principle of yarn formation - DREF-2, DREF-3 spinning systems; developments in friction spinning systems, raw material requirement, theory of yarn formation, effect of process variables on yarn quality, application of these machines for different end products, economics; technological limitations; structure property relationship.
UNIT IV  AIR-JET AND AIRVORTEX SPINNING  9
Description of yarn production in air-jet spinning machine; structure and quality of the air-jet
spun yarn, raw materials requirement, process variables; theory of yarn formation by Air vortex
system, raw material requirement and structure; structure property relationship

UNIT V  OTHER SPINNING TECHNOLOGIES  9
Production of yarn in PLYfill, self-twist, electrostatic, Bobtex spinning systems; working details of
production of double-rove yarns, wrap yarns and core spun yarns; raw material requirement in
these systems; economics of these methods of yarn production; yarn characteristics and their
applications; structure property relationship

TOTAL: 45 PERIODS

REFERENCES:
4. Salhotra K.R. and Ishtiaque S.M., "Rotor Spinning; its advantages ", Limitations and
5. Lord P.R. " Yarn Production; Science, Technology and Economics ", The Textile
Institute, Manchester, 1999.
7. Lawerence C.A and Chen K.Z., "Rotor Spinning ", Textile Progress, The Textile Institute,
Manchester, 1984.
8. Lawrence C. A., “Advances in yarn spinning technology” Wood head publishing,

TX4002  SHUTTLELESS WEAVING TECHNOLOGY  L T P C  3 0 0 3

UNIT I  INTRODUCTION  9
Introduction to shuttleless weaving; advantages of shuttleless weaving, comparison with
shuttle weaving; features of unconventional weaving; different selvedges: tucked-in, leno, fused,
stitched, their mechanism of formation, their characteristics and uses; weft accumulator.

UNIT II  PROJECTILE WEAVING MACHINE  9
Basic principle of projectile weaving; feeding of yarn to projectile; sequence of weft insertion; cam
driven shedding; dwelling sley beat-up; torsion bar picking; energy utilization during picking.

UNIT III  RAPIER WEAVING MACHINE  9
Classification based on type of rapier; system of weft insertion and number of rapiers;
Sequence of weft insertion for Gabler and Dewas systems, their comparison; driving of
flexible and rigid rapiers; asynchronized rapier timing; rapier buckling.

UNIT IV  AIR-JET AND WATER-JET WEAVING MACHINES  9
Principle of weft insertion in air-jet weaving, air requirements; path of the yarn on loom; sequence
of weft insertion; control of air stream by relay nozzle, confuser profile reed and suction; design of
air jet nozzle, air drag force, factors affecting drag force; principle of weft insertion in water-jet
weaving machine, path of the yarn on loom, quality of water required, sequence of weft insertion;
design of water jet nozzle, merits and demerits of water jet weaving; fabric drying on loom
UNIT V MULTIPHASE WEAVING
Technological developments – models & features; functional description of multi-linear shed weaving – shed formation, filling insertion, beat-up, let-off, take-up and selvedge motion; characteristics of multi-linear shed weaving machine; circular and narrow fabric weaving

REFERENCES:

TX4003 HIGH PERFORMANCE TEXTILES

UNIT I FUNDAMENTALS OF HIGH PERFORMANCE FIBRES
Fundamentals of high performance fibres; comparison of regular and high performance fibres; fibre forming process; manufacturing, properties and applications - aramid fibres, high performance polyethylene.

UNIT II INORGANIC AND CARBON FIBRES
Manufacturing, properties and applications - glass fibres, basalt fibres; carbon fibres, ceramic fibres

UNIT III BIODEGRADABLE FIBRES
Manufacturing, properties and applications - alginate fibres; chitosan fibres; regenerated protein fibres – silk, wool, casein, soy bean fibre; synthetic biodegradable fibres

UNIT IV CHEMICAL AND THERMAL RESISTANT FIBRES
Manufacturing, properties and applications of chemical resistance fibres – chlorinated fibres, fluorinated fibres, PPS, PEEK and PEI; thermal resistant fibres – semi carbon fibres, PBI, PBO

UNIT V SPECIALIZED FIBRES
Manufacturing, properties and applications - hollow fibres, profile fibres blended and bi-component fibres, film fibres; functionalization of fibres – methods and applications

TOTAL: 45 PERIODS

REFERENCES:

TX4004 FILTRATION TEXTILES L T P C

UNIT I BASIC PRINCIPLES 9
Filtration and separation, contaminants, surface and depth filtration; filter ratings and filter test, dust collection – theory and principles, practical implications, cleaning mechanisms; fabric design and selection considerations; filter media: introduction, absorbent, adsorbent and biological filter media, paper and fabrics, woven wire and screens, constructed filter cartridges, membranes, packed beds; types of filters.

UNIT II TEXTILE FILTERS & FINISHING TREATMENTS 9
Fabric construction -woven fabrics, needle felts, knitted fabrics; heat setting, singeing, raising, calendaring, chemical treatments, special surface treatments

UNIT III LIQUID AND OIL FILTRATION 9
Water filters, waste water treatments, surface treatment chemicals; oil and hydraulic systems; engine filters, oil-water separators, oil cleaning and hydraulic systems, oil cleaning, hydraulic systems

UNIT IV TEXTILE FILTER IN SOLID-LIQUID SEPARATION 9
Introduction, fabric design/selection consideration, filtration equipment, considerations; yarn types and fabric constructions - monofilaments, multi filaments, fibrillated tape (split film) yarns, staple-fibre yarns, yarn combinations; fabric constructions and properties - plain weave, twill weaves, satin weaves, duplex and semi duplex weaves, link fabrics, needle felts

UNIT V GAS FILTRATION 9
Introduction, indoor air quality, fume and vapour emissions, dust collectors, machine air intake filters, vehicle cabin filters, compressed air filtration, pneumatic systems, sterile air and gas filters, respiratory air filters, Engine filters.

TOTAL: 45 PERIODS

REFERENCES:
UNIT I  LEVELLING
Quality measures and control of intermediate products to achieve required yarn count with minimum dispersion; different levelling methods adopted in the pre-spinning machines; assessment and control of auto levelling; importance of fibre-mix homogeneity on yarn quality; types and levels of mixing in the preparatory processes; assessment of fibre-blend variations, effect of blend variation on fabric quality

UNIT II  NEP AND HOOK REMOVAL
Causes of nep and hook formation, control measures; measurement of neps and hooks; factors influencing the removal of neps in the carding and combing machines; fibre hook straightening during the preparatory operations, factors

UNIT III  WASTE CONTROL
Waste determination and cleaning efficiency; control of waste in blowroom, card and combers; influence of machine and processing parameters on waste removal; controlling the lint content in waste; control of pneumatic waste, hard waste in ring frame; determination of yarn realization; centralized waste collection system

UNIT IV  PRODUCTION CONTROL
Balancing of machinery; factors affecting the production limits of the spinning machinery; new concepts in achieving higher production in the spinning machinery; computation of the productivity indices; automation, improving production and labour efficiency

UNIT V  HUMIDITY CONTROL AND MACHINERY MAINTENANCE
Effect of humidity, temperature and maintenance of machinery on production and quality of yarn, optimizing ambiance and humidity control; process conditions required for producing polyester, viscose and blended yarns; yarn defects – causes and remedies

TOTAL: 45 PERIODS

REFERENCES
UNIT I    INTRODUCTION
Recapitulation of web preparation by dry and wet method and bonding by mechanical, thermal and chemical methods; brief outline of nonwoven manufacture by spun bonding and melt blown processes

UNIT II    WEB QUALITY
Effect of web quality on nonwoven quality; mechanisms of web forming machines and processes to achieve uniformity in web; process control tools used for maintaining web quality

UNIT III    NEEDLE PUNCHED NONWOVENS
Design of needles and its effect on needle punched fabric structure and quality; type of fibres and its characteristics which affect fabric quality; horizontal and vertical structure in needle punched fabrics, and their contribution to fabric properties; needle machine parameters that affect fabric structure and properties

UNIT IV    HYDRO-ENTANGLED, THERMAL AND CHEMICAL BONDED NONWOVENS
Effect of water jets on fibres, effect of water pressure, number of manifolds and nozzles, and type of web support systems used in spun laced nonwoven production on fabric structure and properties; effect of type of heat transfer method on thermal bonded nonwoven structure and properties; effect of process and material variables on the structure and properties of thermal and chemical bonded nonwovens

UNIT V    MELT BLOWN AND SPUN BONDED NONWOVENS
Effect of material and process variables like type of polymer, molecular weight, polymer and air temperature, collector distance, primary and secondary air pressure in melt-blown nonwoven production on fabric structure and quality; factors affecting the structure of spun bonded fabrics and properties

TOTAL: 45 PERIODS

REFERENCES
UNIT I ENZYMES
Nomenclature and classification of enzymes; characteristic features of enzymes; modifiers of enzyme activity - activators and inhibitors; specificity of enzyme action; extraction and purifications of enzymes

UNIT II ENZYME KINETICS
Kinetics of single-substrate enzyme-catalyzed reactions; basics of kinetics of multi-substrate enzyme-catalyzed reactions

UNIT III ENZYMES FOR CELLULOSIC FIBRES
Chemistry and structure of cotton fibre; enzymes in pretreatment of cotton substrates – desizing, scouring, bleaching and bio finishes

UNIT IV ENZYMES FOR OTHER FIBERS
Enzymes for processing and functionalizing protein fibres; enzymatic modification of polyester, polyamide, polyacrylonitrile and cellulose acetate fibres

UNIT V ENZYMES IN EFFLUENT TREATMENT
Enzyme technology and biological remediation, enzyme decolourisation and decolouration by bio sorption and enrichment cultures

TOTAL: 45 PERIODS

REFERENCES
UNIT V QUALITY EVALUATION

Evaluation of protective fabrics - desirable properties of protective textiles, method of testing for thermal protective performance, abrasion and wear resistance, evaluation of resistance to mildew, ageing, sunlight, chemical, electrostatic and electrical resistivity, impact properties; ASTM standards for protective garments.

TOTAL: 45 PERIODS

REFERENCES

UNIT III  YARN MECHANICS  9
Analysis of breakage of yarn; effect of twist on strength and elongation at break of filament yarn; relationship between elongation at break of filament and yarn; prediction of breakage - continuous filament yarn; model - breakage of spun yarn, effect of twist

UNIT IV  BLENDED YARN MECHANICS  9
Blend irregularity; measurement of blending irregularity, effect on fabric properties; concept of elongation balance; effect of properties of constituent fibres and blend composition on behavior of blended yarns

UNIT V  STRUCTURE - PROPERTIES RELATIONSHIP  9
Structure - property relationship of yarns produced from different spinning systems; effect of fibre properties and geometrical configuration of yarn on properties of ring yarn; comparison of ring and compact spun yarn based on structure

TOTAL: 45 PERIODS

REFERENCES

TX4009  STRUCTURAL MECHANICS OF FABRICS  L T P C
3 0 0 3

UNIT I  GEOMETRY OF CLOTH STRUCTURE  13
Geometry of plain and non-plain weaves; Peirce and Olofsson models; crimp ratio and thread spacing; jamming of threads; crimp interchange, balance of crimp.

UNIT II  FABRIC DEFORMATION  9
Fabric deformation under tensile stress; prediction of modulus; tensile properties in bias direction

UNIT III  OTHER FABRIC DEFORMATION  9
Compression, shear, bending and buckling; fabric handle; spirality and skewness formation and control

UNIT IV  KNITTED FABRIC STRUCTURES  9
Geometry of weft and warp knitted structures, influence of friction on knit geometry; load extension of warp knit fabrics; biaxial stress behavior of plain-knit fabrics

UNIT V  NONWOVEN STRUCTURES  5
Structure of felts; mechanical behavior of needle felts; structure of stitch bonded fabrics, chemical and thermal bonded fabrics

TOTAL: 45 PERIODS
REFERENCES

TX4073  
COATED AND LAMINATED TEXTILES  
UNIT I  
POLYMERS USED IN COATING  
Natural Latex & synthetic rubbers, synthetic polymers: polyurethanes, poly (vinyl chloride), polyacrylate elastomers, silicone elastomers, poly (Tetrafluoroethylene), polyethylene, chlorinated and chlorosulphonated polyethylene, foams for laminates; textile substrate for coating  
UNIT II  
METHODS OF COATING  
Knife coating, roll coating, dip coating, transfer coating, gravure coating, rotary screen printing, calendaring, hot melt coating, foam coating, lamination by adhesives, welding.  
UNIT III  
END USES OF COATING I  
Breathable textiles, microporous coatings and films, hydrophilic coatings, smart temperature responsive breathable coatings; synthetic leather, architectural textiles, fluid containers, tarpaulins, automotive applications, carpet backing, flocking, fusible interlinings.  
UNIT IV  
END USES OF COATING II  
Thermochromic fabrics, temperature adaptable fabrics, fabrics for chemical protection, camouflage nets, high visibility garments, intumescent coating, metal and conducting polymer coated fabrics, coating with hydrogel and shape memory polymers  
UNIT V  
CHARACTERIZATION OF COATED TEXTILES  
Tensile strength, elongation, adhesion, tear resistance, weathering behavior, microbiological degradation, yellowing, testing standards  
TOTAL: 45 PERIODS

REFERENCES

TX4010  
COLOURATION AND FUNCTIONAL FINISHES  
UNIT I  
THEORY OF DYEING  
Dyeing equilibrium; dye-fibre interaction; adsorption isotherm; dye affinity; heat of dyeing; half dyeing time  
UNIT II  
INK JET PRINTING  
Concept and methods of inkjet printing; colour separation; selection of dyes and developments in inks; techno-economical features
UNIT III     COATING
Coating polymers and auxiliaries, coating techniques and coated fabric assessment.

UNIT IV     ENZYMES IN PROCESSING I
Enzymes – classifications of enzymes and nomenclature of enzymes, synthesis of enzymes, enzyme kinetics

UNIT V     ENZYMES IN PROCESSING II
Substrates and their structure, scaling of enzyme production, textile processing enzymes

REFERENCES

TX4011     THEORY OF DRAFTING

UNIT I     DRAFTING
Definition of ideal drafting, model; conditions required to achieve ideal drafting in a roller drafting system; deviations from ideal drafting during actual drafting; definition of drafting wave; condition for drafting wave formation during roller drafting; estimation of the magnitude of the irregularity caused by the occurrence of drafting wave.

UNIT II    DRAFTING FORCE
Roller drafting - forces acting on a fibre during drafting at different positions in drafting zone; measurement of drafting force; factors affecting drafting force; methods to avoid drafting wave formation; role of apron in controlling drafting wave formation; limitations of apron in roller drafting system

UNIT III   OTHER DRAFTING IRREGULARITIES
Definition of roller slip; conditions for the formation of forward and backward slips in the roller drafting systems; measures to avoid roller slip occurrence, causes for roller nip movement, model; roller speed variation during drafting and their effect on irregularity formation; control of the irregularity formed due to these sources.

UNIT IV    COMPARISON
Comparison of roller drafting system with wire point drafting system; application of wire point drafting in card and rotor spinning machine; comparison of roller drafting in drawframe, comber preparatory, comber, speed frame, ring frame and air-jet spinning system

TOTAL: 45 PERIODS
UNIT V  COMPACT SPINNING

Spinning triangle – formation, factors affecting dimensions, effect on yarn quality; condensed yarn spinning – principle, different methods

TOTAL 45 PERIODS

REFERENCE:

TX4012  CLOTHING SCIENCE  L T P C

UNIT I  FABRIC HAND  9

UNIT II  CHARACTERISTICS OF POROUS MATERIALS  9
Geometrical characterization of single fibres; structural analysis of fibrous materials with fibre orientations; determination of the fibre orientation; characterization of porous fibrous materials; pore distribution in a fibrous material.

UNIT III  MOISTURE VAPOUR TRANSFER AND INTERACTIONS  9
Mass transfer by diffusion; moisture vapour transfer – principle of moisture diffusion, methods of measurement of moisture vapour transfer; concept of moisture management tester; effect of fibre, yarn and fabric parameters on moisture vapour transfer.

UNIT IV  HEAT TRANSFER AND INTERACTIONS  9
Thermal conduction in fibrous materials – thermal conduction analysis; Effective thermal conductivity (ETC) for fibrous materials; prediction of ETC by thermal resistance networks, volume averaging method and homogenization method; structure of plain weave woven fabric composites and the corresponding unit cell.

UNIT V  PHYSIOLOGICAL COMFORT  9

TOTAL: 45 PERIODS

REFERENCES
UNIT I  BIOMATERIALS
Biomaterials—introduction, types; natural, polymeric and biological biomaterials

UNIT II  HYGIENE TEXTILES
Textile based healthcare and hygiene products; application of nano technology in medical hygiene textiles; advanced textile materials in healthcare; infection control and barrier materials

UNIT III  BANDAGES AND PRESSURE GARMENTS
Bandages and pressure garments - elastic and non-elastic compression bandages, support and retention bandages; evaluation of bandages; bandages for various end uses.

UNIT IV  WOUND DRESSING
Wound – types, healing process; requirements of wound dressing; wound care materials – types, advantages and limitations; testing of wound dressings; advanced wound dressings

UNIT V  IMPLANTABLE MATERIALS AND REGULATIONS
Implantable products; sutures – requirements, classifications, specifications, materials and their applications; vascular grafts, artificial ligaments, artificial tendons; scaffolds for tissue engineering; intelligent textiles for medical applications; ethical issues, clearance; disposal of medical products

REFERENCES
UNIT III  SUSTAINABILITY IN PROCESSING  9
Enzyme biotechnology, plasma technology in textiles; waterless dyeing technologies, low liquor
dyeing; sustainability in effluent treatment, water saving, zero hazardous chemicals.

UNIT IV  RECYCLING  9
Textile recycling: polymer, fibre, yarn and fabric; consumer perception of recycled textile
products

UNIT V  ECO DESIGNING AND ECOLABELLING  9
Eco-design, building eco-design through supply chain; sustainability for credit rating; environmental
management systems; standards for labelling, textile labels and environmental labelling; life cycle
analysis of textiles

TOTAL: 45 PERIODS

REFERENCES
1. Peter P Rogers., “An Introduction to Sustainable Development”, Glen Educational
84569-453-1.

TX4014  THEORY OF TWISTING  LTCP  3 0 0 3

UNIT I  FUNDAMENTALS OF TWISTING  9
Mechanics of imparting strength to a staple-fibre strand by twisting; meaning of twist multiplier and
the basis of selection of required twist; principle of false twisting; fundamental requirements to
create real twist in the strand.

UNIT II  TWISTING IN RING SPINNING  9
Principle of twist insertion in ring spinning; limitations of ring twisting; mechanics of balloon formed
during twisting, yarn tension; influence of twisting on spinning triangle size and the subsequent
effect on yarn quality and spinning performance; design features of rings and travelers used for
twisting different types of yarns.

UNIT III  TWISTING IN OPEN-END SPINNING  9
Principle of twist insertion in open-end spinning; application of this principle in rotor spinning and
friction spinning machines; advantages of this method of twisting over ring twisting method;
comparison of yarn tension developed during twisting in these two machines.

UNIT IV  TWISTING IN AIR-JET AND AIR-VORTEX SPINNING  9
Principle of twist formation in air-jet, air vortex spinning; the merits and demerits of these methods
of twisting; factors influencing twist insertion

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UNIT V OTHER TWISTING PRINCIPLES
Principle of two-for-one twisting; twisting of yarns in double-rove fed spinning machines; operating principle involved in the twisting of core spun yarns, wrap-spun yarns; self-twist spinning; electrostatic spinning

TOTAL 45 PERIODS

REFERENCE:

TX4015 TEXTILES IN CIVIL CONSTRUCTION AND TRANSPORTATION  L T P C  3 0 0 3

UNIT I GEO TEXTILES I
Geo textile – definition, types, functions; types of fibers and fabrics used in geo textiles; applications of natural fibers in geo-textiles; joining of geo- textiles

UNIT II GEO TEXTILES II
Usage of geo-synthetics in civil engineering applications as filters, reinforcement, separation and drainage medium; material specifications and design criteria of geo-synthetics for specific applications

UNIT III ARCHITECTURE TEXTILES
Fiber and fabric property requirements for architecture textiles; coated textiles; Tents, Awnings and Canopies; Inflatable structures – high pressure and low pressure inflatable structures; textile for roofing applications; acoustic and heat insulation textiles; floor and wall covering, scaffolding nets

UNIT IV TRANSPORTATION TEXTILES
Quality and design of textile materials used in automobiles – tire cord, filter, air bag, belt, seat cover, noise insulation; design and development of textile reinforced composites in automobile, marine and aeronautical industry.

UNIT V EVALUATION
Evaluation of textile material used in civil construction and transportation industry in terms of performance, construction survivability and durability

TOTAL: 45 PERIODS

REFERENCES

TX4072  FUNCTIONAL DYRES  L T P C

UNIT I  BASICS OF DYRES  9
General survey of dyes; chemical structure of dyes, general properties of dyes, chromophores and dye classes for textile application

UNIT II  DYSES USED IN TEXTILES  9
Dyeing technology; standardization of textile dyes: dyes for cellulosic fibres, polyamides, polyesters and acrylic fibres; optical brightening agents: chemistry and evaluation of OBA

UNIT III  FUNCTIONAL DYSES  9
Functional dyes: dyes for leather; fur; paper; hair; food and inks – introduction, chemical structure and requirements

UNIT IV  APPLICATION OF FUNCTIONAL DYSES  9
Dyes used for imaging, invisible imaging, displays, electronic materials and biomedical applications; solar cells

UNIT V  TOXICOLOGY AND HEALTH ASPECTS  9
Toxicity and environmental assessment; regulatory and legislative aspects

TOTAL: 45 PERIODS

REFERENCES:
8. Non-Textile Dyes, Freeman H. S.
UNIT I  ENVIRONMENTAL POLLUTION
Industrial policy of India; pollution monitoring and control; functions and activities of Ministry of Environment; Central and State pollution control boards; environmental clearance and guidelines for industries; environment impact assessment; fiscal incentives for environmental protection; environmental auditing; Introduction to water, air and Noise pollution Control

UNIT II  WASTEWATER TREATMENT
Wastewater characteristics; wastewater treatment - objectives, methods and implementation considerations; recycling of effluents

UNIT III  TEXTILE EFFLUENTS
Identification and reduction of pollution sources in textile wet processing; pollution control in man-made fibre industry; analysis of textile processing effluents – colour, odour, pH, total solids, suspended solids, total dissolved solids, BOD, COD, total alkalinity, chloride, sulphates, calcium and chromium; tolerance limits for effluents; bio - degradability of textile chemicals and auxiliaries.

UNIT IV  SAFETY AND HEALTH ASPECTS
Technical regulations on safety and health aspects of textile materials – banned dyes and chemicals; eco labeling, eco friendly textile processes - machines and specialty chemicals; natural dyes and environmental considerations.

UNIT V  WASTE MANAGEMENT
Need for solid and hazardous waste management in textile industry, types and sources of solid and hazardous wastes, storage, collection and transport of wastes, waste processing technologies, waste disposal

REFERENCES

UNIT I  MOLECULAR WEIGHT
Polymer solution thermo dynamics; molecular weight and molecular dimensions by end group analysis, osmometry, light scattering, viscometry, gel permeation chromatography, high performance liquid chromatography
UNIT II  MOLECULAR STRUCTURE CHARACTERISATION  9
Infrared, NMR, UV–visible, Raman spectroscopy, mass spectroscopy

UNIT III  THERMAL PROPERTIES  9
Thermal properties by differential scanning calorimetry, differential thermal analysis, thermo
gravimetry, thermo-mechanical analyzer, dynamic mechanical and dielectric analysis

UNIT IV  MICROSCOPY  9
Optical and electron microscopy; TEM, SEM, AFM, X-ray scattering from polymers,
birefringence

UNIT V  OTHER PROPERTIES  9
Crystallinity by density measurements, surface area, pore volume measurements by B.E.T.
method, porosimetry, surface energy measurements and particle size measurement.

TOTAL: 45 PERIODS

REFERENCES

TX4092  TEXTILE REINFORCED COMPOSITES  L T P C
3 0 0 3

UNIT I  REINFORCEMENTS  9
Introduction – composites – classification and application; reinforcements- fibres and its properties;
preparation of reinforced materials and quality evaluation; preforms for various composites

UNIT II  MATRICES  9
Preparation, chemistry, properties and applications of thermoplastic and thermostet resins;
mechanism of interaction of matrices and reinforcements; optimization of matrices

UNIT III  COMPOSITE MANUFACTURING  9
Classification; methods of composites manufacturing for both thermoplastics and thermostets-
Hand layup, Filament Winding, Resin transfer moulding, prepregs and autoclave moulding,
pultrusion, vacuum impregnation methods, compression moulding; post processing of
composites and composite design requirements

UNIT IV  TESTING  9
Fibre volume and weight fraction, specific gravity of composites, tensile, flexural, impact,
compression, inter laminar shear stress and fatigue properties of thermostet and thermoplastic
composites.

UNIT V  MECHANICS  9
Micro mechanics, macro mechanics of single layer, macro mechanics of laminate, classical
lamination theory, failure theories and prediction of inter laminar stresses using at ware

TOTAL: 45 PERIODS
REFERENCES

TX4017  COLOUR SCIENCE AND ITS APPLICATION  L T P C
3 0 0 3

UNIT I  LIGHT-MATTER INTERACTION  9
Electromagnetic spectrum – the optical region, interaction of light with matter a) Transparent case – Beer’s Law and Lambert’s Law b) Opaque case – reflection absorption and scattering, the concept of “Radiative Transfer Theory” and its simplification into the Kubelka – Munk model

UNIT II  HUMAN COLOUR VISION  9
Colour sensation – physiological and psychological mechanism of colour vision; colour vision theories; defects in colour vision; colour vision tests; additive and subtractive colour mixing and confusion in colour perception

UNIT III  COLOUR ORDER SYSTEMS  9
Description of colour, various colour order systems, CIE numerical system for colour definition and its components – illuminants, the versions of the standard observer, the colour scales, chromaticity diagram.

UNIT IV  METAMERISM AND COLOUR DIFFERENCE ASSESSMENT  9
Metamerism – types and its assessment, metamerism in textile materials; colour differences – visual assessment, standard conditions, methods and problems, assessment of colour difference, non-linearity of subjective perception of colour, need for specific colour difference systems, setting up of objective pass/fail standards.

UNIT V  NUMERICAL COLOUR MATCHING  9
Reflectance and K/S value, relationship between dye concentrations and a) reflectance values and b) K/S values, reflectance and K/S curves of dyed samples; CIE model for computer colour matching and the calculation of colour recipes; non CIE models for colour matching, limitations of computer colour matching, shade sorting

TOTAL: 45 PERIODS

REFERENCES

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TX018 DESIGN AND ANALYSIS OF TEXTILE EXPERIMENTS

UNIT I EXPERIMENTAL DESIGN FUNDAMENTALS
Importance of experiments, experimental strategies, basic principles of design, terminology, ANOVA, steps in experimentation, sample size, normal probability plot, linear regression model.

UNIT II SINGLE FACTOR EXPERIMENTS
Completely randomized design, Randomized block design, Latin square design. Statistical analysis, estimation of model parameters, model adequacy checking, pair wise comparison tests, in respect of textile process, machine and quality parameters.

UNIT III MULTIFACTOR EXPERIMENTS
Two and three factor full factorial experiments, $2^k$ factorial Experiments, Confounding and Blocking designs; application in textile experiments.

UNIT IV SPECIAL EXPERIMENTAL DESIGNS
Fractional factorial design, nested designs, Split plot design, Introduction to Response Surface Methodology, Experiments with random factors, rules for expected mean squares, approximate F-tests for textile applications.

UNIT V TAGUCHI METHODS
Steps in experimentation, design using Orthogonal Arrays, data analysis, Robust design- control and noise factors, S/N ratios, parameter design, case studies related to textile engineering.

TOTAL: 45 PERIODS

REFERENCES
AUDIT COURSES

AX4091 ENGLISH FOR RESEARCH PAPER WRITING L T P C 2 0 0 0

COURSE OBJECTIVES:
• Teach how to improve writing skills and level of readability
• Tell about what to write in each section
• Summarize the skills needed when writing a Title
• Infer the skills needed when writing the Conclusion
• Ensure the quality of paper at very first-time submission

UNIT I INTRODUCTION TO RESEARCH PAPER WRITING 6
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT II PRESENTATION SKILLS 6

UNIT III TITLE WRITING SKILLS 6
Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT IV RESULT WRITING SKILLS 6
Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT V VERIFICATION SKILLS 6
Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first-time submission

TOTAL: 30 PERIODS

COURSE OUTCOMES:
CO1 – Understand that how to improve your writing skills and level of readability
CO2 – Learn about what to write in each section
CO3 – Understand the skills needed when writing a Title
CO4 – Understand the skills needed when writing the Conclusion
CO5 – Ensure the good quality of paper at very first-time submission

REFERENCES
COURSE OBJECTIVES:

- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches.

UNIT I
INTRODUCTION
Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT II
REPERCUSSIONS OF DISASTERS AND HAZARDS

UNIT III
DISASTER PRONE AREAS IN INDIA
Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics.

UNIT IV
DISASTER PREPAREDNESS AND MANAGEMENT
Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT V
RISK ASSESSMENT

TOTAL: 30 PERIODS

COURSE OUTCOMES:

CO1: Ability to summarize basics of disaster
CO2: Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
CO3: Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO4: Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO5: Ability to develop the strengths and weaknesses of disaster management approaches.

REFERENCES:

COURSE OBJECTIVES
Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals’ constitutional
- Role and entitlement to civil and economic rights as well as the emergence nation hood in
  the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik
  Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT I  HISTORY OF MAKING OF THE INDIAN CONSTITUTION
History, Drafting Committee, (Composition & Working)

UNIT II  PHILOSOPHY OF THE INDIAN CONSTITUTION
Preamble, Salient Features

UNIT III  CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES
Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to
Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive
Principles of State Policy, Fundamental Duties.

UNIT IV  ORGANS OF GOVERNANCE
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive,
President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges,
Qualifications, Powers and Functions.

UNIT V  LOCAL ADMINISTRATION
District’s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role
Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level:
Organizational Hierarchy (Different departments). Village level: Role of Elected and Appointed
officials, Importance of grass root democracy.

UNIT VI  ELECTION COMMISSION
Election Commission: Role and Functioning. Chief Election Commissioner and Election
Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women. TOTAL: 30 PERIODS

COURSE OUTCOMES
Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the
  arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the
  conceptualization
  of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party (CSP)
  under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct
  elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

SUGGESTED READING
1. The Constitution of India, 1950 (Bare Act), Government Publication.
AX4094  இலக்கியம் நற்றிகணம்  L T P C 2000

UNIT I  சங்க இலக்கியம் 6
1. தமிழின் துவக்க நூல் பதொல்கொப்பியம்
   - சறுத்து, சதை, பாற்று
2. அகநொனூறு (8)
   - தியாகம் திருச்சித Tamil ஓரைக
3. சிறிதிப் பார்வை புருந்தகாண்பி
4. புருந்தகாண்பி (95,195)
   - பாற்று சியாரிபிய புகாரம்

UNIT II  அறநநறித்
1. அறநநறித் தமிழ் சிதைச்சின்று
   - அந்த சிறுநடுநூல், சிறுபாலனம், சுமார்ப்பங்கள், சது, பாறு
2. பிற அறநூல்கள – இலக்கியம் தொகுகச்
   - பாறை, திருப்ப்ளமணவதர், சியாரிபிய, துகள்பத்திரக்கல்
   (சுமார்ப்பிய சியாரிபிய தொகுகச்)

UNIT III  காப்பியங்கள்
1. காப்பியங்களின் புரட்சி
   - சிலப்பதிகொர வழக்குகர கரத்து
2. மூகப்பகவாயில் மணிபமககல
   - காப்பியங்கள் அறிக்களமொகியகொத்து

UNIT IV  அருள்நநறித்
1. சிறுபொணொற்றுப்பகட
   - பாறை (சுமார்ப்பிய தொகுகச், பந்தலும் புருந்தகாண்பி
   பொருள் களத்திகள், சிறுபாலனாகும் தமிழ்களிகள்
   களத்திகள், அங்கே பந்தலும்
2. சுந்தரவண
   - அதிகாரகரிபை புகலை சியார்
3. சின்னநிதம் (617, 618)
   - சிலம் சிலம் சியாரிபி
4. சுந்தராகழல் சியாரிபும் வள்ளலொர்
5. பாற்றும்
   - சிலம் சுந்தரகாண்பியம்
6. அகநொனூறு (4) - பரை
   குருதிகள் (11) - தொகு
   காப்பியங்கள் (11) - பாறை, புரூ
   மொன்னித்தல் 50 (27) - பாறை
   சியாரிபுப் புருந்தகாண்பி
UNIT V கொண்டு தமிழ் இலக்கியம்

1. தமிழ்நாட்டுக் குறிப்பிட்டு,
   - கவிதை வரலாறு புத்தகம்,
   - கவிதைக் குறிப்பிட்டு புத்தகம்,
   - கவிதைக் குறிப்பிட்டு விளக்கம்,
   - கஸ்பர தமிழ்க் குறிப்பிட்டு,
   - செய்து தமிழ்க் குறிப்பிட்டு,
   - நாளாற்று,
2. நாள் விதிக்கல் பொருளாடியம் தமிழ் இலக்கியம்,
3. பலகத்து விதிக்கல் தமிழ் இலக்கியம்,
4. போன்ற விதிக்கல் விளக்க திறனிலங்காளரின் பொருளாடியம் தமிழ் இலக்கியம்,
5. முதலீட்டு தமிழ்,
6. உச்சத்தமிழ் தமிழ்,
7. கொடிய தமிழ் பொருளாடியம் தமிழ் இலக்கியம்.

TOTAL : 30 PERIODS

தமிழ் விஷயங்கள் விளக்கப்படுத்தும் / புத்தகங்கள்

1. தமிழ் விடுதலை விளக்கப்படுத்தும் (Tamil Virtual University)
   - www.tamilvu.org
2. தமிழ் விக்கிப்பீடி (Tamil Wikipedia)
   - https://ta.wikipedia.org
3. தாமு அகில விளக்கம்
4. பொருளிலியம் விளக்கம்
   - தமிழ் பொருளிலியம் விளக்கம், குட்டத்து
5. பண்புறச் சொல்லால் விளக்கம்
   - தமிழ் மஞ்சம்பிக்குள் குளோ (thamilvalarchithurai.com)
6. அறிவியல் விளக்கம்
   - தமிழ் பண்புறச் சொல்லால் விளக்கம், குட்டத்து