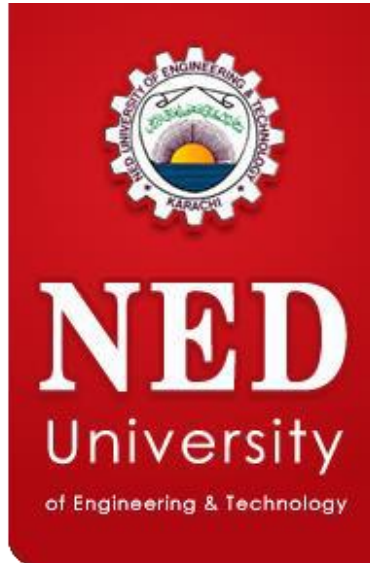


**NED UNIVERSITY OF ENGINEERING TECHNOLOGY**  
**TEXTILE ENGINEERING DEPARTMENT**



**CURRICULUM**  
**OF**  
**BACHELORS OF TEXTILE ENGINEERING**

**Updated in September 2019**

**NED University of Engineering & Technology**  
**Textile Engineering Department Scheme of**  
**studies for**  
**B.E Textile Program**

<b>First Year (FE)</b>				<b>First Year (FE)</b>			
<b>Spring Semester / 1<sup>st</sup> Semester</b>				<b>Fall Semester / 2<sup>nd</sup> Semester</b>			
<b>Subject name</b>	<b>Credit hours</b>			<b>Subject name</b>	<b>Credit hours</b>		
TE 113 Introduction to Textile Engineering	2	0	2	TE 111 Textile Chemistry	3	1	4
PH 122 Applied Physics	3	1	4	ME 112 Thermodynamics	3	0	3
ME 114 Engineering Drawing	2	1	3	ME 104 Workshop Practice	0	2	2
MT 114 Calculus	3	0	3	EE-122 Basic Electricity & Electronics	3	0	3
HS 105 Pakistan Studies/ HS 127 Pakistan Studies for Foreigners	2	0	2	ME 101 Engineering Mechanics	3	1	4
HS 104 Functional English	3	0	3	TE 224 Polymer & Fibre Science	2	0	2
Total			17	Total			18
<b>Second Year (SE)</b>				<b>Second Year (SE)</b>			
<b>Spring Semester / 3<sup>rd</sup> Semester</b>				<b>Fall Semester / 4<sup>th</sup> Semester</b>			
<b>Subject name</b>	<b>Credit hours</b>			<b>Subject name</b>	<b>Credit hours</b>		
MM 205 Mechanics of Material	3	1	4	TE 211 Textile Yarn Manufacturing	3	1	4
TE 208 Material Science	2	1	3	TE 205 Pre-treatment of Textiles	3	1	4
TE 203 Computer Programing & Application	2	1	3	TE 207 Machine Design	3	0	3
TE 206 Fluid mechanics for Textiles	2	1	3	ME 311 Manufacturing Processes	3	1	4
MT 225 Linear Algebra & Ordinary Differential Equation	3	0	3	HS 205 Islamic Studies/ HS 206 Ethical Behavior	2	0	2
Total			16	Total			17
<b>Third Year (TE)</b>				<b>Third Year (TE)</b>			
<b>Spring Semester (TE)/ 5<sup>th</sup> Semester</b>				<b>Fall Semester (TE)/ 6<sup>th</sup> Semester</b>			
<b>Subject name</b>	<b>Credit hours</b>			<b>Subject name</b>	<b>Credit hours</b>		
TE 312 Textile Fabric Manufacturing Processes	3	1	4	TE 313 Textile Product Evaluation-1	3	1	4
TE 307 Utilities for Textile Industry	3	1	4	TE 319 Heat & Mass Transfer	2	1	3
MF 303 Applied Economics for Engineers	3	0	3	TE 318 Textile & Environment	2	0	2

TE 326 Textile Dyeing	3	1	4	TE 305 Quality control in Textiles	2	0	2
HS 304 Business Communication & Ethics	3	0	3	TE 424 Textile Printing	3	1	4
				MT 333 Advanced Calculas & Fourier Analysis	3	0	3
Total			18	Total			18
<b>Final Year (BE)</b>				<b>Final Year (BE)</b>			
<b>Spring Semester / 7<sup>th</sup> Semester</b>				<b>Fall Semester / 8<sup>th</sup> Semester</b>			
<b>Subject name</b>	<b>Credit hours</b>			<b>Subject name</b>	<b>Credit hours</b>		
HS 405 Organizational Behavior	3	0	3	TE 453 Garment Manufacturing	3	0	3
TE 462 Advanced Fabric Manufacturing Mechanism	3	0	3	HS 403 Entrepreneurship	3	0	3
				TE 455 Automation & Control in Textiles	3	0	3
Electives	3	1	4	Electives	3	0	3
TE 408 Textile Engineering Design Project	-	-	-	TE 408 Textile Engineering Design Project	0	6	6
TE 413 Textile Product Evaluation-II	3	1	4				
Total			18	Total			18

#### **ELECTIVES**

<b>Spring Semester (BE)</b>				<b>Fall Semester (BE)</b>			
<b>Subject name</b>	<b>Credit hours</b>			<b>Subject name</b>	<b>Credit hours</b>		
TE 461 Advanced Yarn Manufacturing Mechanism	3	1	4	TE 406 Textile Production Management	3	0	3
TE 452 Textile Finishing	3	1	4	TE 454 Textile Merchandising	3	0	3

## **TE 113: INTRODUCTION TO TEXTILE ENGINEERING**

General Fibre properties & their importance:

### **Textile Spinning:**

Introduction of the processes and machinery in blow room, card, draw frame, speed frame, and ring frame

### **Winding:**

Study of various winding machines and processes; study of different yarn packages

### **Textile Weaving:**

Introduction to weaving; difference between weaving and knitting; Flowchart of weaving processes Brief description of warping systems.

Importance of sizing and preparation of various sizing materials for different yarns cotton, synthetic.

### **Brief Description of a Loom:**

Basic primary motions, weft insertion mechanism, layout and outline of a loom.

### **Wet Processing:**

Fabric preparatory processes, brief description of common batch and continuous methods of scouring, bleaching and dyeing. Theory of dyeing and classification of dyes considering application, textile printing.

## **PH 122: APPLIED PHYSICS**

### **Introduction:**

Scientific notation and significance figures. Types of errors in experimental measurements. Units in different systems. Graphic techniques (Log, semi-log and other non linear graphs)

### **Vectors:**

Review of vectors, vector derivatives. Line and surface Integrals. Gradient of a scalar

### **Mechanics:**

The limits of Mechanics. Coordinate systems. Motion under constant acceleration, Newton Laws and their applications. Galilean invariance. Uniform circular motion. Frictional forces. Work and energy. Potential energy. Energy conservation. Energy and our environment. Angular momentum

### **Electrostatics And Magnetism:**

Coulombs law. Electrostatic potential energy of discrete charges. Continuous charge distribution. Gauss's law. Electric field around conductors. Dielectrics. Dual trace oscilloscope with demonstration

Magnetic field. Magnetic force on current. Hall effect. Biot-savart Law. Ampere's Law. Fields of rings and coils. Magnetic Dipole. Diamagnetism, Paramagnetism, and Ferromagnetism

### **Semiconductor Physics:**

Energy levels in a semiconductor. Hole concept. Intrinsic and Extrinsic regions. Law of Mass Action. *P-N* junction. Transistor. Simple circuits

### **Waves and Oscillations:**

Free oscillation of systems with one or more degrees of freedom Solution for Modes. Classical Waves equation. Transverse modes for continuous string. Standing waves. Dispersion relation for waves. LC network and coupled pendulums. Plasma oscillations

### **Optics and Lasers:**

Harmonic traveling waves in one dimension. Near and far fields Two-slit interference. Huygens Principle. Single slit diffraction. Resolving power of optical instruments. Diffraction Grating

Lasers. Population inversion. Resonant cavities. Quantum efficiency. He-Ne, Ruby and CO<sub>2</sub> lasers. Doppler effect and sonic boom.

### **Modern Physics:**

Inadequacy of classical physics, Planck's explanations of black body radiation Photoelectric effect, Compton effect. Bohr theory of Hydrogen atom, Atomic spectra, Reduce mass, De-Broglie hypothesis Braggs Law, Electron microscope, Uncertainty relations Modern atomic model, Zeeman effect, Atomic nucleus, Mass-energy relation, Binding energy, Nuclear forces and fundamental forces, Exponential decay and half-life. Radioactive equilibrium in a chain, Secular equilibrium, Nuclear stability, Radiation detection instruments, Alpha decay, Beta decay, Gamma decay attenuation Nuclear radiation hazards and safety, Medical uses of Nuclear Radiation. Fission, Energy release. Nuclear Reactors. Breeder Reactor, Nuclear Fusion

## **ME 114: ENGINEERING DRAWING**

Drawing equipment and the use of instruments; Basic drafting techniques and standards; Geometrical curves including plane curves; Cycloid, Hypocycloid, and the Involute

Intersections at various positions of geometrical bodies such as prisms, pyramids, cylinders and cones. Development of surfaces of prisms. Pyramids, cylinders and cones

Freehand sketching of machine and engine components; Locking arrangements; Foundation bolts; Stuffing box; Shaft couplings; Foot-step bearing; Pulleys; Engine connecting rod

Concept of working drawing of component parts of machines and engines; Size, description, dimensions, and specifications; Limit dimensioning and geometric tolerancing; limits; Fits and tolerances conventional symbols

Sectioning of machine and engine components; Orthographic projections and standard practices

Isometric views with particular reference to piping and ducting

## **MT 114: CALCULUS**

### **Set and Functions**

Define rational, irrational and real numbers; rounding off a numerical value to specified value to specified number of decimal places or significant figures; solving quadratic, and rational inequalities in involving

modulus with graphical representation; Definition of set, set operations, Venn diagrams, DeMorgan's laws, Cartesian product, Relation, Function and their types (Absolute value, greatest integer and combining functions). Graph of some well-known functions. Limit of functions and continuous and discontinuous functions with graphical representation.

### **Differential Calculus**

Differentiation and Successive differentiation and its application: Leibnitz theorem. Taylor and Maclaurin theorems with remainders in Cauchy and Lagrange form, power series. Taylor and Maclaurin series, L'Hopital's rule, extreme values of a function of one variable using first and second derivative test, asymptotes of a function, curvature and radius of curvature of a curve, partial differentiation, exact differential and its application in computing errors, extreme values of a function of two variables with and without constraints. Solution of non-linear equation, using Newton Raphson method.

### **Integral Calculus**

Indefinite integrals and their computational techniques, reduction formulae, definite integrals and their convergence. Beta and Gamma functions and their identities, applications of integration. Centre of pressure and depth of centre of pressure.

### **Sequence & Series:**

Sequence, Infinite Series, Application of convergence tests such as comparison, Root, Ratio, Raabe's and Gauss tests on the behavior of series.

### **Complex Number**

Argand diagram, De Moivre formula, root of polynomial equations, curve and regions in the complex plane, standard functions and their inverses (exponential, circular and Hyperbolic functions).

## **HS 105: PAKISTAN STUDIES**

### **An Outline of Emergence of Pakistan:**

A brief historical survey of Muslim community in the sub-continent. War of Independent 1857 and Aftermath. Sir Syed Ahmed Khan, Development of Two Nation Theory. Formation of Muslim League. Lucknow Pact. Khilafat & Non-Cooperation Movement. Political Events from 1924 to 1937. Pakistan Resolution - Struggle for Pakistan from 1940 to 1947. Emergence of Pakistan

### **Land of Pakistan:**

Geophysical conditions, Territorial situation and its importance, Natural Resources - Minerals and Water

### **Constitutional Process:**

Early effects to make constitution - Problems and issues. Constitution of 1956 and its abrogation. The constitution of 1962 and its annulment. Constitutional and Political Crisis of 1971; The constitution of 1973. Recent constitutional developments

### **Post Independence Development:**

Education in Pakistan; Planning & Development in the Field of Education. Development of Science and Technology with special reference to Engineering and Architecture. Brief survey of Pakistan Economy: Industrial and Agricultural Development. Internal and external trade. Economic planning and prospects

### **Cultural Developments in Pakistan:**

Definition, Contents and Contributing factors in culture, Development of Art, Philosophy and literature

## **Foreign Policy:**

Relations with neighbors, Super powers and the Muslim World

## **HS 127: PAKISTAN STUDIES FOR FREIGNERS**

### **Chapter 1 – Land of Pakistan**

- Land & People – Physical features and demography
- Geographical and strategic importance of Pakistan
- Natural resources – Mineral, water, and power
- Natural Landscape
- Environmental issues in Pakistan
- Cultural heritage: important remnants of ancient civilizations in Pakistan

### **Chapter 2 – Creation of Pakistan**

- A brief Historical survey of Muslim community in the sub-continent
- Two-Nation theory – its origin & development
- Rationale for Pakistan – Factors leading to the demand of Pakistan
- Emergence of Pakistan
- Role of Quaid-e-Azam the struggle for Pakistan

### **Chapter 3 - Government & Politics in Pakistan**

- Political History of Pakistan – A brief account (1947 to date)
- Constitution of Pakistan 1973 – Salient features
- Governmental structure – Federal, Provincial and Local

### **Chapter 4 – Pakistan in the Community of Nations**

- An overview of Pakistan's foreign policy
- Relations of Pakistan with neighbors, Super Powers, and the Muslim World

### **Chapter 5 – Pakistan's Stand Point on Human Rights**

- Constitutional provisions
- Comparative analysis of Western and Islamic perspective of Human Rights
- Pakistan's Stand on national and international level

## **HS 104: FUNCTIONAL ENGLISH**

### **Listening**

- Types of Listening

- Problems in listening and coping strategies
- Listening skills, Sub skills
- Practice in Listening

### **Note taking**

- Techniques for taking notes (from lectures, from books)
- Note taking in different forms paragraphs (points, figures, processes, tables, graphs etc.)

### **Vocabulary development**

- Enhancing current vocabulary to reflect a better usage of words in spoken and written language
- Tips / strategies in vocabulary enhancement
- Practice in vocabulary development

### **Reading**

- Reading skills, Sub skills
- Reading comprehension levels
- Reading strategies
- Reading practice through variety of reading texts and comprehension exercises
- Beyond reading [outline, précis, speech and presentation]

### **Writing**

- Process of Writing
- Informal Writing strategies

### **Writing Correctly**

- a. Sentence structure and punctuation
- b. Error correction

### **Paragraphs**

- a. Structure
- b. Types
- c. Topic and the topic sentence
- d. Unity
- e. Adequate development and coherence in paragraphs

### **Essays**

- a. Types
- b. Five paragraphs, long essays
- c. Structure (thesis statement and the paragraphs)

### **Short Reports**



- a. Structure
- b. Format and types (informational and analytical)

### **Letters**

- a. Elements, Styles
- b. Formatting (digital letter writing)
- c. Organization and structure of the letter
- d. Types (Routine requests and intimation, invitation, thank you and condolence letters etc.)

## **TE 111: TEXTILE CHEMISTRY**

### **Liquids and solutions:**

Viscosity, colloidal solution, coagulation, adsorption, absorption and diffusion. Intermolecular forces in liquids, surface tension. osmosis and osmotic pressure, desalination of saline water by reverse osmosis. Ways of expressing concentration of solutions

### **Electrochemistry:**

Theories on acids, bases, electrolytes, buffers. Conductance of electrolytes & measurement of electrolytic conductance & cell constant, pH scale & its measurement, buffer solution & Handersen –Hasselbalch equation

### **Aromatic carbocycles:**

Concept of a dye and a pigment, parts of a dye molecule. Organic and inorganic raw materials for the manufacturing of dyes intermediates, Synthesis of dyestuff intermediates through chemical conversion reactions. Resonance and orbital theory of color

### **Carbohydrates:**

Mono, di & polysaccharides, sources and structure of Starch & cellulose, properties and uses of starch & cellulose. chemistry of cellulose and its degradation products. Physical properties of cellulosic materials

### **Surface active agents:**

Soap and soap manufacturing, theory of detergency, synthetic detergents. Surfactants (anionic, cationic, non-ionic & amphoteric) and their properties. Laundry detergents

### **Chemical auxiliaries used in Textile processing:**

Enzymes and Catalyst; mechanism and application, Salts, wetting agents, sequestering/ chelating agents, dispersing and solubilizing agents, levelling and dye-fixing agents. Waxes

## **ME 112: THERMODYNAMICS**

### **Thermodynamic Properties:**

Introduction; Working substance; System; Pure substance; PVT surface; Phases; Properties and state; Units; Zeroth Law; Processes and cycles; Conservation of mass

### **Energy and its Conservation:**

Relation of mass and energy; Different forms of energy; Internal energy and enthalpy; Work; Generalized work equation Flow and non-flow processes; Closed systems; First Law of Thermodynamics; Open systems and steady flow, Energy equation for steady flow; System boundaries; Perpetual motion of the first kind

### **Energy and Property Relations:**

Thermodynamics equilibrium; Reversibility; specific heats and their relationship; entropy; Second Law of Thermodynamics; Property relation from energy equation; Frictional energy

### **Ideal Gas:**

Gas laws; Specific heats of an ideal gas; Dalton's Law of Partial Pressure; Third Law of Thermodynamics; Entropy of an ideal gas; Thermodynamic processes

### **Thermodynamic Cycles:**

Cycle work; Thermal efficiency and heat rate; Carnot cycle; Sterling cycle; Reversed and reversible cycles; most efficient engine

### **Consequences of the Second Law:**

Calusius's inequality; Availability and irreversibility; Steady flow system.

### **Two-Phase Systems:**

Two-phase system of a pure substance; Changes of phase at constant pressure; Steam tables; Superheated steam; Compressed liquid; Liquid and vapour curves; Phase diagrams; Phase roles; Processes of vapours; Mollier diagram; Ranking cycle; Boilers and auxiliary equipment

### **Internal Combustion Engines:**

Otto cycle; Diesel cycle; Dual combustion cycle; Four stroke and two-stroke engines; Types of fuels

### **Reciprocating Compressors:**

Condition for minimum work; Isothermal efficiency; Volumetric efficiency; Multi-stage compression; Energy balance for a two-stage machine with intercooler

## **ME 104: WORKSHOP PRACTICE**

Use of carpenter's tools; Exercises in preparing simple joints; Bench-fitting practice; Exercise in marking and fittings; Use of measuring instruments

Smith's forge; Exercise in bending, upsetting and swage

Familiarizing the students with the following processes:

Soldering and brazing, Welding, Heat treatment, Moulding and casting Simple machine shop processes, such as turning, shaping, milling, and sheet metal work  
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## **EE 122: BASIC ELECTRICITY & ELECTRONICS**

### **Fundamentals of Electric Circuits:**

Charge, Current Voltage, and Power, Voltage and Current Sources, Ohm's Law;

### **Voltage and Current Laws:**

Nodes, Paths, Loops and Branches, Kirchhoff's Current Law.

Kirchhoff's Voltage Law, The single loop Circuits, The single Node-pair Circuits, Series and Parallel connected independent sources, Resistors in Series and Parallel, Voltage and Current Division.

### **Circuit Analysis Techniques:**

Multi-Nodal Analysis, The super Nodal, Mesh Analysis, the Super Mesh, Linearity and Superposition, Source Transformation, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion.

Capacitor, Inductor, Inductance and Capacitance Combination, The Source-Free RL Circuit, Properties of Exponential Response, the Source-Free RC Circuit.

### **Introduction Machines:**

Induction Motors, Construction, Types, Rotating field theory, Principle of working, slip and its effect on motor current quantities, overexcited and under-excited motor, power factor and power factor control, starting of synchronous motor, parallel operation of alternators and sharing of load, working of alternator on infinite bus bars.

### **Introduction of Transformer:**

Construction, Principle of working, emf equation, Transformation ratios, No load working and vector diagram, magnetizing current, Vector diagram on load.

### **One line Diagram:**

Symbols of different components, understanding of one line diagram.

### **Basic Electronics:**

P-N junction, diode and applications Transistor construction, operation and applications Fundamental concepts of Digital Electronics.

## **ME 102: ENGINEERING MECHANICS**

### **Statics of Particles:**

Forces in a plane; Newton's First Law, Free-body diagram; Forces in space (rectangular components); Equilibrium of a particle in space

### **Kinematics of Particles:**

Rectilinear and curvilinear motion of particles; Components of velocity and acceleration; Motion relative to a frame in translation

**Kinetics of Particles:**

Newton's Second Law; Dynamic equilibrium; Rectilinear and curvilinear motion; Work and energy; Kinetic energy of particle; Principle of Work and Energy; Conservation of energy; Impulse and momentum; Impulsive forces and conservation of momentum; Impact, direct and oblique; Conservation of angular momentum

**Rigid Bodies:**

Equivalent systems of forces; Principle of transmissibility; Moment of a force; Couple; Varignon's Theorem. Centre of gravity of a three-dimensional body and centroid of a volume. Moments of inertia, radius of gyration, parallel axis theorem

**Equilibrium of Rigid Bodies:**

Free-body diagram; Equilibrium in two and three dimensions; Reaction of supports and connections; Equilibrium of two-force and three-force bodies.

**Kinematics of Rigid Bodies:**

General Plane motions; Absolute and relative velocity and acceleration

**Plane Motion of Rigid Bodies:**

Forces and acceleration; Energy and momentum; Conservation of linear and angular momentum

**Friction:**

Laws of dry friction; Angles of friction; Wedges; Square-threaded screws; Journal and thrust bearings; Belt friction

**Analysis of Structures:**

Internal forces and Newton's Third Law; Simple and space trusses; Joints and sections; Frames and machines. Forces in cables

**MM 205: MECHANICS OF MATERIAL**

Review mechanics of materials. Deformation; strain; elastic stress-strain behavior of materials; Introduction to stress-strain diagram, working stresses, unit design, Introduction to elastic and nonlinear continua.

Poisson's ratio; Determination of forces in frames; Simple bending theory; general case of bending; Shear force and bending moment diagrams;

Relationship between loading, shear force and bending moment. Stress; Skew (antisymmetric) bending Direct, shear, hydrostatic and complementary shear stresses; Bar and strut or column; Theory of buckling instability, Thin ring, Elementary thermal stress and strain; General stress-method. Theory of elasticity, Analytical solution of elasticity problems brittle fracture. strain energy in tension and compression.

Analysis of bi-axial stresses, principal planes, principal stress-strain, stresses in thin walled pressure vessels. Mohr's circles of bi-axial stress. Torsion of circular shafts, coiled helical spring, strain energy in shear and torsion of thin walled tubes, torsion of non-circular sections. Shear centre and shear flow for open sections, General case of plane stresses, principal stress in shear stresses due to combined bending and torsion plane strain. Composite materials, Volume dilatation, Theories of Yielding, Thin Plates and Shells Stress Concentration.

## **TE 224: POLYMER & FIBRE SCIENCE**

### **Fundamental concepts of the fibrous polymers:**

Monomer and Polymers, Classification of Polymers, polymerization methods, Degree of polymerization, orientation of chain molecules, Chemical bonds in important textile polymers, Glass transition temperature

### **Textile fibres:**

Definition and classifications of textile fibres. Essential requirements of the fibre forming polymers

### **Natural fibres:**

Cellulosic fibres

Seed Fibre: Processing, morphological structure, physical and chemical properties and uses of cotton fibre, Varieties of Pakistani cotton, Cotton grading

Bast fibres: Processing, extraction (retting process), morphological structure, physical and chemical properties and uses of Jute, flax, hemp, and ramie fibre

Leaf fibres: Processing, extraction, morphological structure, physical and chemical properties and uses of Abaca and Sisal fibres

### **Protein fibres:**

Wool: Introduction, classification, morphological structure, production, physical and chemical properties, grading and uses of wool fibre. Scouring, carbonization and heat-setting of wool. Introduction of fibres such as Camel, Mohair, Cashmere, Alpaca and Angora

Silk: Production, morphological structure, physical and chemical properties and uses

### **Regenerated fibres:**

Introduction and classification of regenerated fibres; manufacturing processes, properties and uses of Rayons such as viscose, high wet modulus rayons, lyocell, and acetates

### **Synthetic fibres:**

Introduction and classification of synthetic fibres; manufacturing processes, properties and uses of polyester, polyamide, acrylic, polypropylene, elastomers, aramid, glass and carbon fibres

## **TE 203: COMPUTER PROGRAMING & APPLICATIONS**

### **Introduction to Computers and System Hardware:**

Analogue and Digital Systems; Number Systems; Computer Hardware; CPU and its components; Storage Devices; I/O and Communication Devices; Computer Classification; Evolution of Computer Hardware

### **Computer Software:**

Software Classification; Operating Systems; Utility Programs & Device Drivers; Application Software; Software Licensing; Software selection Factors

### **Software System Analysis & Design:**

A System; Systems Development Life Cycle; System Specification; System Design; Programs & Programming; Algorithms & Pseudo code; Flow & Hierarchy Charts; Structured Vs. Object Oriented Approach; Software Testing and Maintenance

### **Programming Languages:**

Generations of Programming Languages; High level vs. Low level languages; Overview of some widely used high level languages

### **Structured Programming:**

Building Blocks: (Variables, Constants & Data types); Operators and Precedence; Input and Output functions; Compiler and its functions; Decision Making Constructs; Program Control Structures (Loops); Modular Programming with Functions; Preprocessor Directives; Arrays and Strings; Pointers and Structures Taking examples from C, VB.NET or any another prevalent high level language

### **Data Management and Communication:**

Data, Information and Knowledge; Database Systems; Computer Networks; Classification of Networks; Network Devices; Protocols; Communication Media and its types; Networking Models; The Internet; Computing Environments; Industrial Networking

### **Engineering Graphics and its Applications:**

CAD; Computer Graphics; Image Processing; Areas of Application; Introduction to 2D & 3D Modeling using AutoCAD / Pro-E Software; Application of Computer Graphics in Textile Design & Manufacturing; Process Simulation

## **TE 206: FLUID MECHANICS FOR TEXTILES**

### **Fluid properties:**

Pressure, Vapour pressure, Density, Specific weight, Specific gravity, Viscosity, Bulk modulus of elasticity, Surface tension, capillary action, Ideal, Newtonian and non-Newtonian fluids, Relevance of fluid properties to textiles and textile processes

### **Fluid statics:**

Pressure variation in a static fluid; Pascal's law; hydrostatic force on a plane surface, Pressure prism method; hydrostatic force on a curved submerged surface; buoyant force, Archimedes' principle; the stability of floating and submerged objects, Constant velocity rotation of a liquid around fixed axis

**Fluid dynamics:**

Flow characteristics; Equation of continuity; Application of Newton's second law to fluid flows; development, uses, and limitations of the Bernoulli equation; static, dynamic and stagnation pressures; Laminar and turbulent pipe flow; losses in pipe flows

**Fluid flow applications in textile processing:**

Air jet spinning, Nozzle design and performance in air jet spinning, Spun bonding process of non-woven, fabric like structures, Textile wet processing, Air-jet and water jet weft insertion mechanisms

**Dimensional analysis:**

Buckingham Pi Theorem and its application in dry and wet textile processing

**Fluid measurement:**

Measurement of static pressure, stagnation pressure, flow velocity and flow rate

**Fluid machinery:**

Turbo machinery: Hydraulic Turbines, Pumps and blowers. Minimizing losses in turbo machines; Turbo machinery applications in textile industry

**MT 225: LINEAR ALGEBRA & ORDINARY DIFFERENTIAL EQUATIONS****Linear Algebra:**

Linearity and linear dependence of vectors, basis, dimension of a vector space, field matrix and type of matrices (singular, non-singular, symmetric, non-symmetric, upper, lower, diagonal tri-diagonal matrix), Rank of a matrix using row operations and special method, echelon and reduced echelon forms of a matrix, determination of consistency of a system of linear equation using rank, transitions matrix, basic concept of tensors, eigen value and eigen vectors of a matrix, diagonalization, Cayley-Hamilton theorem. Applications of linear algebra in Engineering

**Euclid Space and Transformation:**

Geometric representation of vector, norm of vector, Euclidean inner product. projections and orthogonal projections, Euclidean n spaces n properties Cauchy- Schwarz inequality, Euclidean transformations, apply geometric transformations to plane figure, composition of transformations

**1<sup>st</sup> Order Differential Equations:**

Basic concept; Formation of differential equations and solution of differential equations by direct integrations and by separating the variables; Homogeneous equations and equation reducible to homogeneous form; Linear differential equations of the order and equations reducible to the linear form; Bernoulli's equations and orthogonal trajectories; Application in relevant Engineering

## **2<sup>nd</sup> and Higher Orders Equations:**

Special types of 2<sup>nd</sup> order differential equations with constant coefficients and their solution; The operator D; Inverse operator 1/D; Solution of differential by operator D method; Special cases, Cauchy's differential equations; Simultaneous differential equations; simple application of differential equations in relevant Engineering

## **Laplace Integral & Transformation:**

Definition, Laplace transforms of some elementary functions, first translation or shifting theorem, second translation or shifting theorem, change of scale property, Laplace transform of the nth order derivative, initial and final value theorem Laplace transform of integrals, Laplace transform of functions  $t_n F(t)$  and  $F(t)/t$ . Laplace transform of periodic function, evaluation of integrals, Definition of inverse Laplace transform and inverse transforms, convolution theorem, Solutions of ordinary differential using Laplace transforms

## **TE 211: TEXTILE YARN MANUFACTURING PROCESSES**

### **Definitions, yarn classification & numbering systems:**

#### **Preparatory processes:**

##### **Blow Room:**

Principles and objectives. Layout of blowroom line. Components; feeding apparatus, opening devices, grid and their interaction. General factors influencing opening, cleaning, blending and transport of material. Conventional and modern blow rooms. Foreign contamination detection and removal system, waste recycling

##### **Carding:**

Principles and objectives. Operating zones of carding. Components; feed device, taker-in, auxiliary carding devices, main cylinder, flats, doffer, detaching apparatus, can coiler. Card clothing, autoleveling and machine drive.

##### **Drawing frame:**

Principles and objectives. Roller drafting, equalizing, parallelizing, blending and dust removal. Components; creel, coiling, drafting arrangement, sliver formation and transport. Can changer, auto-leveling.

##### **Lap Forming and Combing:**

Lap former, conventional and modern preparatory systems. Combing theory and principles, sequence of operations, comparison of carded and combed slivers.

##### **Roving frame:**

Principles and objectives, Operating zones, drafting arrangement, twist insertion, winding system, package formation, machine drives and doffing systems.

##### **Ring frame:**

Principles and objectives, Operating zones, drafting system, ring traveler and clearer, spindle, guide devices, balloon control ring, bobbin building mechanism and machine drives.



**Spinning calculation:**

Yarn count system, Calculation of count, draft, production and twist.

**TE 205: PRETREATMENT OF TEXTILES****Pre-treatment:**

Process, chemical reactions & mechanisms involved in pre-treatment of cotton, wool and silk fibrous substrate viz. Desizing; Scouring; bleaching, shearing and singeing; Mercerising; Carbonizing and Crabbing.

Effects of effective pre-treatment on dyeing properties

**Hydroextraction:**

Mechanism of removal of water from fibrous substrate by mechanical, electrical and thermal system

**Pre-treatment machines:**

Descriptions of machines used in different pre-treatment processes in fibre, yarn and fabric forms. Machinery for knit and pile fabrics

Continuous and batch processes for pre-treatment and their comparison

**Fluorescent Brightening Agents:**

Introduction of FBA's, Mode of action, Chemistry and application of FBA's

Whiteness and measurement of whiteness

**TE 207: MACHINE DESIGN****Basic principles of machine design:**

Basic criteria of design of machine parts, determination of permissible and actual stresses, factor of safety

**Design of simple machine elements:**

Design of keys, cotters, and couplings Design of brakes and clutches, flywheel, Design of welded, riveted and bolted joints, Design of translation screws

**Design of flexible elements:**

Design of belts, Design of chains, Design of ropes

**Design of shaft:**

Design of shafts Introduction to flexible shafting; Connecting rods and crank shafts

**Design of gears:**

Gearing; Design of spur, helical, bevel & worm gears

**Cam follower system:**

Classification of Cam Mechanisms; Cam Nomenclature; Cam Design; Pressure angle; radius of curvature; Cam size and Cam Profile; Weaving and Knitting Machine Cams

**Bearing & lubrication:**

Types and theory of lubrication and its application in textiles, Design of rolling contact bearings, Design of journal bearings

**Industrial design codes:**

Design codes (ASME, BS, ANSI, JIS, DIN or ISO) and standards, tolerances, standards of fits & tolerances

**TE 208: MATERIAL SCIENCE****Introduction:**

Material science and Material Engineering, types of materials, structure & properties, selection criteria of materials

**Metals and alloys:**

Metals, ferrous alloys, non-ferrous alloys and their mechanical properties, Iron-carbon phase diagram, binary diagrams.

Heat treatments of steel, hardenability, annealing

**Ceramics & glasses:**

Composition, properties, structures, application of ceramics, glasses & refractory materials and their manufacturing methods

**Polymers:**

Polymerisation, structural feature of Polymers, Thermoplastic Polymers, Thermo setting Polymers, and their mechanical properties

**Composites:**

Introduction, types, method of fabrication and their mechanical properties, Textile reinforced composite materials in modern applications

**Material degradation:**

Metal degradation by atmospheric, aqueous and galvanic corrosions. Forms of corrosion and methods of corrosion prevention. Chemical degradation of ceramics and polymers. Radiation damage, wear and surface analysis

## **HS 205: ISLAMIC STUDIES**

### **Fundamentals of Islam:**

Tauheed: Arguments for the Oneness of God. Impact of Tauheed on human life. Place of Man in the Universe; Purpose of Creation; Textual study of Surah Al-Rehman and Al-Furqan; Prophethood; Need for Prophet, Characteristics of a Prophet, Finality of Prophethood. Seerat-Life of the Prophet as Embodiment of Islamic Ideology. Faith in the Hereafter Akhrot. Effects of the belief on worldly life

### **Ibadat:**

Concept of Ibadat, Major Ibadat-Salat, Saom, Zakat, Hajj and Jihad

### **Basic Sources of Shariah:**

The Holy Quran: Its revelation and compilation. The authenticity of the text. Hadith: Its need authenticity and importance. Consensus Ijma, Analogy Qiyas

### **Sources of Knowledge:**

Islamic approach to intuition, Reason and experience. Revelation Wahi as a source of knowledge

### **Moral and Social Philosophy of Islam:**

The concept of good and evil. Akhlaq-e-Hasna with special reference to Surah Al-Hujrat. Professional Ethics Kasb-e-Halal

### **Islamic Political Principles:**

Salient features of the Islamic state. Madina character. Responsibilities of the Head of the State. Rights and Duties of citizens

### **Economic Order of Islam:**

Right to Property. System of Taxation. Distribution of Wealth Zakat and Ushar. Interest Free Economy Shirakat and Muzarabat

### **Islam as Living Force:**

Application of Islamic Teachings to the Socio-Economic development in the 20<sup>th</sup> century

## **HS 206: ETHICAL BEHAVIOUR**

Nature, Scope and methods of Ethics and religion. Ethical teachings of world religions. Basic Moral concepts, Right and wrong, Good and evil

An outline of Ethical systems in philosophy; Hedonism, Utilitarianism, Rationalism and Kant. Self Realization Theories, Intuitionism

### **Islam Moral Theory:**

Ethics of Quran and its philosophical basis. Ethical precepts from Quran and Hadith and promotion of moral values in Society

## **TE 312: FABRIC MANUFACTURING PROCESSES**

### **Preparatory systems:**

Types of packages. Objectives, principle and mechanisms of winding. Pirn winding. Mechanism of doubling, twisting, reeling and winding off machines. Principle and operation of warping systems, warping calculations. Sizing machine, types of sizes and sizing calculations

### **Weaving: Mechanisms and Structures:**

#### **Weave design:**

Plain, twill and satin weaves and their derivatives. Colour & weave effects. Computer aided weave designing.

#### **Loom Mechanisms:**

Primary, secondary & auxiliary motions of loom. Let-off mechanisms and its type. Take-up mechanisms and its types.

#### **Shuttle weaving machines:**

Parts, mechanisms and loop timings.

Weaving calculations

#### **Humidity:**

Importance of humidity in a weaving unit, air quality in weaving shed. Types of humidification systems.

#### **Weft Knitting:**

Mechanisms and Structures Knitting terminologies. Basic knitted structures. Elements of knitting machine, types of knitting needles. Designing of structures by needle notation. Flat and Circular machines. Application of CAD/CAM. Whole Garment knitting system

## **TE 307: UTILITIES FOR TEXTILES**

### **Utilities for textiles:**

Water, Natural Gas, Steam, Compressed Air and Electrical power; Piping Network for Utilities

### **Power generation:**

Basic principles and Cycles used; Steam Power Plant and its types; Gas Power Plant; Combined Heat and Power Generation; Solar Cells and Fuel Cells

### **Internal combustion engines:**

Internal Combustion Engines: Types and Classification; Fuels; Speed and Load Control; Supercharging; Exhaust Gas Recovery; Engine Lubrication System; Knocking and Detonation

### **Combustion:**

Stoichiometric Equations; Higher and Lower Heating Values; Fuel Rating; Adiabatic Flame Temperature

**Water supply:**

Sources and Demand of Water; Quality and Treatment of water; Water Desalination

**Steam generation:**

Properties of Steam, Boilers and Types; Heating Surface Area calculations; Fuels, Feed Water Systems; Air Preheaters; Economizers; Super heaters; Condensers; Separators; Ejectors

**Turbines:**

Steam and Gas Turbines: Classification, Operation and Maintenance

**Air conditioning & ventilation:**

Principles of Air conditioning; Relevant Codes & Standards; Primary and Secondary Refrigerants; Vapour Compression and Absorption cycles, Simple Air-conditioning System; Ventilation Equipment

Psychrometric Chart and its Uses; Air Distribution Systems; Duct Design; Distribution Equipment

HVAC Equipment Selection: Humidifiers, Dehumidifiers, Fans, Diffusers and Cooling Towers

**TE 305: QUALITY CONTROL IN TEXTILES****Fundamentals of Probability and Statistics:**

Set theory and set operations; Venn diagram; Definition of probability; Probability laws; Conditional probability; Bayer's rule

Deterministic and probabilistic data; Grouping of data; Measures of central tendency and dispersion; Calculation of mean, mode, median; standard deviation, and range, weighted average, and coefficient of variation

Random variable; discrete and continuous random variable; Mathematical expectation; Laws of expectation

**Probability Distribution:**

Discrete probability distributions: Uniform, Binomial, Multinomial, Hypergeometric, Poisson, & Negative Binomial distribution

Continuous probability distributions: Normal, Exponential, Weibull, Chi-square, F & T distributions. Transformation of variables; Moment generating function; Random sampling; Sampling distribution of mean; Central limit theorem

**Control Charts:**

Properties of the distribution of sample means, sample range estimation of standard deviation, chance and assignable causes, control charts for mean and range, control charts for mean and standard deviation, control charts for proportion defective and defects per assembly. Tests of significance to compute confidence limits

**Acceptance Sampling:**

Introduction, OC curve, consumer and producer risks, AQL & LTPD, sampling errors, acceptance sampling for continuous production, acceptance by variables, single, double, and sequential sampling

**Quality, Reliability, & Maintainability:**

Definitions, management of quality control, total quality control, Taguchi method, economic aspects of quality decisions, process capability and variability analysis, Various aspects of life testing, reliability, & maintainability, introduction to ISO 9000

**Application of QC in Textile Engineering:**

International and Pakistan standard of various textile products such as fibers, Yarn, filaments, woven and knitted fibers, finished goods and garments, with emphasis on cotton products

**TE 326: TEXTILE DYEING****Dye stuff classification:**

Early attempts to classify dyes and pigments, Colour index classification

**Chemical Class:**

Azo, Anthraquinone, Indigoid, Polycyclic, aromatic, Carbonyl, Polymethine, Azine, Oxigine, Thiazines, Xanthene, thiazole, Quinoline, Sulphur and cyanine dyes

**Application Class:**

Direct Dyes, Sulphur Dyes, Azoic Dyes, Reactive Dyes, Anthraquinone Vat and solubilized Vat Dyes, Disperse Dyes, Acid Dyes, and Basic Dyes. Principle of dye selection for various fibrous substrates, Theories of dyeing of natural and manmade fibres. dyeing equilibrium, thermodynamics of dyeing isotherms, dyeing kinetics

**Dyeing:**

Application of Direct, Vat, Sulphur, Reactive and Azoic dye-stuff to cellulosic substrate, Acid dye to protein and Disperse to synthetic substrate through various dyeing techniques. Dyeing of blended fabric. RFT dyeing

Descriptions of machines used in dyeing of fibre, yarn and fabric forms. Dyeing Machinery for knit and pile fabrics. Continuous and batch processes for dyeing and their comparison

**Colour physics & measurement:**

Colour Spectrum, nature of light, light sources, illumination and standard illuminant, principles of colorimetry, CIE system, Beer – Lambert law, Kubelka – Munk theory, computerized colour matching, metamerism, Shade sorting

**Pigments:**

Pigments as colorants. Classification and properties of pigments Viz. inorganic and organic pigments. Pigment dyeing

## **HS 304: BUSINESS COMMUNICATION & ETHICS**

### **PART – I: Business Communication:**

1. Writing formal & business letter
2. Writing formal memos
3. Drafting notices and minutes of meetings
4. Drafting tender notices
5. Theoretical Knowledge & comprehension of contracts & agreements
6. Preparing proposal and technical report
7. Conducting & Writing a project report on a mini research (sessional work)
8. Conducting seminar and interviews
9. Writing and presenting conference papers
10. Solving IELTS type papers

### **PART – II: Engineering Ethics:**

#### **INTRODUCTION**

Objective of the course

Definite of (a) a code (b) ethic

Defining needs for a code of ethics

#### **1. NEED FOR A CODE OF ETHICS**

For who and why

Review of Code of Ethics of international engineering and other bodies

Review of Code of Ethics of other professional bodies of Pakistan

#### **2. COMPARING/CONTRASTING**

Review of PECs' Code of Ethics, Code of Conduct

Comparison between PEC's Codes & those of similar international bodies

## **TE 313: TEXTILE PRODUCT EVALUATION-I**

### **Textile Testing:**

Objectives, General requirement and standards for textile testing (ASTM, AATCC)

### **Sampling:**

Techniques for fibre, Yarn and Fabric sampling

### **Textiles and Moisture:**

Atmospheric moisture and its measurement. Regain humidity relation of textile. Factor affecting regain and methods of regain measurement

**Fibre Testing:**

Determination of length and uniformity, Fineness, Strength, Maturity, Trash Content and colour by conventional and modern testing instruments and techniques

**Yarn Testing:**

Determination of count, Twist, Strength, Elongation, Evenness, Hairiness of yarn by conventional and modern testing instruments. Evaluation of lap, sliver and Roving irregularities and Grading of Yarn

**Fabric Testing:**

Measurement of fabric strength viz Tensile, Tear, Bursting, Seam Strength, Rip, Ballistic, stretch and recovery and their relation with usage of fabric. Assessment of fabric construction

**TE 319: HEAT & MASS TRANSFER****Conduction:**

General equation for conduction; Thermal conductivity of various textile materials; One-dimensional steady-state analysis; Critical thickness of insulation; Extended surface heat transfer

**Convection:**

Momentum and thermal boundary layer fundamentals; Forced convection heat transfer (internal and external flow geometries); Free convection; Boiling; Condensation

**Radiation:**

Basic concepts of electromagnetic radiation; Surface characteristics; Blackbody; Gray body; Emission in defined wave band; Energy exchange between black bodies

**Mass transfer:**

Diffusion mass transfer: Rate equation; Steady-state molecular diffusion in gases and liquids (diffusion through a stagnant layer, equimolar counter diffusion, diffusion in multi-component mixtures); Diffusion through solid materials (non-porous and porous); Diffusion through a polymeric film

Analogy of heat, mass and momentum transfer

Convective mass transfer; Concentration boundary layer; Mass transfer coefficients for various geometries and flow situations

Interphase mass transfer; Batch and continuous drying (rate of drying curve & drying mechanisms, drying time)

**Equipment and textile processes:**

Heat and mass transfer in wet processes; Heat and mass transfer equipment



## **TE 318: TEXTILE & ENVIRONMENT**

### **Atmospheric pollution:**

Origin and prevention; emission and control technology; industrial air pollution; air quality pollution and criteria setting

### **Noise & noise control:**

General consideration; environmental noise sources evaluation; methods and techniques to control and reduce noise level

### **Solid waste management:**

Composition of textile wastes; collection systems and alternatives for treatments and reuse

### **Health and industrial safety:**

ESSA requirements related to the safety of workers; OSHA standard

### **Environmental management systems and eco-labeling:**

ISO14000, Oeko-tex 100, EU-EcoLabel

Environmental impact assessment, Environmental audits, National Environmental Quality Standards

### **Cleaner production technologies in textiles:**

Sources, impact, monitoring, reduction and control of pollution in textile industry

### **Water pollution:**

Waste water characteristics, effluents standards, terminology in waste water treatments, primary treatments, secondary treatments, recycle and reuse of waste water

## **MF 303: APPLIED ECONOMICS FOR ENGINEERS**

### **Introduction:**

Engineering economy defined; Measures of financial effectiveness; Non-monetary factors and multiple objectives; principles of engineering economy

### **The Economic Environment:**

Consumer and producer goods; Measures of economic worth; Price, Supply, & Demand relationship; Production; Factors of production; Laws of return

### **Cost Concepts & Analysis:**

Sunk & opportunity costs; Fixed, variable, and incremental costs; Recurring & nonrecurring costs; Direct, indirect, and overhead costs; Standard costs; Breakeven analysis; Unit cost of production; Cost-benefit analysis; Feasibility studies; Value analysis in designing & purchasing

### **Time Value of Money:**

Simple interest; Compound Interest; Cash flow diagrams; Interest formulas; Nominal versus effective interest rates; Continuous compounding

**Depreciation and Depletion:**

Purpose of depreciation; Types of depreciation; Economic life; What can be depreciated?

**Comparing Alternatives:**

Present economy; Selection among machines, materials, processes, and designs; Payback period method; Present worth method; Uniform annual cost method; Rate of return method; Alternatives having identical lives, Alternatives having different lives

**Production Concepts & Mathematical Models:**

Manufacturing lead time; Production rate; Capacity; Utilization; Availability; Work in process; WIP and TIP ratios

**Linear Programming:**

Mathematical statement of linear programming problems; Graphic solution; Simplex method; Duality problems

**Capital Financing and Budgeting:**

Types of ownership; types of stock; Partnership & joint stock companies; Banking & specialized credit institutions

**Industrial Relations:**

Labour problems; Labour organizations; Prevention & settlement of disputes

**ME 311: MANUFACTURING PROCESSES****Sand Casting:**

Introduction; Sand casting procedures; Patternmaking; Material types and construction of patterns; Pattern allowances; Moulding process; Moulding materials; Tools and equipment; Testing of sand; Moulding machine; Core making; Types of cores; Core making machine; Shell Moulding; Plaster Moulding; Centrifugal casting; Trimming and finishing of castings; Seasoning of castings; Inspection of castings

**Die Casting:**

Pressure die casting; Vacuum die casting; Gravity die casting; Die casting machines; Hot chamber and Cold Chamber methods; Die casting alloys; Die design, construction, and material; Die casting

**Welding Processes:**

Classification of welding processes; Oxyacetylene welding. Oxygen torch cutting, and flame straightening; Arc welding; Shielded arc welding, Gas tungsten arc welding, Gas metal arc welding, Flux-cored arc welding, submerged arc welding, plasma arc welding, stud welding, spot welding, Seam welding, Projection welding. Brazing and Soldering

**Fabrication of Plastics:**

Casting; Blow Moulding; Compression Moulding; Transfer Moulding; Cold Moulding; Injection Moulding; Reaction Injection Moulding; Vacuum Forming; Welding of plastics

**Machining Process and Machine Tools.**

Machine tools using single edge cutting tools, and multiple edge cutting tools, Description, and operations; performed on lathe, shaper, Planner, drilling, milling, gear cutting, and broaching machines. Work holding devices

Machine tools using abrasive wheels; description and functions of various types of grinding machines; wheel dressing, and wheel balancing; Honing, lapping, and super finishing operations; thread manufacturing

Cutting tools for manufacturing: Cutting tool material characteristics; Cutting tool materials; Tool Geometry; Non-traditional machining processes such as EDM, ECM, & ultrasonic machining

### **Hot & Cold Working Metals:**

Advantage and limitations of hot working and Cold working processes; Methods of Forging; Hammer forging; Die forging; Drop, Press and Upset forging; Construction of drop forging hammers; Forging defects and their causes. Cold working processes such as Bending, Shearing, Rolling, Extrusion, Blanking, Perforating, Notching, Tube drawing, Wire drawing, and embossing

## **MT 333: ADVANCED CALCULUS & FOURIER ANALYSIS**

### **Partial Differential Equation:**

Basic concepts and formation of partial differential equations; Linear homogeneous partial differential equations and relations to ordinary differential equations; Solution of first order linear and special types of second and higher order differential equations: D' Alembert's solution of the wave equation and two dimensional wave equations: Lagrange's solution; Various standard forms

### **Fourier series:**

Periodic functions and expansion of periodic functions in Fourier series and Fourier coefficient ; Expansion of function with arbitrary periods . Odd and even functions and their Fourier series; Half range expansions of Fourier series. "DFT and FFT. Fourier Spectrum"

### **Advance calculus:**

Define a stationary point of a function of several variables, define local maximum, and saddle point for a function of two variable the stationary point of a several variables, obtain higher partial derivatives of simple functions of two or more variables, iterated integrals, double and triple integrations with applications (area, centeroid, moment of inertia, surface area and volume, use multiple integrals in solution of engineering problems

### **Vector Calculus:**

Vector differential operator, directional derivative, gradient, divergence, curl of a vector field, and laplacian operators with applications. (Solenoid, conservative, etc)

Vector Integrations; Evaluate line integrals along simple paths, apply line integrals to calculate work done, apply Green's theorem in the plane to simple example, evaluate surface integrals over simple surface, use the jacobian to transform a problem a new co-ordinate system, apply Gauss divergence theorem to simple problem, apply Stokes' theorem to simple examples

## **HS 405: ORGANIZATIONAL BEHAVIOUR**

### **Introduction to Organizational Behaviour:**

- Foundations of OB: Management functions, roles, and skills
- Effective versus successful managerial activities
- Replacing intuition with systematic study
- Exploring OB challenges and opportunities facing globalization: Improving quality and productivity
- Improving people skills
- Managing work force diversity
- Responding to globalization
- Empowering people
- Stimulating innovation and change
- Coping with temporariness
- Handling declining employee loyalty
- Improving ethical behavior

### **Foundations of Individual Behaviour:**

- Individuals & Organizations: Biographical traits and ability
- Personality
- Perceptions and individual decision making: Understanding perception and its significance, factors influencing perception
- Linking perception and individual decision making
- Optimizing decision making model
- Alternative decision making models
- Issues in decision making
- Values, attitudes and job satisfaction: Importance, sources, types of values
- Sources and types of attitude
- Attitude and consistency
- Measuring job satisfaction
- Determinants of job satisfaction
- Effect of job satisfaction on employee performance
- Ways employees can express dissatisfaction
- Motivation - basic concepts and applications

### **Foundations of Group Behaviour:**

- Group in OB: Defining and classifying groups
- Stages of group development, work group behaviour
- Dynamics of groups
- Understanding work teams: Team versus group; types of teams, creating high performance teams
- Turning individuals into team players
- Communication: communicating at interpersonal and organizational level
- Leadership: basic approaches and contemporary issues
- Conflict & negotiation: defining conflict; transition in conflict thought
- Conflict process
- Negotiation - strategies, process and issues

## **Foundations of Organizational Structure:**

- Organizational structure and design
- Work design
- Work stress
- Organizational culture: definition
- Culture's functions, employees and organizational culture
- Organization change and development: forces for change
- Managing planned change, resistance to change
- Approaches to managing organizational change

## **TE 453: GARMENT MANUFACTURING**

Overview of the garment industry; apparel development process charts; apparel sizing and measurements; pattern making; fabric spreading and cutting; sewing and other textile joining methods; types and components of sewing machines; fundamentals of sewing process; garment washing, finishing, pressing and packing; garment quality control: performance, appearance, fit and comfort; garment care labeling

## **TE 424: TEXTILE PRINTING**

### **Textile printing:**

Pre-treatment and fabric requirements for printing, design details of printing. Repeats and its types. Style and methods of printing. Special printing processes. Print designs

### **Printing auxiliaries:**

Auxiliaries for printing with pigments and dyes, General characteristics of, classification, Rheology and selection criteria for thickeners

### **Pigment printing:**

Pigment systems and preparations, different style of application

### **Dyestuff printing:**

Printing system for Direct, Reactive and Vat dyes with various styles

### **Printing of blended materials:**

Dye selection and Printing Process for common Blends

Identification of printing faults (Mechanism and Process) and remedies

### **Inkjet printing:**

Fabric preparation for inkjet printing, dye selection, inkjet printing process and application

### **Printing machines:**

Block, Roller, Manual and automatic carriage flat screen printing machine, rotary printing machine and dryers for printing. Rotary Screen Engraving, CAD/CAM Inkjet printing machines

**Fixation machines:**

Fixation Mechanism for dyes and pigments. Different types of steamers and agers their advantages and disadvantages. After treatment processes and machinery for printing

**TE 413: TEXTILE PRODUCT EVALUATION-II****Qualitative and Quantitative Analysis:**

Difference between Qualitative and Quantitative analysis; Identification of various fibres viz Cotton, Viscose, Polyester, Wool, Acrylic and Nylon by, microscopic viewing, burning, dissolving and staining techniques. Quantitative analysis of common blends and Qualitative analysis of damaged cotton

**Oil and Water Repellency Tests:**

Wicking and Wetting of Textiles, Water Proofing, Shower proofing, water and oil Repellency

**Flammability Tests:**

Factor affecting textile Flammability 450 and vertical flammability tester. Flammability regulations. Process and equipment used to determine Dimensional Stability; Factors Affecting Dimensional Stability, Garment and Fabric Appearance, Bow and Skewness evaluation

**Pilling and Abrasion Tests:**

Introduction and Factors effecting Pilling and Abrasion and its measurement

Subjective and Objective handle evaluation. Care labels and their importance.

**Colour fastness Tests:**

Importance of Fastness properties, Methods and equipment used to determine colour fastness to sun light, Washing, Laundering, Dry and Wet, rubbing, Perspiration, Dry cleaning, bleaching, Water, Sea water, Identification of dyes: powder form and on dyed fabrics

**TE461: ADVANCED YARN MANUFACTURING MECHANISM****Compact Spinning:**

Types of compact spinning systems, Spinning triangle and its reduction, Comparison of ring and compact yarns.

**Rotor Spinning:**

Principle, operation and components. Automated piecing, material transport and package change. Draft and yarn twist. Economics of rotor spinning.

**Air-jet Spinning:**

Principle operation and objectives, Raw material requirements, component; Drafting, nozzle, winding. False twist, Economics. Comparison of air-jet and vortex spinning systems.

**Friction Spinning:**

Principle, operation and objectives. Assessment of DREF-II and DREF-III yarn properties.

**Bulked Yarn texturing:**

Texturing of the synthetic filaments, texturing types; air-jet, false twist, stuffer box, edge crimping, gear crimping.

**Fancy Yarn:**

Types and structures of fancy yarns, Multi count, multi twist, slub and siro yarns.

**Mill Planning:**

Planning the machine sequence for establishing a new mill, Cost calculation for manufacturing yarn.

**TE 452: TEXTILE FINISHING****Mechanical finishing:**

Processes and machines involved in mechanical finishing of various textile substrates viz Heat Setting, Napping, Shearing, Sueding, Calendering, Sanforizing, Compacting, Relaxation, Decatizing

**Chemical finishing:**

Application processes and mechanism of chemical finishing of various textiles substrates. Softening finishes, Hand-building finishes, Easy-care and durable press finishes, Oil and Water repellent finishes, Soil release finishes, Flame retardant finishes, Antistatic and Anti-pilling finishes, Elastomeric finishes, Nonslip finishes. Finishes to improve colour fastness; Ultraviolet protection finishes, Antimicrobial and bio-finishes

**TE 462: ADVANCED FABRIC MANUFACTURING MECHANISM****Weaving:**

**Shedding systems** Tappet shedding Mechanism, Types of shedding and sheds, Types and designing of tappet.

**Dobby shedding:** Mechanism, Types and parts.

**Jacquard shedding:** Mechanism, types and fabric designing.

**Weft insertion systems:**

**Projectile:** Mechanism, specifications of different types of projectile, Parts of projectile weft insertion system. Lubrication system. Weft mixer system.

**Rapier:** Mechanism. Types of rapier, Parts of rapier weft insertion system.

**Air jet:** Introduction. Parts. Machine operating pressure. Air compression system, quality of compressed air.

**Water Jet:** Introduction, parts of water jet weft insertion system. Sensing systems in shuttle-less looms. Weaving cost calculations.

Beat up system for Shuttleless loom.

**Selvedge formation:** Technical requirement and Types.

**Terry-towel weaving:** Mechanism, Types of terry fabrics, designing, machine settings, calculation for contraction of pile warp threads.

**Braiding Technology:** Types of braid and braiding machine. Braiding geometry. 2 step and 4 step braiding process.

**Speciality weaving:** 3 dimensional concept of weaving. Multilayer fabrics.  
Distinguishing features of loom for weaving cotton, woollen, worsted and synthetic yarns.

**Warp Knitting:**

Comparison of weft and warp knitting technology. Principles of warp knitting: parts of machine, pattern mechanisms, basic overlap and underlap variations. Classification of machines. Development of lapping diagram and chain notation of basic warp knitted structures.

Fabric defects

**HS 403: ENTERPNEURSHIP**

**Understanding the Entrepreneurship Mind-set:**

- The revolution impact of Entrepreneurship
- The individual Entrepreneurship Mind-set
- Corporate Entrepreneurship Mind-set
- The Social and Ethical perspectives of Entrepreneurship

**Launching Entrepreneurship Ventures:**

- Creativity and innovations
- Methods to initiate ventures
- Legal challenges in Entrepreneurship
- The search for Entrepreneurship Capital

**Formulation of Entrepreneurship Plan:**

- The assessment of function with opportunities
- The marketing aspects of new ventures
- Financial statements in new ventures
- Business plan preparation for new ventures

**Strategic Perspectives in Entrepreneurship:**

- Strategies growth in Entrepreneurship
- Valuation challenges in Entrepreneurship
- Final harvest of a new venture

**Teaching Methodology:**

**Lectures:** Interspersed with interactive sessions in class

**Practical work:** Spoken language, pronunciation, accent reduction, discussion etc.

**TE 451: AUTOMATION & CONTROL IN TEXTILE**

**Automation:**

Automation defined; Types of automation; Reasons for automation; Arguments for a against automation



**Production Operation & Automation Strategies:**

Manufacturing industries; Types of production; Functions in manufacturing; Organization and information processing in manufacturing; Plant layout; Production concepts and mathematical models; Automation strategies

**Automotive Type Automation:**

Automated flow lines; Methods of workpart transport; Transfer mechanism; Buffer storage; Control functions; Automation for machining operations; Design fabrication considerations

**Analysis of Automated Flow Lines:**

General terminology & analysis of transfer lines without storage; Partial automation; Automated flow lines with storage buffers; Computer simulation of automated flow lines

**Linear Feedback Control Systems:**

Process model formulation; Transfer functions and block diagrams; Laplace Transforms; Control Actions; Linear system analysis; Root-locus method; System Design

**Optimal Control:**

Structural model of a manufacturing process; Steady state optimal control; Adaptive control; on line search strategies

**Computer Assisted Optimal Control:**

Structural model of a manufacturing process; Steady state optimal control; Adaptive control; on line search strategies

**Computer Process Control:**

The computer process interface; Interface hardware; Computer process monitoring; Types of computer process control; direct digital control; supervisory computer control; Programming for computer process control

**TE 406: TEXTILE PRODUCTION MANAGEMENT****Production Management and Systems:**

Introduction to production Management; System concept; Functions of management; Managerial decision making; Models as decision aids

**Plant Location & Plant Layout:**

Selection of region; Selection of community; Site selection; Location factor dependence; Sources of assistance; Plant location trends; Quantitative analysis and Plant layout; Product and process layout analysis and comparison; Material handling considerations in layout

**Production Planning and Control:**

Formalized production planning; Production planning methods; Master scheduling; MRP; MRP inputs, MRP outputs; Product Structures; Types of MRP; Capacity planning and control; Production control systems; Scheduling techniques

**Planning & Control techniques:**

Inventory control; types of inventory; Inventory costs; Independent versus dependent demand; EQQ/EPÑ models; Types of control systems; Selective inventory control; Inventory system development; Project

Planning; CPM/PERT; Network development; Determination of activity times; Establishment of critical path; Probabilistic statements

**Method Study:**

Definition; Objectives; Procedure; Process chart symbols; Outline process chart; Flow process charts; Multiple activity chart; Two handed chart; Critical examination, Principles of motion economy, Case studies and Application

**Work Measurement:**

Definition; Objectives; Techniques of work measurement; Stop watch time study; Timing methods; Performance rating; Standard timing; Allowance factors. Work sampling; Confidence level; Determination of samples size; Making random observations; Scope of work sampling. Predetermined time standards; Definition; Advantages and criticisms; Motion classification; TMU; Use of PTS systems

**Maintenance:**

Types of maintenance; Breakdown maintenance; Preventive maintenance; Individual versus group replacement; Internal versus external maintenance; Queuing theory; Application of queuing theory; Input characteristics; Queue characteristic; Service characteristic; Mathematical approach

**TE454: TEXTILE MERCHANDIZING**

Introduction to Merchandizing and scope; Merchandize: Raw and Finished merchandizes; Main markets and potential markets; Sampling and new developments; Outsourcing; Costing; Communication; coordination and follow-ups; Merchandizing process: Program purchase order, Time & Action, Approval Phases, Fabric working, Follow up, Inspections, Shipments, Export documents, shipment, Modes of payment; Complaints handling and Claims; Quality assurance and compliance; Retail trends: International markets and local market; International trends and policies; Case Studies