Syllabus of Four Year Degree Course in Textile Engineering
Textile Engineering Department
Faculty of Technology & Engineering
The Maharaja Sayajirao University of Baroda
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FIRST SEMESTER of B. E. I (TEXTILE ENGG)

APPLIED PHYSICS-I

APH 101

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	3 Hrs/Week	Total	150 Marks

1. Interference : Types of interference. Fresnel's bi-prism, white light fringes, determination of thickness of sheet, interference in thin films (conditions for normal incidence), necessity of extended source, Newton's rings. Michelson interference & its uses. Types of fringes. Antireflection coating, interference filters.
2. Diffraction : Fraunhoffer diffraction at a circular aperture, plane diffraction grating, formation of multiple spectra and determination of wavelength, dispersive power of grating, resolving power of optical instruments, meaning of resolving power. Rayleigh's criterion of resolution. Resolving poer of grating, prism, telescope and microscope.
3. Polarization : Geometry of calcite crystal. Double refraction, Nicol's prism. Huygene's theory of double refraction quarter wave plate. Elliptically and circularly polarized light and production of circularly polarized light. Optical activity. Specific rotation. Fresnel's theory of optical rotation. Laurent's half-shade polarimeter. Photo elasticity.
4. Lasers : Spontaneous and stimulated emission, population inversion, structure of laser, properties of laser light (monochromatic, low divergence, coherence). Types of lasers with specification, applications.
5. Ultrasonic : Ultrasonic waves, production and detection, properties and applications of ultrasonic waves.
6. Electricity and magnetism : Magnetic forces on a current, torque on a current loop, hall effect and hall devices, circulating charges, cyclotron and mass spectrometer. Faraday's law of induction, Lenz's law. Induction- a quantitative study, time varying magnetic fields. Betatron, Para magnetism, diamagnetism, ferromagnetism, nuclear magnetism & NMR.
7. Thermoelectricity : Seeback effect, variation of thermo-emf with temperature, thermoelectric series, measurement of thermo-emf, law of intermediate metals. Law of intermediate temperatures. Peltier effect. Thomson effect. Total emf in a thermocouple, thermoelectric power, applications of thermoelectric effect.
8. Modern Physics : Artificial radioactivity, artificial transmutation, nuclear reactions and q-value. Types of nuclear reactions, structure of nucleus, nuclear constituents, proton-neutron theory, general properties of the nucleus. Atomic mass unit, mass Defect and Packing fraction. Nuclear binding energy, nuclear forces, nuclear models.
9. Nuclear fission : Theory of nuclear fission, energy released in nuclear fission, the chain reaction, thermonuclear reactions, atom bomb, stellar energy, nuclear reactors.
10. X-rays: Discovery & production of x-rays, origin and properties of x-rays, diffraction of x-rays, Bragg's law, x-ray spectrometer and crystal structure, powder method, applications of x-rays.

APPLIED MATHEMATICS-I

AMA 112

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

UNIT - 1 CALCULUS:

Reorientation. Functions of one variable. Applications of Derivatives-curvature. Successive Differentiation Partial Derivatives, Leibnitz rule for the nth order derivative of a function, Techniques of Partial derivatives.

UNIT - 2 INFINITE SERIES:

Sequences and their convergence, convergence and divergence of infinite series, Geometric series, P-series, A necessary condition for convergence, Comparison test, Ratio test, Absolute convergence and conditional convergence of alternating series. Expansion of functions : Macluarins & Taylor's expansion with remainder form. Indeterminate forms, L'Hopspital's rule.

UNIT - 3 COMPLEX ALGEBRA :

Complex numbers "& their geometrical representation, Complex numbers in polar form, Demoivre's theorem and its applications. Exponential, Logarithmic,Trigonometric & Hyperbolic functions.

UNIT - 4 DIFFERENTIAL EQUATIONS:

Reorientation. Modeling of Engineering systems pertaining to first order differential equations, Exact differential equations, Integrating factors, Unified approach to first order ordinary differential equations, equations of first order and higher degree.

UNIT - 5

Linear differential equations of higher order with constant coefficients and with variable Coefficients, models of higher order differential equations.

UNIT - 6

Method of variation of parameters and simultaneous linear differential equations. Method of solution in series, Bessel and Legendre's equations. Properties of Bessel functions, introduction to Legendre polynomials.

TEXT/REFERENCES:

1. Advanced Engineering Mathematics by Erwin Kreyszig.(6th edition) Johnwilley & sons.
2. Text Book of Engineering Mathematics - Dhanpat Rai & Sons,Delhi. by Srivastava -Dhavan
3. Differential Calculus by Shantinarayan S. Chand & Co. New Delhi.
4. Advanced Calcus by Willfred Kaplan-Addison Weseley Publ.company,Inc.
5. Advanced Engineering Mathematics-C.R.wylie,Mc.Graw-Hill,Inc.

ENGINEERING DRAWING
ME-01

Lecture	2 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

1. Plane Geometry, types of lines, lettering, geometrical construction, tracing or curves.
2. Projection of points, lines and projection on auxiliary planes.
3. Orthographic projection and Isometric drawing of machine parts and sections.
4. Threads, bolts, studs, nuts set screws split pins, keys, rivets, shafts, pulleys, foundation bolts, standard sections.
5. Cotter joints, knuckle joint, riveted joints, welded joints and couplings.
6. Sketches of above parts.

ELEMENTS OF MATERIAL SCIENCE
MET 1101

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

1. Engineering requirements of materials: Criteria for selection of materials for engineering applications on the basis of mechanical properties.
2. Crystallography: Crystal structure, space lattice, unit cell, crystal systems atomic packing factor, co-ordination numbers, crystal structure for metallic elements. Crystal directions and planes, Miller indices, stacking sequence in HCP and FCC.
3. Metallic Materials: Phase, diagram, Gibbs phase rule, Binary isomorphous phase diagram, purely eutectic binary phase diagram, partially eutectic binary phase diagram, solid solution-Hume Rothery Rules.
4. Imperfections: Point defects, Line defects and Area defects-grain boundary, till boundary and twin boundary grain, grain size number.
5. Cold working and annealing: Effect of grain size, alloying element and heat treatment on properties of material. Failure of metals-Ductile, Brittle, Ductile-to-Brittle transition, creep failure and fatigue failure.
6. Ceramic and Polymeric material: Structure, properties and applications of above materials. Glasses and refractories. Types of polymerization like condensation and Co-polymerization. Ageing aulcanization, cross-linking and branching.
7. Corrosion: Types of corrosion-Dry and Wet corrosion. Electro chemical and oxidation (Chemical) corrosion. E m f series and Galvanic series, stress concentration and compositional cells, corrosion prevention-Galvanic potential and coatings.
8. Classification of Insulator, Semi conductor and conductor on the basis of Band theory, ferromagnetism, Hard and Soft magnetic material.
9. Composite materials (PMC, CMC, MMC) and new developments Metallic glasses, super conducting material and optic fibre.

* Numericals related to above topics:

TEXT/REFERENCES:

1. Elements of material science and engineering – L H Van Vlack, Addison-Wesley Publising Company
2. An Introduction to material science and engineering – William D. Callister
3. Material Science and Engineering – V Raghavan

FUNDAMENTALS OF CIVIL ENGINEERING
C 1101

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Pr/Drg	3 Hrs/Week	Total	150 Marks

(I) Theory :
(A) ENGINERING MATERIALS :
1. (a) Bricks: Classification of bricks, factors affecting quality of bricks, characteristics of good bricks - As per ISI specifications - Field bests of bricks, special forms of bricks, field test for brick, Bricks for specific purposes like refractory bricks.
(b) Stones: Types and classification of stones, characteristics of good stones, choice and uses of stones, Dressing of stones.
2. (a) Lime : Classification of lime, characteristics of good lime, slaking process of lime, I.S. specification of lime
(b) Cement : Basic ingredient of ordinary cement - Physical properties of cement, Field examinations of cement, storing of cement, varieties of cement and its uses, I.S. specification of ordinary cement.
3. Mortar and concrete : Specifications of ingredients for mortar and concrete, classification of mortar and concrete, selection of mortar and its uses, Precautions in using mortar, Production and quality control of concrete, Physical properties of concrete.
4. (a) Timber : Characteristics of good timber, Impotence of seasoning of timber, Requirements of good preservations, Market forms of timber.
(b) Plastics, Steel & Glass : Basic types of plastics - physical & mechanical properties of plastics, uses of plastics in various engineering field, uses of steel, properties of mild steel, market forms of steel, composition of glass, properties and uses of glass - special varieties of glass.

(B)SURVEYING :
5. Introduction : Principle, role of survey, classification, basic instruments in linear and angular measurements, chain, tape, compass, uses, field work and notes, survey drawings, conventional symbols, scale.
6. Leveling : Temporary adjustments, field work, computation of levels, arithmetic checks, profiles and contours from level data, area measurements by field measurements from drawings, sue of planimeter.

(C) BUILDING CONSTRUCTION :

7. Types of constructions: Typical details of load bearing and framed structures, brief discussion and illustrations by sketches of typical important building components, suck as light and medium type foundations, lintel, flooring, roofing, different types of doors, typical finishing items, like plastering and painting.

(D) INTRODUCTORY ENVIRONMENTAL ENGINEERING :

8. Terminology: Air, water and land pollution, introduction to various type of pollution and remedial measures for control, environmental protection and legislation, water & waste water quality criteria, disposal of wastes.

(II) Term work :

Termwork will consist of practicals, drawings and sketches based on the above topics of the subject.

WORKSHOP

ME02

Lecture	--	Theory	--
Tutorials	--	Pr/tw/viva	50 Marks
Practicals	3 Hrs/Week	Total	50 Marks

Carpentry – Name, use and setting of hand tools, construction of halved single mortise and tenon joints, dovetail joints, bridle joint, oblige mortise and tenon joint and rafter joint

Smithy – Tools used for preparing simple jobs in hand forging

Termwork – Each candidate shall submit to the examiners, the term work as mentioned below which will be allotted marks up to a maximum of 50 with a certificate from the dean, Faculty of Tech. & Engg. that it was completed by him in a satisfactory manner within the walls of the college

Carpentry – At least 4 different joints

Smithy – At least 4 different jobs

When once a set of job has been submitted for the examination unless new jobs are presented. A candidate whose marks in term work are thus carried over shall be eligible for a class.

SECOND SEMESTER of B. E. I (TEXTILE ENGG)

APPLIED PHYSICS II

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	3 Hrs/Week	Total	150 Marks

1. FIBRE:(1L) Natural and manmade fibres, growth of fibre and effect of temperature, pressure and other parameters on fibre.
2. EQUILIBRUM ABSORPTION OF WATER: (8L) Humidity and relative humidity, dew point, measurement of humidity and hygrometers, regain and moisture content, measurement of regain, relation between regain and relative humidity, influence of temperature and stress.
3. COLOR SCIENCE: (5L) Beer's Law, Colorimetry, additive color mixture, three color mixture, spectrophotometry, dominant wavelength and purity, Subtractive method of color mixing, the color of paints & inks, Subtractive primaries.
4. OPTICAL INSTRUMENTS AND THEIR USE IN TEXTILE: (8L) Compound microscope, oil immersion microscope, electron microscope and their use in studying surface and structure of fibre, polarization microscope, spectrophotometer and interpretation of IR, visible and UV spectra.
5. FIBRE FRICTION: (9L) Technological effects, measurement of fibre friction: Bowden and Leben's apparatus, Guthrie and Oliver's apparatus, static and dynamic capstan method, Buckle and Pollitt's Technique and measurement of inter-fibre friction, static and kinetic friction and state of the surface, General theory of friction and application to fibre, theory of directional frictional effect. And lubricated condition.
6. TENSILE PROPERTIES: (9L) Stress, specific stress, tensile stress, strength, work of rupture, elongation at break, initial modulus, work factor, yield point, and crimp, experimental techniques to study elasticity, effect of moisture, temperature and light in the study of elastic properties. The effect of variability, Pierce's, Specers-Smith's and weak-link theories, Elastic recovery: Experimental methods, influence of test conditions on recovery and simple recovery models.
7. PHOTO ELECTRIC EFFECT: (5L) Einstein's equation, Photomultipliar tube, semiconductor, pn-Junction diode, LED, Photoconductive cell, Photovoltric cell.

TEXT/REFERENCES:

1. Physical properties of Textile fibres by W.E. Morton and J.W.S. Hearl
2. Optics by F.W. Sears
3. Engg. Physics by Gaur and Gupta.

MATHEMATICS & STATISTICAL METHODS

AMA 122

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	2 Hrs/Week	Total	150 Marks

UNIT 1 PARTIAL DIFFERENTIATION: Function of two variables. Limits, continuity and partial derivatives. Chain Rule. Euler's theorem. Implicit function. Differentiation. Applications of Partial derivatives. Tangent planes and normal lines to above surfaces (by calculus method).

UNIT 2 VECTOR CALCULUS: Scalar and vector fields. Gradient of a scalar function. Directional derivatives. Divergence and Curl of a vector field and their applications. Line Integrals, length of a arc curves, discussion on the curve helix.
UNIT 3 MULTIPLE INTEGRATION: Double Integral, Change of order of Integration, Changing from Cartesian to Polar Co-ordinates, Triple Integration, Applications of Double and Triple Integration.
UNIT 4 Preparation of frequency distribution, presentation of frequency distribution into graphs (histogram, frequency curve and frequency polygon, ogive curve). Measures of central tendency, measure of dispersion, skewness. Curve fitting (least square approximation) Correlation and regression analysis.
UNIT 5 Probability theory, Discrete Probability Distribution, Distribution – Binomial, Poisson and Continuous probability distribution.
UNIT 6 General idea of Sampling, methods to draw a random sample, Confidence interval for mean General idea of testing of hypothesis, acceptance sampling plan by attributes (single), large and small sample tests (mean, variance and proportion). Control Chart.
TEXT/REFERENCES:

1. Advanced Engineering Mathematics by Erwin Kreyszig.(6th edition) Johnwilley & sons.
2. Text Book of Engineering Mathematics - Dhanpat Rai & Sons, Delhi. By Srivastava -Dhavan
3. Differential Calculus by Shantinarayan S. Chand & Co. New Delhi.
4. Advanced Calculus by Wilfred Kaplan-Addison Wesley Pub. company, Inc.
5. Advanced Engineering Mathematics-C.R. Wyllie, McGraw-Hill, Inc.
6. Richard A, Probability & Statistics for Engineers, Johason, Phi, 1996
7. Sheldon P. Gordon & Florence S. Gordon: Contemporary Statistics, McGraw- Hill, Inc.1994

INTRODUCTION TO TEXTILES

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	2 Hrs/Week	Total	150 Marks

Classification of fabrics based on methods of manufacture, type of finish, raw material used, end uses, etc. Concept of fabric manufacture: Weaving, knitting, non-woven and lacing. Physical properties of woven fabrics, knitted fabrics, their uses and comparison with woven fabrics. Concept of fabric designing, fashion, market trend, etc. Concept of yarn preparation. Classification of yarns: Physical properties of yarns and fibres. Concept of yarn manufacture - concept of spinnability, different systems of staple yarn manufacture. Chemical processing: Importance of chemical processing. Concept of different processes.
PRACTICALS: Based on the above syllabus conducted during the semester.
TEXT/REFERENCES:

1. Corbman : Fibre to Fabric
2. H.V.S. Murthy : Textile Fibres
3. B. C. Goswami : Textile Yarns
4. Eric Oxtoby : Spun yarn technology

TEXTILE FIBRES

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

General classification. Structure, growth, geographical distribution, cultivation, grading, properties, end uses of important natural fibres. Cotton ginning. Study of physical properties and uses of man-made fibres. Study of methods used in production of man-made fibres by wet spinning, solvent spinning and melt spinning.

INTRODUCTION TO COMPUTER AND NUMERICAL ANALYSIS

AMA 221

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	2 Hrs/Week	Total	150 Marks

[A] C Programming:

- Algorithms, effective procedures in problem solving, flowcharts, pseudo-code
- C Preliminaries: Data types, Constants, variables, Type specification statements, operators and expressions Library Functions, Simple C programmes.
- Control Structures: Importance and types of control structures, Structured programming. IF---ELSE, While, Do ---While, For, Switch structure, GO TO continue and Break statement.

[B] NUMERICAL ANALYSIS AND APPLICATION PROGRAMMING

- Finite differences, Newton's interpolation formulae, Lagrange's formula
- Numerical integration, Trapezoidal Rule, Simpson's rule.
- Solution of equation of one variable: Bisection method, Regula-falsi, Newton-raphson Method.
- Introduction of Matrix Algebra, Rank of Matrix, Consistency of system of equations
- Solution of systems of linear equations: Gauss-Seidel, Jacobi, Gauss-elimination methods.
- Numerical solution of differential equation: Euler's Method, Modified Euler Method, Runge-Kutta method
- Finite difference methods for ordinary differential equations.

TEXT/REFERENCES:

1. Sudhir kaiker programming in C
2. Kernighan B.W. and Ritchie D.M.: The C programming Language. 2nd edition.
3. Numerical Methods for Scientific & Engineering Computation by M.K. Jain, S.R.K. Iyengar, R.K. Jain - Willey Eastern Ltd.
4. Textbook on engineering Mathematics by Bali, Saxena and Iyenger Laxmi publications Ltd.
5. Introduction to Numerical Analysis - S. S. Shastry, Prentice Hall of India.

MACHINE DRAWING

Lecture	2 Hrs/Week	Theory	100 Marks
Tutorials	--	Pr/tw/viva	50 Marks
Practicals	3 Hrs/Week	Total	150 Marks

Line convention and dimensioning methods (IS ¾ code 696), Line and block schematics, flow diagrams, circuit diagrams, fasteners and welding, sectioning methods and conventions, assembly of parts, exploded assembly and shading. Building drawing, perspective drawing, architectural drawing, conventions of limits, fits and tolerance, machine symbols.
TERM WORK: Based on the above syllabus conducted during the semester.
VIVA EXAMINATIONS: Oral examination will be based on the term work.
TEXT/REFERENCES:

1. N. D. Bhatt : Machine Drawing
2. R. S. Khurmi : Machine Drawing
3. S. B. Jurnarkar : Machine Drawing

FIRST SEMESTER OF B. E. II (TEXTILE ENGG)

APPLIED MECHANICS

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

Coplanar forces acting at a point. Force polygon. Resultant of a force and couple. Equilibrium of coplanar forces. Funicular polygon. Parallel forces. Reaction of beams. Center of gravity and centroid of the plane sections. Moment of Inertia of the plane sections. FRICTION: Equilibrium on a rough inclined plane,. Angle of friction. The wedge. The screw. The screw jack. LIFTING MACHINES: Basic machines. The differential principles. Pulley blocks. Crab winches. Worm gearing, Linear law. Compound efficiency. ROPE AND BELT DRIVE: Simple and compound belt drive. Velocity ratio. Length of the belt. Transmission of power. Centrifugal tension. Rope drive. TOOTHED GEARING: Simple and compound wheels of trains. Design of wheel train., Gearbox of motorcar. Epicyclic gearing. Reverted trains. Hump age's speed reduction gear. Differential gear. Strength and elasticity of materials: Stress and strain. Hooke's law. Elastic limit. Ultimate stress. Factor of safety. Lateral strain. Poisson's ratio. Tension Compression and shear. Complementary shear stress. Elastic constants and relations. Suddenly applied an impact loads. Resilience. Fatigue of metals. Resolution of stress: Principal planes and principal stresses. Mohr's stress circle.
PRACTICAL / TERM WORK: Laboratory work: A minimum of ten experiments. Graphic statistics: A minimum of ten exercise problems based on the above topics. Laboratory work shall be presented by the candidate in the form of laboratory journal.
The graphic statistic work shall be presented by the candidate in the form of drawing file.
TEXT / REFERENCES:

1. Applied Mechanics by S. B. Junnarkar and H.J.Shah
2. Mechanics of structures Vol.-I by S. B. Junnarkar and H.J.Shah
3. Engineering Mechanics by H. Shames, Practice Hall Publications
4. Applied Mechanics by D. A. Low
5. Applied Mechanics by Ramamrutham
6. Applied Mechanics by R. C. Patel and B. M. Patel, C Jamanadas & Co.

FIBRE SCIENCE & TEXTILE PHYSICS

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

Basic requirement for fibre formation, long chain molecules, crystal structures, crystal binding. Investigation of fibre structure using infrared absorption method. Study of X –ray diffraction patterns of fibre, study of crystallinity (amorphous and crystalline regions). FIBER DENSITY MEASUREMENT: Displacement of liquid method, specific gravity bottle method. Flotation method. Abbott – Gooding method, and density gradient tube method. SWELLING: Fibre expansion due to water absorption, expansion coefficients, relation between them and their experimental determination. ELECTRICAL PROPERTIES: Dielectric properties, Electrical resistance of fibres and its measurement, static electricity, measurement and explanation of static phenomena. OPTICAL PROPERTIES: Refraction, absorption and dichroism, reflection and luster. THERMAL PROPERTIES: Thermal parameters, structure changes in fibres on heating.
TEXT/REFERENCES:

1. fibre structure by Hearle and peters
2. Physical properties of Textile fibres by W.E. Morton and J.W.S. Hearle

3. Introduction to Polymer Physics by Perepechko

ENGINEERING MANUFACTURING TECHNOLOGY

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

BASIC MANUFACTURING PROCESS: Cold Working And Hot Working Processes e.g Rolling, Forging, Sheet Metal Work Etc. Casting-Processes, casting terminology, advantages, disadvantages, application of each process, Sand casting, Die Casting, Centrifugal Casting, Shell Moulding. Welding Processes-Gas Welding, Arc Welding, Resistance Welding, Soldering & Brazing. Finishing Operations-Honing, Lapping, Buffing, Super Finishing, Surface Treatment, Plating Etc. Metal Cutting- Principles, Merchant's Circle diagram, Tool Geometry, Tool Signature. GENERAL PURPOSE MACHINE TOOLS: Construction, working principle, types, specifications, functions of major components, possible operations, tools used.Lathe machine, Drilling machine, Shaping machine, Milling machine, Slotting machine, Planning machine, Grinding machine, and Broaching machine. INTTODUCTION TO ADVANCED MACHINING PROCESS: Working principle, construction, tool materials, work piece materials, advantages, disadvantages, application, MRR, tool erosion/wear, surface finish. Abrasive jet machining, Ultrasonic machining, Electro Discharge machining, Electro Chemical machining, Laser Beam machining. MEASURING INSTRUMENTS: Micrometer, vernier caliper, height gauge, depth gauge, dial gauge, plug gauge,snap gauge, sine bar, slip gauges, comparators. LIMITS FITS AND TOLERANCES: JIGS AND FIXTURES.: MACHINE SHOP ESTIMATION AND COSTING.:

ENGINEERING CHEMISTRY

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	3 Hrs/Week	Total	150 Marks

PHYSICAL CHEMISTRY: Hydrolysis, Degree of hydrolysis, Colloids, osmotic pressure and its determination, Reverse osmosis, catalysis adorption. INORGANIC CHEMISTRY: General principle of extraction of metals, extraction of iron chromium, manganese, silver, alloys, alloy steels, thermite process, sodium hydroxide, sodium carbonate, suphuric acid, hydrogen sulphide, fuels, water for industrial and boiler feed purposes, treatment of boiler feed water, de-mineralization of water, bleaching powder and bleaching solutions, ozone, hydrogen peroxide, boric acid, borex perborates, sodium, sodium-thiosulphate, hydrosulphate. ORGANIC CHEMISTRY: Ethane, ethylene, acetylene, polymerisation of ethylene. Ethyl-chloride, methanol, ethylene glycol, carbohydrates, polysaccharides, cellulose, starch, c.m.c., plastisizers, alicyclic compounds. Ethyle acetate, acetaldehyde, acetone, carboxylic acids, amides, amines, benzene, toluene, nitrobenzene, aniline, phenol, benzoic acid, phthlic acid, napthlene, polyester, polyamides, anthracene, heterocyclic compunds, furanthiophene, pyridine.
PRACTICAL / TERM WORK: Preparation of standard solutions, volumetric analysis, involving oxidation, reduction, iodimetry, determination of hardness of water, qualitative analysis of inorganic, substances soluble in water or hydrolic acid.
TEXT/ REFERENCES :

1. Parekh, Gandhi, and Bhagwat : Inorganic chemistry
2. Soni : Inorganic chemistry
3. Uppal : Engineering chemistry
4. Bahl and Tuli : Essential of Physical chemistry
5. MEE : Physical Chemistry
6. Shah, Mehta & Jadhav : Practical Chemistry
7. Jain & Jain : Engineering Chemistry

THERMODYNAMICS

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

BASIC CONCEPTS AND SEFINATIONS: Classical (Equilibrium) and Statistical thermodynamics -macroscopic and microscopic points of view, thermodynamic system, surroundings, system boundary, control mass and control volume thermodynamic properties, processes and cycles, thermal equilibrium, quasi-static process- pure substance, continuum concept. ENERGY INTERACTIONS: Thermodynamic definitions of work and heat -displacement of P-dV work and other types of work interactions -net work done by a system, free expansion with zero work done, work interaction: a path function. Zeroth law of thermodynamics, concept of ideal gas thermometer. FIRST LAW ANALYSIS: Statements of first law of thermodynamics for a closed system undergoing a cycle and a change of state -consequence of the first law -heat as a path function, energy as a thermodynamic property, perpetual motion machine of first kind, different forms of energy -enthalpy –specific heat at constant pressure and constant volume, First law analysis of elementary processes such as isochoric, isobaric, isothermal, adiabatic and polytropic undergone by an ideal gas. First law applied to flow processes -mass and energy balance in simple steady flow process- application of steady flow energy equation to systems like nozzle, diffuser, throttling devices, pumps, compressors, turbine and heat exchanger -general form of energy equation. SECOND LAW ANALYSIS: Thermodynamic definition of heat engine, direct and reverse heat engine, diagrammatic representation of heat engine, performance parameters of direct and reverse heat engine - statement of second law of thermodynamics -Kelvin-Plank and Celsius statement- perpetual motion machine of the second kind -Concept of reversibility, reversible process and reversible cycle -conditions of reversibility -irreversibility -Carnot reversible cycle -Carnot theorem and its consequences -definition of thermodynamic (Absolute) temperature scale using the concept of reversible engines. EQUATION OF STATE FOR IDEAL GASES: Application of First and Second law to the processes undergone by an ideal gas. THERMODYNAMIC RELATIONS: Maxwell relation, T -dS relations, specific heat relations, Clausius-Clapeyron equation. BASICS OF HEAT TRANSFER: Steady state conduction heat transfer in one

dimension, Fourier law of conduction, Simple conduction problems like plane wall, composite wall, cylinder, composite cylinder, convective heat transfer, Forced & Free convection, Newton's law of cooling. Correlation for forced and free convection -simple problems on convection. Thermal Insulation -Estimation of heat loss through insulation.
TEXT/REFERENCES:

1. Engineering Thermodynamics, P.K.Nag
2. Thermal Engineering Domkundwar
3. A course in Heat & Mass Transfer Domkundwar

FABRIC STRUCTURE & DESIGN ANALYSIS

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	2 Hrs/Week	Total	150 Marks

Fabric classification, concept of weave, representation of design draft, peg plan, and denting order, and their inter relation. Plain weave, ornamentation of plain weave and derivatives of plain weave. Simple twill and its characteristics. Sateen and satin weaves and their characteristics. Various derivatives of twill and sateen/satin weave. Diamond and diaper weaves Honey comb, huck – a – back , mock leno,
Distorted thread effect, crepe, bed ford cords, welts and pique. Characteristics of different fabrics.
PRACTICAL / TERM WORK: Analysis of different fabric sample referred in the syllabus.
TEXT/REFERENCES:

1. Textile Design and Colour: Z. Grosesicki
2. Woven cloth construction Marks and Robinson

SECOND SEMESTER OF B. E. II (TEXTILE ENGG)

FLUID MECHANICS

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	2 Hrs/Week	Total	150 Marks

Introduction to fluid mechanics and its role in engineering. Fluids- definitions and types, fluid properties and units of measurements. Hydrostatic pressure and its distribution, measurement of pressure, gauges and manometers. Hydro-static forces on submerged surface areas plain and curved. Total pressure. Resultant pressure center of pressure and their computations. Relative equilibrium –motion with linear uniform acceleration rotation with vertical axis. Fluid flow. continuous concept. Fluid particle and flow description. Types and classes of flow. Kinematics of flow. Flow viscosity. Description of fluid flow. Stream lines. Path lines. Stream function velocity, potential flow acceleration. Translation, rotation and deformation of fluids. Concept of circulation and velocity. Irrotational fluid flow. Net equation of continuity. Dynamics of flow, fluid forces-stress and strain equation of motion. Eulers equation. Bernoulies equation and its modification and application. Kinetic correction fector. Fluid flow (Incompressible) through close conduits, laminar flow-turbulent flow, Reynolds experiment, Froudes experiment, Laminar flow through pipes and between parallel plates. Velocity distribution and loss of heat. Turbulent flow through pipes. Friction factor for smooth and rough pipes. Moody diagram and its use. Minor loss of heat in flow through pipe at expansion, contraction etc. Energy gradient and hydraulic gradient. Shyphone pipe. Flow through uniform pipe between two reservoirs – compound pipe- equivalent length pipes in parallel branching pipes. Power transmissions by pipes. Flow measurement. Flow through orifices and mount pieces. Flow of various types, co-efficient of discharge and velocity flow over notch rectangular, triangular measurement- venture meter- orific meter- pilot tubes.
PRACTICAL / TERM WORK: Term work, experiment and tutorial will be based on above topics.
TEXT/REFERENCES:

1. Dr. R.M. Dave : Fluid Mechanics Part -I
2. A.K.Jain : Fluid Mechanics
3. R.M.Modi ande S.M.Shah : Hydraulics and Fluid Mechanics
4. H.R.Vallentine : Applied Hydrodynamics

STRESS ANALYSIS

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	2 Hrs/Week	Total	150 Marks

Introduction to elementary theory of elasticity, Generalized Hooke’s law, Equilibrium, Compatibility, Plane stress and plane strain problems, Stress on arbitrary plane, Airy’s stress function, use of polynomials, St. Venant’s principle. Theories of failure, torsional distortion. Stress and strain at a point in two or three dimensional problems, Analytical and graphical problems, Visco-elastic models Maxwell Erving- 4 elements models. Model analysis: Standard method of model stress analysis, Dimensional Buckingham theorem, Analysis and design of models for machine parts. Mechanical, optical and electrical strain gauges. Transmission of strain gauges data into desired results, static and dynamic strain measurement. Introduction to two dimensional photo elasticity. Vibration of shafts, whirling of shafts.
PRACTICAL / TERM WORK: It consists of submission containing Lab/Tuto/Drg/Design work done based on above stated syllabus.
TEXT/REFERENCES:

1. S.Timoshenko : Elementary strength of materials
2. J.W.Dally and W.P.Riley : Experimental stress analysis

3. R.C.Dove and P.H.Adams : Experimental stress analysis
4. A.J.S.Pipared and J.F.Baker : The analysis of engineering structures
5. S.Timoshenko and J.N.Goodier : Theory of elasticity

FABRIC MANUFACTURE – I

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

WINDING: Objects, different winding machines, winding packages, parallel, random, precision and stepped precision winding. Winding package parameters. Creel, balloon breakers, tensioners, mechanical clearers, knots, introduction to splicing, basic of electronic yarn clearers. Yarn fault classification, concept of clearing curve. Methods of yarn traversing, drive, package faults and their remedies.
Calculations related to winding and brief introduction to filament winding. WARPING: Objects, classification, details of parts of direct warping and sectional warping, drive, features of modern warping machines, process control aspects and calculations.
PIRN WINDING: Objects, classification, weft supply systems, types of pirns, build up drive, traversing and advancing, process control aspects and calculations.
AN OUTLINE OF WEAVING PROCESS: Shedding, scope of tappet, dobby and jacquard shedding, tappet shedding, reversing mechanism, shedding with positive cams. Picking: Types, Over pick and under pick mechanisms, shuttle checking. Beat up mechanism. Let Off: Negative let off mechanism. Take up: cloth wind up system, seven wheel, rayon and Shirley take up mechanism. Warp protector motion: fast reed, loose reed, electromagnetic. Weft stop motion: side weft fork. Brief discussion on healds, reeds, fabric faults.
PRACTICAL/TERM WORK: Practicals and term work will be based on the above course conducted during the semester. Measurements and calculations wherever applicable.
TEXT/REFERENCES:

1. R.Marks and Robinson: Principles of weaving
2. P.R.Lord and M.H.Mohemad Conversion of yarn to fabric
3. K.T.Aswani Plain weaving motions
4. Talukdar, Shriramalu and Ajgaonkar Weaving, machines, mechanism, management
5. J.E.Booth Textile Mathematics Vol-III
6. Talukadar Introduction to winding and warping
7. BTRA Winding monogram series
8. ATIRA Process control in weaving

STRENGTH OF MATERIALS

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

Diagrams of bending, moments and S.F. in cantilevers and simply supported beams under static load analytically. Theory of bending of straight beams. Distribution of normal stresses due to bending. Moment of resistance, Moment of inertia of section. Beam of uniform strength. Distribution of shear stress. Curvature, Slope and deflection of cantilever and simply supported beams, Flitched beams.
Simple strut theory, Rankine's and other formulae. Torsion, Moment of resistance, Distribution of stresses, Angle of Twist, Strength and stiffness of shafts. Types of springs in general. Thin and thick cylinders subjected to internal and external pressures. Carriage springs and closed coiled helical springs.
TEXT/REFERENCES:

1. Mechanics of Structure Vol. –I by S.B.Junnarkar and H.J.Shah
2. Strength of Materials by R.C.Patel , T.D.Bhagia and B.M.Patel
3. Strength of Materials by Ramamruthan
4. Strength of Materials by R.S.Khurami

FUNDAMENTAL OF ELECTRICAL ENGINEERING – I

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

Review of Ohm's law. Kirchoff'1s laws. Series and parallel circuits. Star –Delta transformation. Their application in solution of simple d.c.circuits. Sinusodial e.m.f.'s and currents. R.M.S. and average value. Phaser representation. Voltage- current relation in purely resistive and capacitive circuits and their series combination. Power and power factor.Polyphase system. Relation between phase and line voltage and currents of star and delta connections. Power balances 3 phase circuits. Measurement of power. D. C. GENERATORS: Principle of working. Types of generators. Their characteristics and applications. SINGLE PHASE AND THREE PHASE TRANSFORMER: Review of Faraday's law and Lenz's law. Self and mutual induction. Types of transformers. E.M.F. equation. Transformation ratio. Transformer on no load and on load conditions. Vector diagram. Equivalent circuit. Losses and efficiency: All day efficiency O.C. and S.C. and test on transformer. Auto transformer, 3-phase transformer connections. Applications.
PRACTICAL/TERMWORK: About 12 to 15 experiments based on the above syllabus.

TEXT / REFERENCES:

1. Basic Electrical Engineering by V.N. Mittle
2. Electrical technology by B.L. Theraja
3. Problems in Electrical Engineering by Parker Smith

FIRST SEMESTER OF B. E. III (TEXTILE) (ENGG)

FUNDAMENTALS OF ELECTRICAL ENGINEERING – II

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

[A] A. C. Mahcines:

INDUCTION MOTOR: Construction, Types of I. M. principle of working. Slip. Starting torque under running conditions. Torque slip curves of I. M. measurement of slip. Power stages in I. M. speed control. Single phase I. M.-Types and applications.
ALTERNATORS: Constructional details, e.m.f. equation. Alternator on load. Vector diagrams of loaded alternator. Voltage regulation. O. C. and S. C. test on thirty alternator or synchronizing of alternators. SYNCHRONOUS MOTOR: Principle of working. Method of starting. Motor on load. Power stages of synchronous motor. V- characteristics of synchronous motors. Applications.

[B] Electronics:

Conductors, semi-conductors and insulators. Intrinsics and extrinsic semi-conductors. Conduction in p-n, n-p-n and p-n-p junctions, their characteristics.
Zener diode, photo diode and display devices. Simple circuit diagrams and working of C.B., C. E. and C. C. amplifiers. Comparison and application (no analysis). THYRISTOR APPLICATION: Contracted rectifiers and invertors. Motor speed control. OSCILLOSCOPE: C. R. tube, basic circuit block diagram and its working. Measurement of voltage, current, frequency and phase using C.R.O.. Different types of meters. Bridge measurement.
PRACTICAL / TERM WORK: Twelve to fifteen experiments based on the syllabus.
TEXT / REFERENCES:

1. H. Cotton : Applied Electricity
2. B. L. Theraja : Electrical Technology
3. H. Cotton : Advance Electrical Technology
4. Parker Smith : Problems in Electrical Engg.
5. Millmar and Halkiass : Integrated electronics
6. Cooper : Electronic instrumentation
7. Bagde and Singh : Electronics
8. B. S. Bhimbra : Power electronics
9. Barde : Power electronics
10. V.K.Mehta : Electonics
11. A.P.Malvino : Semiconductor Circuit Approximations

TEXTILE MACHINE CONTROL & QUALITY MANAGEMENT

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

Textile Machine Control :
Introduction to controls, PLC, DCS, Control valves, sensors, convertors and relays.
Electronic controls and automation in textile machines.
Signal conditioning data collection and processing. Microprocessors and logic controllers,
Pneumatics applications in textiles.
Robotics : Introduction and applications in textile.
Quality Management :
Concepts and various systems, Need, relevance and tools. Documentation and standardization . Various standards for management systems. Flexibility and change in management systems and documentation procedures.
ISO 9000 – Importance and Implementation procedures.
TQM.Environment protection act , SA 8000 etc.
TEXT / REFERENCES:

1. NCUTE Publication, Hiren Joshi, Electronic Controls for Textile Machines.: Gauri Joshi
2. Bela J. Lipak : Process Control
3. Andrew Par : Industrial Control Hand Book
4. NCUTE Publication : Textile Machine Controls
5. Brochures/ Manuals of machine : Manufacturers and other related publications.
6. J.M.Juran : Quality Planning and Analysis
7. P.L.Jain : Quality Control and TQM
8. Publications of TRAs and other agencies on quality management, ISO 9000, TQM and environment.
9. G.Shanmmugam, T.Sivasantaran, D.Sarvanan NCUTE publicatios Quality Control Technique

YARN MANUFACTURE – I

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

Objects of blow-room, Principles of opening, cleaning and mixing of fibres. Principles and mechanics of various blow-room machines. Assesment of blow-room performance. Recent developments in blow-room machines. Engineering aspects of blow-room machines. Blow-room calculations. Processing of man-made fibre/blends in blow-room. Direct feed systems in cards, Principles and objects of carding, constructional details and working. Card calculations. Recent developments in Blow Room and Card . Assessment of performance of card. Processing of man-made fibres and blends on card. Maintenance schedule, work allocation, production balancing etc. at blow-room and card. Formulation of a mix, concept of yarn realization , control of waste at blow-room and cards.
PRACTICAL / TERM WORK: Based on the above course conducted during the semester.
TEXT / REFERENCES:

1 Textile institute & Butterworth : Manual of cotton spinning a) vol.-2: Opening & Cleaning. b) vol.-3: Carding.
2 Textile Institute manual of A practical guide to opening and Carding bytextile technology: By W. Klien, Vol -2
3 Textile Tnstitute manual of The technology of short staple spinning (Short staple textile technology:spinning series) By W. Klien, Series editor – Dr. H. Staldar.
4 Gilbert R. Merril: Cotton Opening and Picking.
5 Gilbert R. Merril: Cotton Carding.
6 Dr. Zolten S. Szalook: a)Opening, Cleaning and Picking, High speed carding and continuous card feeding.
7 A. R. Garde and Subramanium: Process control in cotton spinning.
8 W. S. Taggart: Cotton spinning.
9 K. R. Salhotra (T. A. I.): Spinning of man-made and blends on cotton system.
10 SITRA: Maintenance, management in spinning.
11 M. E. I.: Handbook.
12 A. R. Garde: Spinning tablet: a) Blow-room, b) Card.
13 Dr. Zolten , S. Szalooki- a) Opening, cleaning and picking
b) High Speed Carding and continuous card feeding.

FABRIC MANUFACTURE-II

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

1. Importance of sizing, different sizing techniques, sizing materials, preparation of size-paste and application of size on natural fiber yarns and blended yarns. Machine parts, mechanism and controls on sizing machines. Sizing of zero twist filament yarn. Denim sizing. Process control and calculations in sizing, maintenance of machine. New trends in sizing.
2. Introduction to modern automatic winding machines, their salient features.
3. Multiple box motions, conventional and modern dobbies, terry motions, pick-at-will motions. Conventional jacquards, harness-ties, pattern card cutting, repeating and lacing.

TERM WORK / PRACTICAL: Practical and term work will be based on the above course conducted during the semester.
TEXT / REFERENCES:

1. D. B. Ajgaonkar et al : Sizing: materials, methods, machines.
2. J. B. Smith : Warp sizing technology.
3. T. Ramsbottom : Warp sizing mechanism.
4. Seydel : Warp sizing.
5. P. R. Lord and M. H. Mohmad : Conversion of yarn to fabric.
6. Banerjee :Weaving Mechanism.
7. M.K.Talukdar .et al :Weaving:Machines,Mechanism,Methods
8. Marks and Robbinson : Principles of Weaving.
9. K. T. Aswani : Fancy weaving.

THEORY OF MACHINE

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

1. Basic of Machine, Kinematics of Machines, link or element, Kinematics pair, kinematic Chain, Mechanism, Inversions of Mechanism, Four bar chain, Quadratic Cycle chain, Degree of freedom, Type of joint.
2. Velocity and Acceleration of Mechanism: Relative velocity between two points, Relative velocity equation, slider crank mechanism, Instantaneous center of rotation, Application of Instantaneous center method to determine velocities & acceleration, Klein's construction for velocity and acceleration of Piston, Coriolis acceleration, static & dynamic force analysis of Mechanism.
3. Force Analysis : Equation of equilibrium, force convention, Equilibrium of a body under parallel forces compound Pendulum, Inertia force and inertia couple, inertia force analysis in a Reciprocating Engine.
4. Cams : Introduction, Types of Cams, Types of followers, Terminology, Motion of follower, Cam profile, Cam dynamics.

5. Flywheel : Introduction, types, turning moment diag. Fluctuation of energy and speed, Co-efficient of fluctuation of energy, coefficient of fluctuation of speed, energy stored in a fly wheel, estimation of fly wheel wheight, calculation of flywheel dimensions.
6. Balancing : Balancing of single revolving Mass, Balancing of several Masses revolving in the same place, static and dynamic balancing, Balancing of reciprocating Mass.
7. Gear Trains : Introduction, Types of gear trains, velocity ratio, simple gear trains, compound gear trains, reverted Gear trains, Epicyclic gear trains, Torque in Epicyclic gear trains, Kinematics of spur gears.
8. Mechanical Vibration : Introduction, Basic concepts of vibration, Definations, Parts of a vibrating system, Types of vibration. Methods of Vibration analysis, Damped vibration, undamped force vibration. Forced vibration.

TEXT / REFERENCES:

1. R. S. Khurmi : Theory of machines
2. J. M. Shah : Theory of machines
3. Ballaney : Theory of machines
4. J. Shigley : Kinematics of machinery
5. J. S. Rao : Theory of machines and mechanism
6. Ratan : Theory of machines.
7. V.P.Singh : Theory of machines. Vol. I & II.

SECOND SEMESTER OF B. E. III (TEXTILE ENGG)

YARN MANUFACTURE – II

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

Objects of drawing. Constructional details of draw frame. Principles of Perfect Drafting, Irregularity due to drafting and remedies. Recent development. Processing of man-made fibres and blends on Draw Frame. Assessment of performance of draw frame. Objects of combing. Lap preparation methods, construction and working of combers, control of comber waste. Performance assessment of comber. Recent developments on combers. Objects, construction and working of speed frames. Twisting, winding and building mechanisms. Twists speeds and settings to suit different materials, Drafting systems on speed frame. Recent developments, Assessment of performance of speed frames. Processing of man-made fibres and blends on speed frame. Manufacturing and engineering aspects of the components of above machines. Theory of epicylic gear trains PLC, microprocessors and their applications, calculations of differential gears in textile machines, timer, relays etc.

Practical/Term Work: Based on the above course conducted during the semester.

TEXT / REFERENCES:

1. Textile institute & Butterworth : Manual of cotton spinning a) vol.-4: part II: Drawing, Combers and Speed frames
2. Gilbert R. Merril : Cotton Combing
3. Textile Institute Manual of Textile technology : Practical guide to combing and drawing
4. Gilbert R. Merril : Cotton Drawing and Roving
5. Dr. Zolten S. Szalooki : Drawing, Combing and Roving
6. T.K. Pattabhiram : Essential elements of Practical cotton spinning
7. W. S. Taggart : Cotton spinning.
8. M. E. I. : Handbook.
9. A. R. Garde : Spinning tablets: a) Drawing, b) Combing, C) Roving
10. SITRA : Maintenance Management in spinning
11. SITRA : Quality control in spinning.

PROCESS CONTROL AND INSTRUMENTATION

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

1. Basic concept of Automatic control: Open-loop and closed loop control systems, Mathematical modeling of systems. Transfer function models. Control system components like servomotors, synchros, gyroscope, Valves, gears and their modeling. Time response analysis of First-order and second order systems. Transient and Steady-state responses. Time response specifications. Concept of stability and R-H criterion. Examples of Automatic control application for Textile machinery.
2. Instrumentation: Transducer for measuring humidity, pressure, flow, temperature, force, displacement, etc. Basic digital logic circuits like gates, flip-flops, registers, counters, etc. Introduction to modern microprocessor based Data Acquisition systems. Fundaments of PLC based instrumentation and distributed control systems.
3. Introduction to Robotics: Basic concepts related to Industrial robots. Flexible Automation versus hard Automation. Classification of Robotic systems based on an geometry and applications. Basic concepts of Kinematics, Dynamics and Trajectory planning.

TEXT/REFRENCES:

1. Rangan, Sharma and Mani : Instrumentation.
2. M. Gopal : Control systems-principles and Design.
3. A. R. Garde : Process control in spinning.
4. Yoramkoren : Robotics for Engineering.
5. Groover, Weiss, Nagel ordery : Industrial Robotics.

TEXTILE TESTING

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

Importance of textile testing and quality control. Sampling and its techniques. . Humidity and moisture in textiles. Trash and its measurement. Importance and measurement techniques of fibre length, fibre fineness, fibre strength, maturity. Identification of fibres. Testing of manmade fibres. Yarn properties: Count and its measurement, Twist and its measurement, Strength and its measurement, Evenness and its measurement

Fabric properties: Dimensions, air permeability, stiffness, crease recovery, drape, serviceability, wear and abrasion, bursting, pilling, fabric tensile strength, tearing strength. Dimension stability, colour fastness of fabric to various agencies, water repellency and water proof test, flammability test, fibre blend composition %age in fabric.

TEXT / REFERENCES:

1. J. E. Booth : Principle of textile testing
2. Grover and Hambay : Hand book of textile testing and quality control
3. Angpappan, R. Gopal Krishna, B.K. Keshwan : Physical testing vol. I & II
4. W.S. Morton and Hearle : Physical properties textile fibres .
5. M.E.Ansus and W.W.Adams : Physical Textile Testing
6. Graner : Textile laboratory manuals
7. B.S. Handbook No.11 : Methods of test for textile
8. P.A. Koch and C.J. Hooper : Microscopic and chemical testing of textile
9. M.V.S. Rao and A.B. Telele : Guide in crimping/ texturising
10. J. Lunena and W. Albert : Non woven bonded fabric
11. A.S.T.M. standards for textile material
12. I.S.I. handbook of textile testing

MACHINE DESIGN

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	2 Hrs/Week	Total	150 Marks

Mechanical engineering design : General design process, Design considerations in textile machinery, Functions and specifications, Force and stress analysis, Static and dynamic loads, Material, its selections criteria, Is designation of materials, Strength rigidity, Stresses, static and dynamic failure theories, safety factor, stress concentration. Preferred sizes and standardization. Manufacturing and assembly, Fits and Tolerances. Documents and communications of design.

Design of Textile Machinery elements :

Drives and components : Belts drives, spur and helical gear pair, Shafts, Spindles, Keys and couplings, Levers and Cams.

Springs : Helical compression, tension and torsion spring.

Fasteners : Threaded fasteners, rivets, welding and its applications.

Bearing : Rolling elements bearings, sliding contact bearings and lubrication.

TEXT / REFRENCES:

1. Pandya N.C. & shah N.C. Machine design Charotar Publishing.
2. Norton Robert L Machine Design, an Integrated Approach (2^{nd} Edition) Pearson Education Asia.

INDUSTRIAL ENGINEERING & OPERATION RESEARCH

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

Linear programming techniques:

Operation research and decision making, types of mathematical models and constructing the model, roll of computers in operations research, formulation of linear programming problem, applications and limitations, simplex method (analytical & graphical)

Distribution Methods:

Vogel's approximation methods, modified distribution method, optimization models, unbalance and degeneracy in transportation model.

Assignment Models:

Hungerian algorithm, traveling sales man problem, routing problems, processing 'n' jobs through two machines and three machines, processing two jobs through 'm' machines.

Network Analysis:

PERT and CPM. Total slack, free slack, probability of achieving completion date, cost analysis, updating resource smoothing – roll of computer in network analysis.

Inventory Method:

Variable in inventory problem, inventory problem, inventory models with panelty, stoarage and quantity discount, safety stock, inventory models with probability, demand, multi item deterministic model.

Queuing Theory:

Poisson arrivals and exponential service times, waiting time and idle time cost, single channel multi channel problem, Monte Carlo technique applied to queuing problems, Poisson arrivals and service time.

Decision Theory Game:

Examples of the application of theory of games 2 x M and M x 2 problems, graphic dominance and linear programming method for different problems, decision trees.

Replacement Model:

Replacement of item that deteriorate, gradually, fail suddenly. Group replacement policy. Concept of system reliability.

TEXT / REFRENCES:

1. Taha, H.A., "Operation Research", Mc Millan Publicaiton Co. Inc, New York.
2. Hiller, F.S., Liberman, G.J., "Introduction to Operation Research 2nd Edition", Holden-Day Inc, San Francisco, 1974.
3. Rao S. S., "Optimization – Theory and applications", Wiley Eastern, New Delhi, 1978.
4. Rao K.V., "Management Science", Mc Graw Hill Singapore, 1986.
5. Sesieni, M.A., Yaspan, A. and Friedman, L., "Operation Research: Methods and Problems", John Wiley and Sons, New York 1959.
6. Wagner, N.B., "Principles of Operation Research", NJ Prentice hall, 1975.
7. Lewis, C.D., "Scientific Inventory control", Butterworths, London, 1970.
8. Love, S., "Inventory Control", Mc Graw Hill, 1979.
9. Naddor, E., "Inventory Systems", Wiley New York, 1996.

FIRST SEMESTER OF B. E. IV (TEXTILE ENGG)

WEAVING III

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

Auto looms : Introduction to automatic shuttle looms, various weft feelers, cop & shuttle changing mechanisms, Positive let off motions – Principle & action. Method of warp tensioning, various let off motions (based on method of warp tensioning & beam driving), Warp stop motions, Weaving of filament yarns.

Shuttleless weaving machines : Projectile – Picking cycle, Preparation for picking, shifting of projectile & transfer on conveyor, Torsion bar picking mechanism, Beat up mechanism, Tucking in of weft, Timing diagram, Details of projectile.

Air jet – Nozzles (main, relay, stretch etc) , position & setting of relay nozzle, Profile reed.

Water jet – Working of picking mechanism.

Rapier – Rigid & flexible rapier weaving machine, Rapier drive, Rapier head design and picking cycle.

PRACTICALS/TERM WORK : Based on the above topics covered in the theory .

TEXT / REFERENCE :

1. Marks and Robinson : Principle of weaving
2. V. Duxdury and G.R.Wary : Modern developments in weaving machinery.
3. O.Talavasek and V.Svaty : Shuttleless weaving machines.
4. P.R.Lord and M.H.Mohmed : Weaving conversion of yarn to fabric.
5. BTRA : Loom shed
6. M.K. Talukdar : Weaving-Mechanism, Machine & Management

YARN MANNUFACTURE - III

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

Objects of Ring frames. Constructional details of Ring frame. Recent developments. Manufacturing and engineering aspects of components of Ring frames. Production of doubled, folded and fancy yarns. Concept of productivity and its controls. Modern yarn production. Detailed study of rotor spinning. Basic principles of other unconventional spinning systems. Comparison of properties of yarn produced on different systems. Assessment of performance, Maintenance schedule, work allocation, production balance, calculations etc. of Ring and Rotor spinning systems and doubling process.

PRACTICALS/ TERM WORK : Practicals and term work will be based on the above course conducted during the semester.

TEXT/REFERENCE :

1. V.Butterworth series : Manual of cotton spinning
2. A.R.Garde & T.A. Subramaniam : Process control in spinning
3. Gilbert R.Merrill : Cotton Spinning
4. W.Klein : A Practical Guide to Ring Spinning (Textile Institute vol - I & IV series)
5. K.R. Salhotra : Spinning of Man Made and blends on cotton spinning system
6. T.K.Pattabhiram : Essential Elements of practical cotton spinning.
7. B.C.Goswami, J.G.Martindale and F.L.Scardioo : Textile Yarns, Wiley international
8. Eric Oxtoby : Spun yarn Technology
9. R. Neild : Rotor Spinning
10. Anant s. haranhalli : Practical open end spinning
11. Text. Asso. of India : Spinning Tablets -Ring frame, doubling
12. M.E.I. : Hand Book

ENGINEERING OF TEXTILE STRUCTURE

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

Yarn diameter, measurements, Schwarz's correction factors, twist angle, optimum twist or helix angle for cotton yarns, twist for filament yarns, specific volume of yarns, twist multiplier, relation between twist factor, specific volume and helix angle, contraction and retraction in filament yarn due to twist, expressions. Stress strain curves, young's modulus, tenacity, RKM etc. Ideal yarn geometry and model, mechanics of yarn structure, tensile behaviour of continuous filament yarns, Platt's and Hearl's simple equations, to predict modulus, strain etc., under low strain. Hearl's large strain model (no derivation) and various parameters. Idea about Treolar and Riding energy method (no derivation). Tensile behavior of staple yarn, traditional and modified qualitative approach, factors affecting it . Migration, factors controlling and effect of Migration in yarn structure and properties, several parameters. Brief idea about structure characteristics of O.E. and Ring spun yarns,

Pierce's basic model of fabric geometry and its application in special cases, modifications in basic model. Yarn crimp in fabric, its measurement, effect of finishing processes on yarn crimp in fabric, crimp interchange. Cover and cover factors – different approaches, conditions for equal coverage in redesigning of fabric. Permeability and porosity of fabric. Fabric weight and weight factor. Theories of cloth setting. Mechanical behavior of fabric under tensile and compressive load. Shear and Drape behavior of fabric (Theory only) Effect of fabric structure on mechanical properties of fabric. Fundamentals of warp and weft knitted structures, their simple models. Numerical problems based on above topics , wherever possible.

TEXT / REFERENCES:

1 J.W. Hearle, P.Grossberg and S.Backer : Structural Mechanics of Fibres, Yarn and fabrics.
2 B.C. Goswami, J.G.Martindale and F.L.Scardioo : Textile Yarns, Wiley international
3 J.E. Booth : Textile Mathematics – Vol III.
4 A.T.C. Robinson, R. Marks. : Woven Cloth Construction

MAN-MADE FIBRE TECHNOLOGY-I

Introduction. Outlines of the manufacturing process of important manmade fibres like Nylon, Polyester, Polypropylene, Acrylics, Rayon, Spandex etc., properties and end uses. Polymer characterization. Detail study of melt spinning process including polymerization, chip forming, extrusion, etc. Spin finishes. Post-spinning operations like drawing tow to top conversion, staple cutting, twisting etc. Outline of Industrial fabrics, non- woven manufacture and Geotextiles, their properties and end uses.

TEXT/REFERENCE:

1. J. Lunenschloss and W.Albercht : Non Woven bonded fabrics
2. V.K.Kothari & V.B.Gupta : Manufactured Fibre Technology
3. B.L.Deopura : Manmadefibres, NCUTE pilot programme.
4. Ashwini Agrawal : Solution spun fibres, NCUTE pilot programme.
5. A.A. Vaidya : Production of synthetic fibres
6. R.W.Moncrieff : Manmade Fibres
7. B.C.Goswami, J.G.Martindale and F.L.Scardioo (Wiley international): Textile Yarns
8. G. R. Wary : Modern Yarn Production.
9. Journals and periodicals in the selected topics.

THEORY AND DESIGN OF TEXTILE MACHINES

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

- Principles governing design of Textile machines**.**
- Circular and non-circular movement. Transmission of motion. Impulsive forces. Torque.
- Elastic behaviour of machine parts, design of machine parts.
- Theory of vibration and its practical aspects on Textile machines.
- Fluid Mechanics & its application in Textile Machines - Fluid flow, pressure in fluids, coefficient of viscosity, laminar flow, viscosity and textiles, absorbency of textile materials.
- Mechanics of Spinning machines - feed regulating mechanism, doffing systems, builder mechanisms, etc.
- Design aspects of weaving preparatory and knitting machines.
- Mechanics of basic weaving operations - Kinematics of sley and heald motion. Theoretical analysis of conventional / Non-conventional picking and checking mechanism. Warp & Weft tension and their control.
- Numerical / problems based on the above topics.

TERM WORK : Design and drawing of various mechanism/components based on the above topics.
Experimental work based on the above topics.

TEXT / REFERENCES :

1. W.A.Hanton (The Textile Institute) : Mechanics of Textile Machinery
2. J.E.Booth : Textile Mathematics, Part I, II, III.
3. K. Slater : Textile Mechanics
4. P.R.Lord & M.H.Mohamed : Conversion of yarn to fabric.
5. R.Marks & Robbinson : Principles of Weaving.

SECOND SEMESTER OF B. E. IV (TEXTILE ENGG)

TEXTILE PRODUCTION MANAGEMENT AND COSTING

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	4 Hrs/Week	Total	150 Marks

Spin plans (hank and draft schedule) for various counts and yarns, blends. Production rates, waste, efficiency level of modern machines. Estimation of number of machines for yarn manufacturing, , yarn preparatory and fabric manufacturing departments. Cloth setting rules and estimation of quantity of yarn requirement . Export norms.
Different categories of Labour required in textile production process, their training and work load analysis . Estimation of Labour requirement and its norms. System of wage payment, Retrenchment, dismissal, suspension of workers, lay off and closure of industry. Reason for industrial sickness.
Selection of site for textile industry, principles of machinery lay outs and flow plans. Different methods of material handling. Types of buildings used and their constructional details. Humidification and Air-Conditioning. Environmental and health hazards in textile industry.
Elements of costs methods of costing. Application of cost overheads to production cost centers, calculation of direct and indirect cost for yarn and fabric conversion processes. Cost control in textile industry. Theory and practice of marginal costing, break even charts. Financial resources to start a new textile industry, Planning of working capital, cash flow estimates and evaluation techniques financial statement ratio analysis. Depreciation and different systems of providing depreciation. Inventory management.
Organization of large and small scale textile units. Numerical problems based on the above topics, wherever possible.
TERM WORK / PRACTICAL : Planning , preparing and drawing of lay-outs for yarn to fabric conversion processes with spin plans, estimations of number of machines and cost. Line sketches of manufactured fiber / yarn producing line , machine lay outs of knitting and garment manufacturing.
TEXT / REFERENCES :

1. Dr. M.K.Talukdar et. Al. : Weaving – Mechanism, machines and management.
2. P.V. Bhave & V. Srinivasan : Cost accounting in textile mills.
3. M.Y.Khan & P.K.Jain : Financial management, Text and problems
4. Sprigel : Principles of Industrial management
5. K.D.Saksena : Dynamics of India's Textile Economy.

MAN-MADE FIBRE TECHNOLOGY-II

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	2 Hrs/Week	Total	150 Marks

Importance of texturising. Methods of texturising. Basic principles. Physics of texturising. False twist texturising. Developments of false twist texturising machines. Hardwares used in false twist texturising. Structural geometry of textured yarn. Stuffer box texturising, edge crimping, gear crimping, knit-de-knit process. Texturising of non-thermoplastic yarns- Airjet and chemical texturising. Characterization of textured yarns. Testing and quality control. Recent developments, detailed study of the blended yarn manufactured on cotton system of spinning. Problems of blending. Blended yarn properties and fabric performance.
TERM WORK / PRACTICAL: Based on the above syllabus conducted during the semester.
TEXT / REFERENCE:

1. B. C. Goswami, J.G. Martindale and Scardino : Textile Yarns
2. G. R. Wray : Modern Yarn Production
3. Dr. M. V. S. Rao And A. B. Talele : A Guide To Crimping/ Textured Technology
4. Berkeley L. Hathorne : Woven Stretch and Textured Fabrics
5. K. R. Salhotra : Spinning Of Manmade And Blends on Cotton System

GARMENT TECHNOLOGY

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

Pattern making terminologies, Anthropometrics, Size charts, ranges and grading. Garment machinery, equipments, attachments, and their specifications. Cutting including spreading, marker planning and cutting, stitch classification, all machines of lock stitch and chain stitch. Seam stitch interplay in strength, elasticity and slippage, choice of threads and needles, causes of stitch damage and thread failure. Basic principles and comparison of machineries for a variety of sewing operations. Chain, lock, blind, multi-needle and multitask stitching machines. Special purpose attachments. Application of stitch and seam types in garment construction. Tailarability and Sewability of material, quality control.

KNITTING

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

Introduction, Knitting needles.
Weft Knitting : Basic weft knit structures, basic weft knitting machine, float & tuck stitches and their knitting, loop transfer stitches, racked rib structures, cable stitch, designing of weft knit structures. Production & fabric calculation, Engineering approach to knitting calculations.
Warp Knitting : Classification of warp knitting machine, Tricot & Raschel Knitting machine, warp knit structures and their representation: Single bar fabric, Two full set guide bar structures.
TEXT/REFERENCES:

1. David J. Spencer : : Knitting Technology
2. D.B. Ajgaonker : : Knitting Technology

TEXTILE CHEMISTRY PROCESSING MACHINES

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	50 Marks
Practicals	2 Hrs/Week	Total	150 Marks

Introduction and working principle of preparatory machineries in volved in singeing, Desizing, Bleaching and Mercersing,
Introduction to working principle of dyeing and printing machineries. Brief introduction and working of various machineries employed for various cloth finishing processes such as stentering, damping, calandering, heat setting, sanforizing and resin finishing. Polymeriser and its technical aspects and coating technique.
PRACTICAL/TERM WORK: Practical and term work will based on the above topics covered during the semester. Drawing sheets of various machines.
VIVA EXAMIONATION: Oral examination based on the TERM WORK

TECHNICAL TEXTILE (Elective)

Lecture	3 Hrs/Week	Theory	100 Marks
Tutorials	1 Hrs/Week	Pr/tw/viva	--
Practicals	--	Total	100 Marks

Non-woven : - Introduction to non-wovens, manufacturing processes of non-wovens : dry laid process, wet laid process. Various bonding techniques:- mechanical bonding, adhesive and thermal bonding, stitch bonding, etc., Raw materials and bonding agents used in nonwovens. Testing of non-wovens.
Industrial Textiles : Introduction, Principles of Industrial Textiles & Classification, Raw materials : Fibres, yarns, Fabrics etc.. Coating & Laminating processes. Textile composites. Geo-textiles, Medical Textiles, Filtration Textiles, Military and Defense Textiles, safety and protective Textiles, transportation Textiles and other specialty Textiles.
TEXT / REFERENCES :

1. Francis M. Buresh : Non-Woven Fabrics
2. M. S. Casper : Non-Woven Textiles
3. J. Lunenschloss & W. Albrecht : Non-Woven Bonded Fabrics
4. Sabit Adanur : : Wellington Sears hand book of Industrial Textiles.
5. Dr. V.K.Kothari : Textile Fibres : Development & Innovations.
6. M.G.Kulkarni : Textile Manufacturing.

ADVANCE FABRIC STRUCTURE (Elective)

Colour and weave effect. Figuring with extra threads. Warp & weft pile structures. Gauze & leno structures, Jacquard designing. Backed, double & triple cloth. Dobby & jacquard design software.
TEXT / REFERENCE:

1. Z. J. Grosiscki : Watson's Textile Design And Colour
2. Z. J. Grosiscki : Watson's Advanced Textile Design

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