

Second Year Second Term

EE 2221

Instrumentation and Electrical Control

Credit: 3.00

(Contact hours: 3 hrs /week)

Instrumentation: Analog and digital instruments, ammeter, voltmeter, Ohmmeter and wattmeter, measurement of resistance, inductance and capacitance. Strain gauge, resistive, capacitive, inductive, thermal, smoke and photo voltaic transducers. Data acquisition and PC based process control systems.

Control System: Mathematical model, steady state and transient responses, block diagrams, poles and zeros, Routh's stability criterion, block diagram, transfer functions and signal flow graph, stability, P, PI, PID and Fuzzy controllers, Introduction to PLC, microprocessors and microcontrollers, distributed control systems, power electronic controlled drives.

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ME 2221

Solid Mechanics and Machine Design

Credit: 4.00

(Contact hours: 4 hrs/ week)

Stress and Strain: Introduction, Analysis of internal forces; Tensile, compressive, bearing and shearing stresses; Stresses in thin-walled pressure vessel; Stress-strain diagram; Statically indeterminate members; Thermal stresses; **Statically Determinate Beams:** Introduction; Different types of loading and supports; Shear force and bending moment diagrams; Stresses in beams, flexure formula; **Torsion:** Introduction; Torsion formula; Angle of twist; Analysis and design of circular shaft.

Machine Design: Approach to design; Stress analysis; Tolerance and allowances; Variable loads and stress concentrations; Design of various types of springs; Shaft design; Design and selection of bearings; Journal and plane surface bearings; Ball and roller bearings; Design of spur, helical, bevel and worm gears; Design of clutches and brakes; Design and selection of flexible power transmission elements; Belts, ropes and chains.

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ME 2222

Sessional on ME 2221

Credit: 0.75

(Contact hours: 3/2 hrs/week)

Sessional based on ME 2221

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TE 2203

Fabric Manufacturing Engineering– I

Credit 4.00

(Contact hours: 4 hrs/ week)

Weaving Preparation: Introduction and historical background of fabric manufacture; Flow chart for weaving; Introduction to yarn preparation.

Winding: Introduction; Types of winding; Winding package; Yarn guide and tensioner; Winding parameters; Yarn Withdrawal; Balloon theory; Winding efficiency; Driving of winding packages; Winding fault and remedy; Relevant calculations.

Warping: Introduction; Requirements; Warping machine; Creel; Control system in warping; Warping fault and remedy; Relevant calculations.

Sizing: Introduction; Objects; Requirements; Types; Size ingredients; Sizing variables; Size take up percentage; Different techniques of sizing; Methods of size mixing or cooking; Sizing machines; Different types of drying System; Typical size recipe; Faults of sizing and there remedy, Substitution of sizing, relevant calculations.

Weaving Mechanism: Basic principle of weaving; Different types of motion; Classification of Loom; Different parts and their functions; Brief study of primitive, pit, frame fly shuttle, Chittaranjan and Hattersley looms; Relevant calculations; Types and procedure of drawing-in, Denting, Tying-in.

Knitting:

Introduction and historical background of Knitting Technology; General terms and principles of knitting Technology; Basic elements of knitting, basic stitches of knitting; Knitting action of latch, bearded and compound needle, Basic mechanical principles of Knitting Technology, Elements of knitted loop structure, knitting action, cam system, sinker timing; Relevant calculations.

Circular Rib machine; Description, knitting action, needle timing etc. **Circular Interlock machine;** Description, knitting action, interlock cam system, etc. **Purl knitting machine;** Description, knitting action, needle timing etc. **Study on weft knitting machines;** Fabric machine, Garment length machine.

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TE 2204

Sessional on TE 2203

Credit: 0.75

(Contact hours: 3/2 hrs/ week)

Sessional based on TE 2203.

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TE 2213

Textile Testing-I

Credit: 3.00

(Contact hours: 3 hrs/ week)

Testing: Introduction, standard testing and conditioning atmosphere.

Moisture: Moisture content and regain, standard moisture regain of different fibers, effects of moisture on textiles, importance of moisture regain for textile materials, methods of measurement of moisture in textiles; Relative humidity, measurements of relative humidity.

Yarn Testing: Measurement of linear density of sliver, roving and yarn, counting systems, different methods of measurement of yarn count, Twist in yarn, Measurement of twist.

Yarn Evenness: The nature of irregularity, periodic variation of irregularity (Short, medium and long term periodic variation), Visual examination of irregularity, Cut & weigh method, Uster evenness tester, U%, PMD, CV%, Index of irregularity, Addition and reduction of irregularity, limit irregularity, spectrogram, yarn hairiness, Shirley yarn hairiness tester.

Strength and Elongation Test: Units, Breaking strength, tensile strength, specific stress, tenacity, breaking length, elongation, strain, Different types of modulus, extension percentage, gauge length, CRL, CRT, CRE method, yield point, work of rupture, elastic recovery etc. Factors affecting tensile testing, Single yarn strength method, skein method, count strength product

Fabric Handle: Fabric dimension, measurement of length, width, thickness; ends and picks per unit length in woven fabric, Courses and Wales per unit length in knitted fabric. Bending length, drape, crease recovery, stiffness (Shirley stiffness tester, Hanging loop method), shear, crimp of yarn in woven and knit fabric, cloth cover of woven and knit fabric.

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TE 2214

Sessional on TE 2213

Credit: 0.75

(Contact hours: 3/2 hrs/ week)

Sessional based on TE 2213

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TE 2227

Mechanics of Textile Structures

Credit: 4.00

(Contact hours: 4 hrs/ week)

Physical structure of fibers: Basic concepts of methods for investigating fiber structure, X-ray diffraction, optical and electron microscopy infra-red absorption, relations between fiber properties and structure of fiber.

Detailed study of fiber properties: Effect of water on fiber; Importance in drafting experimental methods of measurement; Effect of lubricant and dyes; Relationship of frictional properties on knitting, stitching and sewing; Reflection, refraction, scattering, polarization, birefringence; Absorption and emission of radiation, Energy changes associated with changes of state including transition temperature of fibers; Moisture content and heat of wetting; Electronic properties of solids, conductors and insulators, capacitance, di-electric constant, effect of moisture, measurement of di-electric constants of fibers, yarns and fabrics.

Static electricity formation: Theories of static electrification, measurement of static charge, explanation of the phenomenon of static electrification in textile, its effect and remedies in textile processes.

Mechanics: Engineering approach to fiber structure, Mechanics of simple yarn structure, effects of fiber properties and yarn twist on torsion and flexural rigidity, Effect of fiber length, fineness, strength and moisture on yarn strength.

Yarn Geometry: Idealized helical yarn structure; yarn count and twist factors, twist contraction; packing of fibers in yarns; measurement of packing density and radial packing density of yarn; measurement of yarn diameter; ideal migration, tracer fiber technique, characterization of migration behavior, migration in blended yarns, mechanisms of migration, effect of various parameters on migration behavior.

Fabric geometry: Geometry of plain woven fabrics, calculation knowing crimp ratio and thread spacing, Geometry of jumped conditions, crimp interchange, effect of yarn flattening, deformation of fabric, application of cloth geometry, tensile testing, geometrical change during extension of fabrics.

Fabric buckling shear and drape: Geometry of plain knitted structure, engineering design of fabric to meet specific mechanical properties, Prediction of tensile properties of fabrics.

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