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

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

#### Second Year – Third Semester

**A. Theory**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Paper Code</th>
<th>Subjects</th>
<th>Contact Hours / Week</th>
<th>Cr.Points</th>
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<td>1.</td>
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<td>Values &amp; Ethics in Profession</td>
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<td>2.</td>
<td>PH-301</td>
<td>Physics-2</td>
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<tr>
<td>3.</td>
<td>CH-301</td>
<td>Basic Environmental Engineering &amp; Elementary Biology</td>
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<tr>
<td>4.</td>
<td>TT-301</td>
<td>Instrumentation &amp; Control</td>
<td>3</td>
<td>0</td>
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<tr>
<td>5.</td>
<td>TT-302</td>
<td>Textile Fibre</td>
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<td>6.</td>
<td>TT-303</td>
<td>Yarn Formation-I</td>
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**Total Theory**

- 17
- 3
- 12
- 20
- 20

**B. Practical**

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<th>Sl.No</th>
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**Total Practical**

- 0
- 0
- 12
- 12
- 8

**Total Semester**

- 17
- 3
- 12
- 32
- 28

#### Second Year – Fourth Semester

**A. Theory**

<table>
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<tr>
<th>Sl.No</th>
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<th>Contact Hours / Week</th>
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<td>M-402</td>
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<td>TT-401</td>
<td>Theory of Machines</td>
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<td>TT-402</td>
<td>Fabric Formation-I</td>
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<td>5.</td>
<td>TT-403</td>
<td>Textile Chemical Processing-I</td>
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**Total Theory**

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- 17

**B. Practical**

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**Total Practical**

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- 14
- 14
- 9

**Total Semester**

- 14
- 3
- 12
- 31
- 26

#### Third Year – Fifth Semester

**A. Theory**

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<td>Principles and Practice of Management</td>
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<td>TT-501</td>
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<td>TT-504A/ TT-504B</td>
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**Total Theory**

- 14
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- 0
- 16
- 16

**B. Practical**

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<th>Sl.No</th>
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**Total Practical**

- 0
- 0
- 12
- 12
- 8

**Total Semester**

- 14
- 2
- 12
- 28
- 24
### Syllabus for B.Tech (Textile Technology) up to Fourth Year

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

#### Third Year – Sixth Semester

**A. Theory**

<table>
<thead>
<tr>
<th>Sl. No</th>
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<th>Cr. Pts</th>
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<td>HU-611</td>
<td>Production &amp; Operations Management</td>
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<td>TT-601</td>
<td>Yarn Formation-III</td>
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<td>TT-602</td>
<td>Fabric Formation-III</td>
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<td>TT-603</td>
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<td>TT-604</td>
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<td>TT-605</td>
<td>Free Elective-II A: Colour Science/ B: Introduction to Java Programming (IT)/ C: Introduction to Microprocessors (ECE)</td>
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**Total Theory**

17 | 2 | 0 | 19 | 19

**B. Practical**

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<td>TT-691</td>
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<td>TT-692</td>
<td>Textile Testing Lab</td>
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<td>TT-693</td>
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**Total Practical**

0 | 0 | 12 | 12 | 8

**Total Semester**

19 | 0 | 12 | 31 | 27

#### Fourth Year – Seventh Semester

**A. Theory**

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<td>1</td>
<td>TT-701</td>
<td>Textile chemical Processing-III</td>
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<td>TT-702</td>
<td>Design &amp; structure of fabrics</td>
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<td>TT-703</td>
<td>Textile Elective-II: A: Wool Technology / B: Apparel Technology/ C: Advanced Chemical Processing/ D: Application of CAD/CAM in Textiles</td>
<td>3</td>
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<tr>
<td>4</td>
<td>TT-704</td>
<td>Textile Elective-III: A: Technical Textiles/ B: Smart Textile/ C: Production of Manmade fibres &amp; Texturing)</td>
<td>3</td>
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<td>5</td>
<td>TT-705</td>
<td>Free Elective-III (A. Introduction to Soft Computing / B. Image Processing)</td>
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**Total Theory**

15 | 1 | 0 | 16 | 16

**B. Practical**

<table>
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<th>Sl. No</th>
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<th>Subjects</th>
<th>Contact Hours / Week</th>
<th>Cr. Points</th>
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<td>TT-793</td>
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<td>Industrial Training (Viva Voice on training Report) During 6th - 7th sem break</td>
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**Total Practical**

0 | 0 | 12 | 18 | 12

**Total Semester**

15 | 0 | 12 | 34 | 27
# Syllabus for B.Tech (Textile Technology) up to Fourth Year

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

## Fourth Year – Eighth Semester

### A. Theory

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<tr>
<td>1</td>
<td>HU801A</td>
<td>Organisational Behaviour</td>
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| 2     | TT 801     | Textile Elective-IV:  
A. Process control in Mechanical Processing of Textiles  
B. Process control in Chemical Processing of Textiles  
C. Textile Mill Planning & Organisation | 3   | 0 | 0 | 3    | 3    |
| 3     | TT 802     | Free Elective-IV (A. Mechatronics/  
B. Supply Chain Management /  
C. Introduction to Biotechnology | 3   | 0 | 0 | 3    | 3    |
|       |            | Total Theory | 9   | 0 | 0 | 9    | 8    |
|       |            | Total Theory | 9   | 0 | 0 | 20   | 21   |

### B. Practical

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<td>TT 893</td>
<td>Grand Viva</td>
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VALUES & ETHICS IN PROFESSION

HU-301

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<td>Introduction</td>
<td>Science, Technology and Engineering as knowledge and as Social and Professional Activities</td>
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<td>Effects of Technological Growth:</td>
<td>Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: sustainable development.</td>
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<td>Energy Crisis: Renewable Energy Resources.</td>
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<td>Environmental degradation and pollution, Eco-friendly Technologies, Environmental Regulations. Environmental Ethics</td>
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<td>Appropriate Technology Movement of Schumacher; later developments.</td>
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<td>Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis.</td>
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<td>Ethics of Profession</td>
<td>Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond, Case studies.</td>
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<td>4)</td>
<td>Profession and Human Values</td>
<td>Values Crisis in contemporary society.</td>
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<td>Nature of values: Value Spectrum of a good life</td>
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<td>Psychological values: Integrated personality; mental health</td>
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<td>Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution.</td>
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<td>Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity.</td>
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<td>Moral and ethical values: Nature of moral judgements; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.</td>
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Text Books and Articles:

PHYSICS-2

PH-301

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<th>Lectures in hour</th>
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<tr>
<td>2)</td>
<td>Module 2: Electricity</td>
<td>2.1 Coulombs law in vector form. Electrostatic field and its curl. Gauss’s law in integral form and conversion to differential form. Electrostatic potential and field, Poisson’s Eqn. Laplace’s eqn (Application to Cartesian,Spherically and Cylindrically symmetric systems – effective 1D problems) Electric current, drift velocity, current density, continuity equation, steady current.</td>
<td>5</td>
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<td>2.2 Dielectrics-concept of polarization, the relation D=ε0E+P. Polarizability. Electronic polarization and polarization in monoatomic and polyatomic gases.</td>
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<td>3)</td>
<td>Module 3: Magnetostatics &amp; Time Varying Field:</td>
<td>3. Lorentz force, force on a small current element placed in a magnetic field. Biot-Savart law and its applications, divergence of magnetic field, vector potential, Ampere’s law in integral form and conversion to differential form. Faraday’s law of electro-magnetic induction in integral form and conversion to differential form.</td>
<td>3</td>
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<td>4)</td>
<td>Module 4: Electromagnetic Theory:</td>
<td>4.1 Concept of displacement current Maxwell’s field equations. Maxwell’s wave equation and its solution for free space. E.M. wave in a charge free conducting media. Skin depth, physical significance of Skin Depth, E.M. energy flow, &amp; Poynting Vector.</td>
<td>6</td>
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</tbody>
</table>
5) **Module 5: Quantum Mechanics:**

- 5.2 Concept of probability and probability density, operators, commutator. Formulation of quantum mechanics and Basic postulates, Operator correspondence, Time dependent Schrodinger’s equation, formulation of time independent Schrodinger’s equation by method of separation of variables, Physical interpretation of wave function $\psi$ (normalization and probability interpretation), Expectation values, Application of Schrodinger equation – Particle in an infinite square well potential (1-D and 3-D potential well), Discussion on degenerate levels.

6) **Module 6: Statistical Mechanics:**

- 6.1 Concept of energy levels and energy states. Microstates, macrostates and thermodynamic probability, equilibrium macrostate. MB, FD, BE statistics (No deduction necessary), fermions, bosons (definitions in terms of spin, examples), physical significance and application, classical limits of quantum statistics Fermi distribution at zero & non-zero temperature, Calculation of Fermi level in metals, also total energy at absolute zero of temperature and total number of particles. Bose-Einstein statistics – Planck’s law of blackbody radiation

Total Lectures $= 39$

**Text Books and Articles:**
- 1. Perspectives of Modern Physics: A. Baiser
- 4. Engineering Physics: R.K. Kar
b) R.G. Takwal & P.S. Puranic
- 6. Quantum Mechanics: a) Eisberg & Resnic; b) A.K. Ghatak & S. Lokanathan; c) S.N. Ghoshal
- 7. Statistical Mechanics and Thermal Physics: a) Sears and Salinger; b) Avijit Lahiri; c) Evelyn Guha
- 8. Solid State Physics: a) A.J. Dekker; b) C. Kître; c) Ascroft & Mermin; d) S.O. Pillai

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**BASIC ENVIRONMENTAL ENGINEERING AND ELEMENTARY BIOLOGY**

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
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</thead>
<tbody>
<tr>
<td>1) General</td>
<td>Basic ideas of environment, basic concepts, man, society &amp; environment, their interrelationship. Mathematics of population growth and associated problems, Importance of population study in environmental engineering, definition of resource, types of resource, renewable, non-renewable, potentially renewable, effect of excessive use vis-a-vis population growth, Sustainable Development. Materials balance: Steady state conservation system, steady state system with non conservative pollutants, step function. Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and control/management; Anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and Engineering.</td>
<td>1 2 1 2</td>
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<tr>
<td>2) Ecology</td>
<td>Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function. Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban); Food chain [definition and one example of each food chain], Food web. Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur]. Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity.</td>
<td>1 2 1 2</td>
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</table>
smokestack plumes and Gaussian plume model.

Definition of pollutants and contaminants. Primary and secondary pollutants: emission standard, criteria pollutant. Sources and effect of different air pollutants: Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN.


Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP, cyclone separator, bag house, catalytic converter, scrubber (venturi), Statement with brief reference).

4) Water Pollution and Control

Hydrosphere, Hydrological cycle and Natural water. Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, heavy metals, pesticides, volatile organic compounds.

River/Lake/lake water pollution: River: DO, 5 day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of oxygen demanding wastes on river[deoxygenation, reaeration], COD, Oil, Greases, pH.

Lake: Eutrophication [Definition, source and effect].

Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only)


Water pollution due to the toxic elements and their biochemical effects: Lead, Mercury, Cadmium, and Arsenic

5) Land Pollution

Lithosphere; Internal structure of earth, rock and soil

Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes; Recovery and disposal method- Open dumping, Land filling, incineration, composting, recycling. Solid waste management and control (hazardous and biomedical waste).

6) Noise Pollution

Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise, neighbourhood noise].

Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level, L10 (18hr Index) , Ld . Noise pollution control.

7) Environmental Management

Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol.

Total Lectures= 39

Text Books and Articles:

INSTRUMENTATION & CONTROL

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

15) Measurement accessories  
   Brief concept of instrumentation amplifiers, signal generation and processing, data acquisition and conversion, input-output devices and displays  
   4

16) General test equipment  
   Brief review of general-purpose electronic test equipment - CRO, digital multimeters, counters, signal generators, regulated power supplies.  
   4

17) Control systems and engineering  
   Introduction, open and closed loop systems, idea of mathematical modelling of simple physical systems, concept of transfer functions, types of control action - ON-OFF, proportional, derivative, integral and PID, concept of time response analysis with respect to instrumentation systems - zero order systems, first order systems and its step, ramp frequency response, second order systems and its step, ramp response.  
   10

Total Lectures= 40

Text Books and Articles:
1. Instrumentation & Control by Rangan, Mani & Sharma,
2. Transducers & Instrumentation by D.V.S. Murty, PHI Learning Pvt. Ltd.
3. Control Systems Engineering by Nagrath and Gopal, New Age International

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**TEXTILE FIBRES**

**TT-302**

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</tbody>
</table>

**Serial No.**

**Chapters/Units**

**Description**

**Lectures in hour**

1) **Introductory Concepts**

   General classification of textile fibres, difference between natural and synthetic fibres according to their composition and properties, longitudinal and cross sectional view of different textile fibres and their impact on physio-mechanical properties like tenacity, elongation, initial modulus, yield point, toughness, elastic recovery, moisture sorption etc.

   3

2) **Fibre forming polymers and Structure**

   Essential and desirable characteristics of fibre forming polymers, chemical structure and bonding of natural and synthetic fibres, Macro and micro structure of cellulose, protein and synthetic fibres, orientation and crystallinity, Glass transition temperature and its significance. measurement of crystals by X-ray diffraction, thermal analysis of fibrous polymers by DSC, TGA and DTA, Structural study by FTIR and NMR.

   6

3) **Natural Fibres**

   Classification, grading, structure and properties and end uses of natural fibres like a) Vegetable (bust, leaf and seed fibres), b) animals (wool and silk) and c) mineral (glass, asbestos and metallic fibres), d) cotton; concept of varieties; definition of grading, distinctive properties and end uses, e) jute:- varieties, distinctive properties and end uses, f) flax and pineapple fibres:- brief introduction and uses, g) protein fibres:- wool:- classification, distinctive properties and end uses, silk:- classification, distinctive properties and end uses.

   10

4) **Regenerated Fibres**

   a) Classification, b) regenerated fibres-acetate, viscose & diverse forms of viscose, cu-prammonium, alginate, lyocell. - general properties, end uses, main features of the production of some important regenerated fibres-viz., viscose, cellulose-acetate, lyocell etc.

   7

5) **Synthetic fibres**

   a) Classification, principles of polycondensation with reference to polyesters, polyamides and polyurethanes, principles of poly addition with reference to acrylics, polyolefins, polyvinyl chlorides and co-polymers, aramid fibers d) chemical properties & end uses of polyester, polyamide and poly

   12
acrylonitrile fibres, e) introduction to the production of synthetic fibres: i) principles of melt spinning details of melt spinning process with special reference to polyester-parameters near spinneret, LOY, MOY & POY, g) dry spinning and h) wet spinning; i) viscosity of melts and solutions, j) equipments of manmade fibre production, k) main features of the production of some important manmade fibres-viz., polyamides, polyesters, polypropylene and poly acrylic fibres, l) concept of quenching operation and finish application.

6) Fibre forms and Characteristics
Continuous and Staple fibres, heat setting and drawing of fibres, concept of micro denier fibre.

Text Books:
1. Manmade Fibres by R.W. Moncrieff,
3. Fiber Chemistry by M. Lewin and E.M. Peare,
4. Man-made Fibres Science and Technology, Vol. 1,2,3, by H.F. Mark, S.M. Atlas and E. Cernia,
5. Polyester Fibres Chemistry and Technology by H. Ludwig,
7. Textile Science by E.P.G. Gohl and L.D. Vilensky
8. Textile fibre, S.N. Murthy

YARN FORMATION – I

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
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<tbody>
<tr>
<td>2)</td>
<td>Staple Yarn Conversion</td>
<td>Yarn classification and their general comparison. Process flow chart involved in conversion of fibres/filaments to yarns by presently available yarn formation systems with brief objectives of each process. Process flow chart of carded and combed spun yarn. Atmospheric processing conditions at different stages of material preparation.</td>
<td>3</td>
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<td>3)</td>
<td>Ginning and baling</td>
<td>Impurities in natural fibres and their removal during pre-bailing operation; Concept of Ginning and its Performance on yarn quality; Objectives of baling for yarn preparation</td>
<td>2</td>
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<tr>
<td>4)</td>
<td>Blowroom</td>
<td>Rudiments of opening, cleaning, blending and mixing along with their sequential implementation in yarn preparatory stage. Classification of opening devices and opening variants; elements of grid as cleaning components; interaction of feed assembly, opening element and grid; Principles of opening and cleaning methods in blowroom and carding; Factors influencing opening and cleaning action. Principles and methods of mixing and blending with their merits and demerits. Idea of accessories and associated equipment (dust removing and disposing devices; material transport devices, material flow control devices, metal extractors, fire eliminator); Sequence of opening and cleaning machineries in modern blow room and their brief study; Process Performance of blow room (viz. cleaning efficiency, degree of opening, waste, etc.)</td>
<td>10</td>
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<td>5)</td>
<td>Carding</td>
<td>Mechanism of feeding into a card; Principles of action in different zones of carding; Concept of card clothing; Overview of various types of designs of carding machines; General Elements of a carding machine along with their maintenance and settings; mechanism of material condensing in carding Process</td>
<td>13</td>
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</table>
Syllabus for B.Tech(Textile Technology) up to Fourth Year
Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
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<tr>
<td>6)</td>
<td>Draw Frame</td>
<td>Objectives and principles of equalizing and drafting process; An idea of drafting theory; Study on drafting arrangements – requirements, elements, forms etc.; Mechanism of material condensing in drawing. Process Performance assessment of draw frame.</td>
<td>7</td>
</tr>
<tr>
<td>7)</td>
<td>Autolevelling &amp; recent Trends</td>
<td>Causes of mass variation of fibrous assembly, their monitoring and control – concept of autolevellers. Productivity of parallel fibre assembly of preparatory stage machines. Recent trends and developments including automation.</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Books:
1. The Technology of Short Staple Spinning by W. Klein
3. A Practical Guide to Combing & Drawing by W. Klein,
4. Manual of Cotton Spinning (Opening & Cleaning) by C. Shrigley,
5. The Principle of Roller Drafting & The Irregularity of Drafted Materials by G. A. R. Foster,
6. Spun Yarn Technology by Eric Oxtoby,
7. Fundamentals of spun yarn technology by Carl A. Lawrence
8. Spun Yarn Technology (Vol-1 & Vol-2) by A Venkatasubramani

Total Lectures= 40

PHYSICS LAB-2
PH-391

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Contacts: (3P)

Credit: (2)

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

Group 2: Quantum Physics
5. Determination of Planck’s constant using photocell.
7. Determination of Stefan’s radiation constant
8. Verification of Bohr’s atomic orbital theory through Frank-Hertz experiment.
9. Determination of Rydberg constant by studying Hydrogen/ Helium spectrum

Group 3: Modern Physics
10. Determination of Hall co-efficient of semiconductors.
11. Determination of band gap of semiconductors.
12. To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells.

a) A candidate is required to perform 3 experiments taking one from each group. Initiative should be taken so that most of the Experiments are covered in a college in the distribution mentioned above. Emphasis should be given on the estimation of error in the data taken.

b) In addition a student should perform one more experiments where he/she will have to transducer the output of any of the above experiments or the experiment mentioned in c) into electrical voltage and collect the data in a computer using phoenix or similar interface.

c) Innovative experiment: One more experiment designed by the student or the concerned teacher or both.

Note:
1. Failure to perform each experiment mentioned in b) and c) should be compensated by two experiments mentioned in the above list.
2. At the end of the semester report should sent to the board of studies regarding experiments, actually performed by the college, mentioned in b) and c)
3. Experiment in b) and c) can be coupled and parts of a single experiment.
Syllabus for B.Tech (Textile Technology) up to Fourth Year
Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011

INSTRUMENTATION & CONTROL LAB.
TT-391

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Contacts: (3P)
Credit: (2)
The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

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

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

TEXTILE FIBRE LAB
TT-392

Contacts: 3P
Credits: 2

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

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

A. Identification of Textile fibres
Identification of common textile fibres like cotton, wool, silk, jute, flax, ramie, viscose rayon, nylon, polyester, acrylic, polypropylene, glass, by longitudinal and cross-sectional views & by Burning test
Identification of common textile fibers (as mentioned above) by solubility test

B. Fibre dimension and other physical test
1. To prepare a Baer sorter diagram and determine the following:
   a) Effective Length
   b) Mean Length
   c) Dispersion percentage
   d) Short fibre percentage
2. To determine 2.5% span length, 50% span length and uniformity ratio of a given Cotton using fibrograph. Construct a fibrogram by re-setting the counters for various S.L. between 5% to 90%. Compare the fibrogram of manmade fibre with cotton.
3. To determine micronaire value of given cotton sample by Airflow method. Convert the result into SI unit and give a suitable rating to the fibre sample.
4. To determine maturity coefficient and maturity ratio of given cotton sample by caustic soda method. Give appropriate rating to the sample.

10
5. To determine the bundle strength and elongation at break of a cotton fibre using Stelometer instrument. Study the effect of rate of loading on tensile properties of the fibre.
6. To determine moisture content/regain of a fiber sample by desiccators/hot air method.
7. To determine crimp (arcs/cm and crimp%) of a given manmade fibre sample.
8. To determine fibre fineness of manmade fibers/filaments by:
   Whole fibre method, Microscope

**YARN FORMATION LAB - I**

**TT-393**

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<thead>
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<th>Contacts : 3P</th>
<th>Credits : 2</th>
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The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

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

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

**SEMESTER-IV**

**NUMERICAL METHODS**

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<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
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<tbody>
<tr>
<td>1)</td>
<td>Approximation in numerical computation:</td>
<td>Truncation and rounding errors, Fixed and floating-point arithmetic, Propagation of errors.</td>
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<tr>
<td>2)</td>
<td>Interpolation:</td>
<td>Newton forward &amp; backward interpolation, Lagrange’s and Newton’s divided difference Interpolation.</td>
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<td>3)</td>
<td>Numerical integration:</td>
<td>Trapezoidal rule, Simpson’s 1/3 rule, Weddle’s rule.</td>
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<th>Lectures in hour</th>
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Total Lectures= 28

Text Books:

References:
2. Baburam: Numerical Methods, Pearson Education.
4. Soumen Guha & Rajesh Srivastava: Numerical Methods, OUP.
5. Srimanta Pal: Numerical Methods, OUP.

MATHEMATICS-3

<table>
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<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
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<tbody>
<tr>
<td>1)</td>
<td>Module I Fourier Series:</td>
<td>Introduction, Periodic functions, Even and odd functions, Special waveforms, Euler's formulae for Fourier coefficients, Dirichlet’s conditions and sum of the Fourier series, Half range Fourier series, Parseval’s identity (Statement only).</td>
<td>8</td>
</tr>
<tr>
<td>2)</td>
<td>Module II Calculus of Complex variable:</td>
<td>Functions, Limit and Continuity, Analytic functions, Cauchy-Riemann equations (Statement only) and related problems, Analytic continuation, Complex integration and Cauchy’s theorem (Statement only), Cauchy’s integral formula (Statement only), Taylors and Laurent series, Zeros of an analytic function, Poles, Essential singularities, Residue theorem (Statement only) and its application to evaluation of definite integrals (Elementary cases only), Introduction to Conformal Mapping.</td>
<td>12</td>
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<tr>
<td>3)</td>
<td>Module III Probability:</td>
<td>Axiomatic definition of probability, Conditional probability, Independent events, Related problems, Bayes theorem (Statement only) &amp; its application. One dimensional random variable, Probability distributions-discrete and continuous, Expectation, Binomial, Poisson, Uniform, Exponential and Normal distribution, Problems on Binomial, Poisson and Normal distribution only.</td>
<td>12</td>
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<tr>
<td>4)</td>
<td>Module IV Partial Differential Equations:</td>
<td>Solution of one dimensional wave equation, One dimensional heat-conduction equation, Laplace equation in two dimension by the methods of 1: Separation of variables 2: Integral Transforms (Laplace and Fourier Transforms)</td>
<td>6</td>
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<tr>
<td>5)</td>
<td>Module V Series solution of Ordinary Differential equation:</td>
<td>Introduction, validity of series solution of an ordinary differential equation, general method to solve equation of the type: P0y'' + P1y' + P2y = 0, related problems, Bessel’s equation, properties of Bessel’s function, Recurrenceformula for Bessel’s function of first kind, Legendre’s equation, Legendre function; Recurrence formula for Legendre function (Pn(x)); Orthogonality relation.</td>
<td>10</td>
</tr>
</tbody>
</table>

Total Lectures= 48

Text Books:
2. Das N.G.: Statistical Methods, TMH.
5. Lipschutz S., and Lipson M.L.: Probability (Schaum's Outline Series), TMH.

References:
SYLLABUS FOR B.TECH (TEXTILE TECHNOLOGY) UP TO FOURTH YEAR

5. Ramana B.V.: Higher Engineering Mathematics, TMH.

THEORY OF MACHINES

<table>
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<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>1)</td>
<td>Basic concepts</td>
<td>Kinematics and Kinetics; Introduction to mechanisms; Difference between Machine, Mechanism and Structure; Classification of Pairs of Elements: Links, Frames and Kinematic Chains; Pairs, Higher Pairs, Lower Pairs and Linkages; Types of joints in a chain; Four &amp; six -bar linkage; motions of links, Grashof’s criterion of movability; Degrees of freedom for plane Mechanisms, Gruebler’s criterion for plane mechanism; Introduction to Kinematic inversions.</td>
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<td>2)</td>
<td>Velocity and Acceleration in Mechanisms</td>
<td>Velocity analysis in Mechanisms: Relative velocity method – slider crank mechanism, four bar mechanism, Crank and slotted lever mechanism; Instantaneous centre method –Kennedy’s theorem; Acceleration analysis: Acceleration Images, Klein’s construction, analytical expression of velocity &amp; acceleration.</td>
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<td>3)</td>
<td>Mechanisms with Lower Pairs</td>
<td>Study of lower pair Mechanisms- Pantograph, Parallel linkage mechanisms, Straight line mechanism, Hooks joint.</td>
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<td>4)</td>
<td>Belt, Rope and Chain Drives</td>
<td>Belt Drives, Rope Drives and Chain Drives: description and analysis.</td>
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<td>5)</td>
<td>Cams</td>
<td>Introduction, Cam Mechanisms, Classification of Cam Mechanisms; Follower Arrangement- In-line, Offset ;Cam Shape -Plate cam or disk cam, Grooved cam or closed cam , Cylindrical cam or barrel cam ,End cam ;Constraints on the Follower; Cam Nomenclature- Trace point, Pitch curve, Working curve, Pitch circle, Prime circle (reference circle, Base circle, Stroke or throw, Follower displacement, Pressure angle ;Motion events- Constant Velocity Motion, Constant Acceleration Motion, Harmonic Motion, cycloidal motion ; Cam Design- Parameters, Cam profile design principle, Design equations , manual drawing examples of some textile cams.</td>
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<td>6)</td>
<td>Gears</td>
<td>Gear terminology, Laws of gearing, types of gears – Spur, Bevel, Helical, Worm; tooth profile, interference; Gear trains – simple, compound, epicyclic gear train; Speed-torque analysis of gear trains.</td>
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<td>8)</td>
<td>Balancing of Masses</td>
<td>Introduction to Balancing of Rotating Masses and Balancing of Reciprocating Masses.</td>
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<tr>
<td>9)</td>
<td>Vibrations</td>
<td>a) Longitudinal and Transverse Vibrations: Introduction, Terms Used in Vibratory Motion, Types of Vibratory Motion, Types of Free Vibrations, Natural Frequency of Free Longitudinal Vibrations, Natural Frequency of Free Transverse Vibrations, b)Introduction to Torsional Vibrations.</td>
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</tbody>
</table>

Total Lectures= 40

Text Books:
2. Theory of Machines – S S Rattan, Tata McGraw Hill
6. An introduction to textile mechanisms. Author, P. Grosberg, Publisher, Benn, 1968

FABRIC FORMATION-I

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
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<tbody>
<tr>
<td>1)</td>
<td>FABRIC FORMATION-I</td>
<td></td>
</tr>
</tbody>
</table>
1) Introduction

2) Single-end Warp Winding
   a) Introduction -sequence of processes, Jungle and multi-end winding, b) need for warp winding, c) cleaning, clearing, d) standard package formats packages and different types of package builds, package requirements, e) winding principles-random, precision, sectional and combined, f) winding parameters: winding rate, wind and traverse ratio, gain, winding angle, g) winding faults; pattern formation, principles of pattern breaking, h) winding operation, i) unwinding- side and over end withdrawal, j) winding machines–basic function, classification of winding machines, spindle and drum driven machines, commercial automatic and non-automatic machines, k) yarn traversing- reciprocating mechanisms, rotating mechanisms, l) yarn faults m) yarn clearing-mechanical and electronic types, knotting, splicing etc. n) tensioning devices, o) stop motions and auxiliary functions (creeling, piecing, doffing etc.), p) winding economics- Efficiency, Productivity, future etc.

3) Single-end Weft Winding
   a) Introduction b) need, c) shape and build of the pirn, c) basic requirements, d) elements of the pirn winding machines, e) concept of basic terms-pirn density, cohesion, consistency of pirn diameter, bunch building, chase, winding and binding coils, yarn tails and back wind, spindle speed, direction of rotation, etc., f) principal features of a pirn winding machine with respect to a latest commercially available automatic and non-automatic machines, g) Unifil-winder, h) calculation of Efficiency, Productivity, etc.

4) Multi-end Winding/Warping
   a) Introduction b) need, c) shape and build of the pirn, c) basic requirements, d) elements of the pirn winding machines, e) concept of basic terms-pirn density, cohesion, consistency of pirn diameter, bunch building, chase, winding and binding coils, yarn tails and back wind, spindle speed, direction of rotation, etc., f) principal features of a pirn winding machine with respect to a latest commercially available automatic and non-automatic machines, g) Unifil-winder, h) calculation of Efficiency, Productivity, etc.

5) Sizing
   a) Introduction, b) sizing process, c) size ingredients, d) size recipe, preparation of size recipe, e) factors which affect the properties of sized yarns, Sizing–Weaving Curve, f) preparation of the size paste-formulation and equipments, g) techniques of sizing, h) types of sizing- normal/slasher sizing, single-end sizing, draw warping and sizing, draw sizing, foam sizing, dye sizing, ball sizing, hank sizing etc. i) concept of size pick up in a beam, j) principal machine components- Creels—unwinding zone, Size boxes—sizing zone, Drying cylinders—drying zone, Burst rods—splitting zone, Head stock—waver’s beam preparation zone, Controls and instrumentations, k) controls in sizing:-control of size pick-up, determination of size pick up in a beam, control of sizing conditions, control of yarn stretch control of moisture in sized yarns, control of size losses, l) sizing of different yarns, m) performance of sized yarns, dependence of weavability, effect of sizing, n) Calculation of Efficiency and Productivity.

6) Elements of woven design, Drawing-in and Tying in
   a) Idea of fabric structure; methods of fabric representation; repeat of weave; drafts; requirements of drawing in; weaving plan; lifting plan; relationship between weave; draft and lifting plan; construction of weaving plan from a given weave; construction of weave from a given draft and lifting plan; construction of draft from a given lifting plan and weave;b) General characteristics; plain weave; twill weaves; satin and sateen weaves c) Introduction to Drawing-in-draft (DID) and Tying-in, need, manual and mechanized methods

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

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**TEXTILE CHEMICAL PROCESSING-1**

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<thead>
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<th>TT-403</th>
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<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
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<tbody>
<tr>
<td>1) Introduction</td>
<td>Overview of colouration and finishing or chemical processing of textile materials, overview of different stages, preparation of cotton/cellulosic materials, prelims of preparation: grey checking-grey</td>
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</tbody>
</table>

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

Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011)
<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topic</th>
<th>Description</th>
<th>Lectures</th>
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</thead>
<tbody>
<tr>
<td>1)</td>
<td></td>
<td>Testing-stamping-mending-stitching-shearing/cropping.</td>
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<tr>
<td>2)</td>
<td>Chemical processing equipment</td>
<td>Principles of functions of different machines used in preparatory processing including padder, J-box, washing machine, kiers, different mercerising machines, equipments for water removal – contact and non-contact type of dryer, hydroextractor, construction, schematic diagram, function, speed, capacity etc.</td>
<td>5</td>
</tr>
<tr>
<td>3)</td>
<td>Singeing</td>
<td>Objectives, materials suitable, singeing methods-mentioning of plate and roller singeing machine, details of gas singeing machine, merits, demerits, precautions, advancement, bio-singeing.</td>
<td>3</td>
</tr>
<tr>
<td>4)</td>
<td>Desizing</td>
<td>Objective, ingredients of size, brief chemical nature and process of removal-chemistry of starch and its hydrolytic and oxidative decomposition, methods of desizing-hydrolytic &amp; oxidative, brief glimpse of rot steep and acid steep; enzymatic desizing, classification of amylases used in desizing-according to hydrolytic action &amp; according to origin, factors of enzymatic desizing, methods of enzymatic desizing, some commercial names of enzymes, merits and demerits over other desizing processes, precautions, bromite desizing, factors, methods of bromite desizing, advancement, if any; method of evaluation of desizing efficiency.</td>
<td>5</td>
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<tr>
<td>5)</td>
<td>Scouring</td>
<td>Objective, impurities of cotton fiber-their chemical nature and possible methods of removal, merits and demerits of each process, importance of alkali scouring, surfactants, concept of micelle, critical micelle concentration, HLB value, cloud point, their classification –according to chemical nature, action, mechanisms of wetting, detergency and emulsification, factors of scouring, methods of scouring, different scouring equipment e.g., High pressure kier, combi-steamer, their construction, working principle, capacity, solvent scouring, method of evaluation of scouring efficiency, enzymatic scouring.</td>
<td>5</td>
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<td>6)</td>
<td>Mercerisation</td>
<td>Objective, action of alkali on the morphological/time structure of cellulose, methods- cold and hot, relative merits and demerits, evaluation.</td>
<td>2</td>
</tr>
<tr>
<td>7)</td>
<td>Bleaching</td>
<td>Objective, classification of bleaching methods, different bleaching agents, their relative merits and demerits, hypochlorite, chlorite, peroxide bleaching, their mechanisms, bleaching parameters, methods of bleaching, role of chemicals used in bleaching, method of evaluation of bleaching efficiency including objective, principle/mechanism, properties, and method of application of optical whitening agents.</td>
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<tr>
<td>8)</td>
<td>Treatment with liquid ammonia</td>
<td>Objective, methods, relative merits and demerits, evaluation.</td>
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<td>9)</td>
<td>Preparation of coloured materials</td>
<td>Nature of problems associated with the preparation of coloured goods, causes and remedies</td>
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<tr>
<td>10)</td>
<td>Preparation of silk and wool</td>
<td>Impurities present, degumming/scouring, bleaching, optical whitening of wool and silk.</td>
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<td>11)</td>
<td>Preparation of jute</td>
<td>Impurities present, scouring, bleaching, optical whitening.</td>
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<tr>
<td>12)</td>
<td>Preparation of synthetic fibres, blends</td>
<td>Impurities present, heat-setting: objective, different setting methods, i.e., with/without swelling agents, hot air, infra-red etc., different heat-setting sequences like loom-state, intermediate and after-setting, their relative merits and demerits, singeing of man made fibres, their blends; scouring, bleaching, optical whitening.</td>
<td>3</td>
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</tbody>
</table>

**Total Lectures**: 40

Textbooks and References:
1. Textile Chemistry, Vol. II by R.H. Peters,
2. Textile Scouring and Bleaching by E.R. Trotman
3. Technology of Bleaching and Mercerising by V.A. Shenai,
4. Engineering in Textile Colouration by C. Duckworth,
5. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman,
7. Chemical Technology of Fibrous Materials by F. Sadov, M. Korchagin and A. Matetsky,
8. Mercerisation by J.F. Marsh,
9. Surfactants in Textile Processing by A. Datyner,
10. The Preparation and Dyeing of Synthetic Fibres by H.U. Schmidlin,
11. Chemical Technology in the Pre-treatment Processes of Textiles by S.R. Karmakar,
Syllabus for B.Tech (Textile Technology) up to Fourth Year

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


TECHNICAL REPORT WRITING & LANGUAGE LAB PRACTICE

<table>
<thead>
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<th>Code: HU-481</th>
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<td>Credit-2</td>
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Objectives of this Course: This course has been designed:
1. To inculcate a sense of confidence in the students.
2. To help them become good communicators both socially and professionally.
3. To assist them to enhance their power of Technical Communication.

Detailed Course Outlines:

A. Technical Report Writing : 2L+6P
   1. Report Types (Organization/Business/Project)
   2. Report Format & Organization of Writing Materials
   3. Report Writing (Practice Sessions & Workshops)

B. Language Laboratory Practice
   1. Introductory Lecture to help the students get a clear idea of Technical Communication & the need of Language Laboratory Practice Sessions 2L
   2. Conversation Practice Sessions: (To be done as real life interactions) 2L+4P
      a) Training the students by using Language Lab Device/Recommended Texts/cassettes/cd’s to get their Listening Skill & Speaking Skill honed
      b) Introducing Role Play & honing over all Communicative Competence
   3. Group Discussion Sessions: 2L+6P
      a) Teaching Strategies of Group Discussion
      b) Introducing Different Models & Topics of Group Discussion
      c) Exploring Live/Recorded GD Sessions for mending students’ attitude/approach & for taking remedial measure
   4. Interview Sessions: 2L+6P
      a) Training students to face Job Interviews confidently and successfully
      b) Arranging Mock Interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in a formal situation for effective communication
   5. Presentation: 2L+6P
      a) Teaching Presentation as a skill
      b) Strategies and Standard Practices of Individual/Group Presentation
   6. Competitive Examination: 2L+2P
      a) Making the students aware of Provincial/National/International Competitive Examinations
      b) Strategies/Tactics for success in Competitive Examinations
      c) SWOT Analysis and its Application in fixing Target

Books – Recommended:
Nira Konar: English Language Laboratory: A Comprehensive Manual
PHI Learning, 2011
Pearson Education (W.B. edition), 2011

References:
Adrian Duff et. al. (ed.): Cambridge Skills for Fluency
A) Speaking (Levels 1-4 Audio Cassettes/Handbooks)
B) Listening (Levels 1-4 Audio Cassettes/Handbooks)
Cambridge University Press 1998
Mark Hancock: English Pronunciation in Use
A. 4 Audio Cassettes/CD’S OUP 2004
Syllabus for B.Tech(Textile Technology) up to Fourth Year
Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011

NUMERICAL METHODS LAB
M(CS)-491

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Contacts : 2P
Credits : 1

1. Assignments on Newton forward & backward, Lagrange’s interpolation.
2. Assignments on numerical integration using Trapezoidal rule, Simpson’s 1/3 rule, Weddle’s rule.
4. Assignments on numerical solution of Algebraic Equation by Bisection, Secant, Regular-falsi and Newton Raphson methods.
5. Assignments on ordinary differential equation: Taylor series, Euler’s, Runga-Kutta and Finite difference methods.
6. Introduction to Software Packages: Matlab / Scilab / Labview / Mathematica.

THEORY OF MACHINES LAB
TT-491

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Contacts : 3P
Credits : 2

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

FABRIC FORMATION LAB- I
TT-492

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(Any six selecting two from each category)

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

Category A:
1. To study the working of an Automatic winding machine and prepare a bobbin.
2. To study the working of a Beam warping.
3. To study the working of a Sectional warping.
4. To study the passage of yarn on a sizing machine and the features of various parts/mechanisms of the sizing machine.

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

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

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

CHEMICAL PROCESSING OF TEXTILES LAB- I
TT-493

Contacts : 3P
Credits : 2

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

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

SEMIESTER-V

Principles & Practices of Management
HU-511

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
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<tbody>
<tr>
<td>5)</td>
<td>Module I: Management</td>
<td>Definition, nature, importance, evolution of management thoughts – pre &amp; post scientific era, contributions made by Taylor, Fayol, Gilbreth, Elton Mayo, McGregor, Maskow –covering Time &amp; Motion Study, Hawthorne Experiments; Is management a science or art? Functions of manager, ethics in managing and social responsibility of managers.</td>
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<td>6)</td>
<td>Module II: Planning &amp; Control</td>
<td>Why Management process starts with planning, steps in planning, planning premises, types of planning, barriers to effective planning, operational plan, strategic planning, McKinsey’s 7’s Approach, SWOT analysis, Controlling- concept, Planning: control relationship, process of control, Human response to control, dimensions of control, MB0.</td>
<td>4</td>
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<td>7)</td>
<td>Module III: Decision Making &amp; Organizing</td>
<td>Nature, process of decision making, decision making under Certainty and Uncertainty, decision-tree, group-aided decision, brainstorming. Organizing – concept, nature and process of organizing, authority and responsibility, delegation and empowerment, centralization and decentralization, concept of departmentation.</td>
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</table>
8) **Module IV: Staffing & Motivation**
   Concept, Manpower planning, Job design, recruitment & selection, training and development, performance appraisal, motivation, motivators and satisfaction, motivating towards organizing objectives, morale building.

9) **Module V: Leadership & Communication**
   Defining leadership and its role, should managers lead, leadership style, leadership development, Leadership behavior. Communication - Process, Bridging gap-using tools of communication, electronic media in Communication.

10) **Module VI: Financial Management**

11) **Module VII: Marketing Management**
    Functions of Marketing, Product Planning & Development, Marketing Organization, Sales Organization, Sales Promotion, Consumer Behaviour, Marketing Research and Information.

Total Lectures= 24

**Suggested Readings: Text & References:**
1. Robbins & Caulter – Management (Prentice Hall of India, 8th Edition)
7. D.Chandra Bose– Principles of Management and Administration (PHI)
11. Principles of Management* - 10 e/d by Richard. L.Daft; Cengage Learning
Publisher- Macmillan

**Yarn Formation - II**

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/ Units</th>
<th>Description</th>
<th>Lectures in hour</th>
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<tbody>
<tr>
<td>2.</td>
<td>Roving Operation</td>
<td>Objectives of roving operation. Machine elements of speed frames. Flyer twisting; types and design aspects of flyers. Drafting systems in speed frames. Differential gear drives in Speed frame. Package building in speed frames. reversing of bobbin rail, shortening of the lift, gear train &amp; accessories; monitoring devices. Novel features of a modern roving frame and automation possibilities; Calculations pertaining to speed, production, draft and twist, coils/inch etc. Quality aspects in speed frame.</td>
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<tr>
<td>5.</td>
<td>Processing of manmade fibres in the short staple mill:</td>
<td>Speed frame, Ring frame (material preparation, processing guidelines, problems, settings, modifications required, processing environment)</td>
<td>2</td>
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<tr>
<td>6.</td>
<td>Conversion of filaments to fibres</td>
<td>Principles of stretch breaking and cutting, tow to top and tow to yarn converters.</td>
<td>2</td>
</tr>
</tbody>
</table>

Total Lectures= 41

**Text Books:**
2. W. Klein, Man-Made Fibres and Their Processing, Manual of Textile Technology – Vol-6, by The Textile Institute, Manchester, UK.
### Fabric Formation -II

**TT-502**

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
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<tbody>
<tr>
<td>1)</td>
<td>Introduction</td>
<td>a) Introduction b) Principle of Operation of a loom, c) Different motions on a loom, d) methods of indicating loom timing, e) history of loom development.</td>
<td>10</td>
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<tr>
<td>2)</td>
<td>Shedding</td>
<td>a) Introduction b) geometry of the shed, forms and other consideration-bending factor, shed depth curve, shed troughing etc. c) shedding mechanisms- idea of tappet, dobby and jacquard shedding and their scope, Cam or tappet shedding- a)idea of different types of cam used in shedding, bipositive and negative tappet, c) shedding with negative cams, d) a simplified idea of arrangement of cams and other elements on the loom, e) idea of designing a simple cam f) i) shedding with positive tappets, grooved and matched cam shedding arrangements j) limitations of tappet shedding, k) split shedding or heald staggering - definition, purpose, methods, l) different types of healds. Dobby shedding: a) classification, b) principle of single lift and double lift dobbyes, c) negative dobbey-introduction, climax dobbey- working principle, timing diagram, idea of pegging the lags, modern negative dobbey with minimal pivot points, d) positive dobbey- introduction, gear dobbey- working principle, paper dobbey- working principle, rotary dobby- working principle. Jacquard Shedding: a) classification and other considerations, b) concept of single lift single cylinder, double lift single cylinder and double lift double cylinder jacquards; c) electronic jacquard- working principle, d) electronic jacquard- working principle, e) Jacquard harness- introduction to systems of harness mounting and harness ties. e) Shedding: a) Introduction, b) principle of operation, c) scope. Shedding timing with respect to crank shaft rotation, Early and late shedding</td>
<td>6</td>
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<tr>
<td>3)</td>
<td>Picking</td>
<td>a) Introduction, b) classification of picking methods, c) shuttle picking, the shuttle types etc. shuttle projection, shuttle acceleration, d) principal types of mechanism for imparting motion to the shuttle (macro and micro/projectile), e) nominal and actual displacement, catapult action, profile of picking cams (linear, parabolic, sinusoidal etc.), f) conventional picking mechanisms-brief description of cone over pick, cone under pick, side shaft &amp; side-lever mechanism; g) Shuttle checking- General consideration of checking.</td>
<td>6</td>
</tr>
<tr>
<td>4)</td>
<td>Beat-up</td>
<td>a) Introduction, b) construction of crank based &amp; cam based sley mechanism, c) eccentricity of sley mechanism in crank based mechanisms, d) expressions for sley eccentricity in terms of crank arm and crank radius e) cloth fell position in the loom, relation between weaving resistance and fell displacement, bumping conditions, f) multiple beat up mechanisms- double beat up, g) beat up mechanism for shuttle loom</td>
<td>4</td>
</tr>
<tr>
<td>5)</td>
<td>Warp and cloth control</td>
<td>a) Introduction to pick spacing and pick density, b) causes of variations in pick spacing, c) The Take-up motions, negative and positive take-up, Intermittent and continuous, S wheel take-up, J wheel take-up, Shirley, 4 wheel combination take-up of Sulzer and Picanol and electronic take-up, d) Warp Let-off; negative frictionlet-off; semi positive and positive let-off, brief description and principle of operation of Ruti-C let-off, Saurer let-off, hunts let-off and one electronics let-off, e) Temple- introduction, brief description of different types- ring, roller and full width.</td>
<td>8</td>
</tr>
<tr>
<td>6)</td>
<td>Auxiliary mechanisms</td>
<td>Introduction, weft stop motions, warp stop motions and warp protector motions</td>
<td>3</td>
</tr>
<tr>
<td>7)</td>
<td>Weft mixing in shuttle loom</td>
<td>2 X 1, 2 X 2 and 4 X 1 box changing system, their limitations; Pattern making for box changing with specific example; Concept of weft mixing in circular box mechanism</td>
<td>4</td>
</tr>
<tr>
<td>8)</td>
<td>Calculations</td>
<td>a) Reed and heald calculations, b) Production calculation, c) GSM calculation, d) Calculations related to shed geometry e) Calculations related to shuttle acceleration/retardation etc, f) Take up calculation</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total Lectures**: 43

**Textbooks:**

Textile Chemical Processing - II

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

Total Lectures= 42

Text Books:
1. Textile Chemistry Vol. III by R.H. Peters,
2. The Dyeing Of Textile Materials by J. Cegarra, P. Puente, J. Valdeperas,
3. Engineering in Textile Colouration by C. Duckworth,
4. Dyeing and Chemical Colouring of Textile Fibres by E.R. Trotman,
6. Basic Principles of Textile Colouration by Arthur D Broadbent,
# Syllabus for B.Tech(Textile Technology) up to Fourth Year

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

## Free Elective-I
### Statistical Quality Control

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units Description</th>
<th>Lectures in hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Quality Management: Definition of quality and its importance, different approaches to quality, Description of Deming’s fourteen points and Ishikawa’s seven tools of quality, utility of statistical method for quality control and improvement, concept of Total Quality Management (TQM), ISO 9000 Standards, Quality Function Deployment (QFD) and Quality Costs.</td>
<td>6</td>
</tr>
<tr>
<td>2)</td>
<td>Basic Approaches to Statistical Quality Control: Population and sample, descriptive and inductive statistics, discrete and continuous variables, subjective tests, collection and classification of data, frequency distributions, measures of central tendency, measures of dispersion, random variables and probability distribution, differences and applications of normal, binomial, Poisson’s and other form of distribution.</td>
<td>6</td>
</tr>
<tr>
<td>3)</td>
<td>Statistical Analysis for Continuous Function: Population and sampling distribution of mean, statistical estimation theory, points estimates, concept of single tail and double tail test, Student’s t distribution, confidence limit, statistical decision theory, tests of hypotheses and significances, type I and type II errors, difference between two sample means. Test for single variance, Chi-square test, test for the difference between two variances, confidence limits for variance and ratio of two variances, choice of sample size.</td>
<td>8</td>
</tr>
<tr>
<td>4)</td>
<td>Statistical Analysis for Discrete Function: Application of binomial and Poisson’s distribution, normal approximation, test for a single proportion and difference between two proportions, application ication of $\chi^2$ distribution, contingency table.</td>
<td>5</td>
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<tr>
<td>5)</td>
<td>Subjective Tests: Rank correlation, tied rank, coefficient of concordance.</td>
<td>3</td>
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<tr>
<td>6)</td>
<td>Acceptance Sampling: Basic idea about acceptance sampling, OC curve, producer’s risk and customer’s risk.</td>
<td>3</td>
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<tr>
<td>7)</td>
<td>Control Charts: Advantages using quality control charts, random and assignable causes, action and warning limits, $X$, $R$, $n$, $p$ and $c$ chart, Process Capability Ratio (CP and CPK), concept of 6 sigma process control, brief idea aboutCUSUM and EWMA chart.</td>
<td>4</td>
</tr>
<tr>
<td>8)</td>
<td>ANOVA and Regression: Some basic concept of Analysis of Variance, method of least squares, linear regression methodology, correlation and standard error.</td>
<td>5</td>
</tr>
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</table>

**Total Lectures= 40**

**Text Books:**

## Free Elective-I
### Total Quality Management

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units Description</th>
<th>Lectures in hour</th>
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</thead>
<tbody>
<tr>
<td>1)</td>
<td>Introduction: Definition of Quality, Small q &amp; Big Q, Quality characteristics- weaves, Dimensions, determinants, Quality Planning, Quality &amp; profitability - idea, Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.</td>
<td>6</td>
</tr>
<tr>
<td>3)</td>
<td>Managing Quality: Traditional Vs Modern quality management, the quality planning, road map, the quality cycle. Cost of</td>
<td>6</td>
</tr>
</tbody>
</table>
### Syllabus for B.Tech (Textile Technology) up to Fourth Year

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


Total Lectures: 40

**Text Books:**


### YARN FORMATION LAB - II

**TT-591**

<table>
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</table>

**Contacts:** 3P  
**Credits:** 2  
The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

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

**Category I (Combing):**
1. General study of comber machine.
2. Study of the gearing diagram and calculation of mechanical draft and draft constant of comber.
3. Determination of operating speed and production from the gearing plan of a comber.
4. An estimation of noil extraction (between head and overall) in a comber machine.

**Category II (Roving Operation):**
1. Study of various components of speed frame and their functions.
2. Study of gearing diagram of speed frame and calculation of speeds of various components.
3. Calculation of mechanical draft and draft constant of speed frame.
4. Calculation of mechanical twists and twist constant of speed frame.
5. Study the working of building motion and differential drive of speed frame.

**Category III (Ring Spinning & Doubling/twisting):**
1. Study of gearing diagram of a Ring frame and calculation of speeds of various components.
2. Calculation of mechanical draft and draft constant of Ring frame.
3. Calculation of mechanical twist and twist constant of Ring frame.
4. To study the working of building motion of Ring frame.
5. Determination of coils per inch and coils per inch constant from the gearing plan of a Ring frame.
6. To study the effect of twist on the yarn strength.
7. To study the effect of Ring frame draft on the yarn quality.
8. General study of the gearing diagram of Two for One Twister/ring doubler-calculations involved.
9. To study the influence of assembly winding on quality of ply yarn.
10. To study the working principle of Two-for-one twister/Doubling m/c. by producing samples.

### FABRIC FORMATION LAB - II

**TT-592**

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</table>

**Contacts:** 3P  
**Credits:** 2  
The following list is in no way exhaustive. Additional laboratory work or experiments can be planned to consolidate the theoretical work and to emphasize the activities for doing rather than the knowing.

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

23
1. Passage of warp through the weaving machine; Name and functions of different elements of loom/weaving machine.

2. Study on tappet shedding mechanism; Calculation of heald lift and tappet lift; To find shed geometry from loom and to calculate yarn extension for both top and bottom line of warp for different sheds and to understand symmetric and asymmetric shed concept. Shedding timing w.r.t crank shaft rotation.

3. Study on picking mechanism, Shuttle box; Shuttle checking, Shuttle dimension and weight. Picking timing; To find interference factor/bending factor at entry and exit. Displacement of shuttle in shuttle box w.r.t. crank shaft motion.

4. Study of Dobby loom, function of different elements and there timing. Dobby design and pegging.

5. Study of Single lift, Double lift.

6. Study of four bar beat up system and to find out displacement, velocity, acceleration curve actual and calculated. Comparison with SHM curve.

7. Study of 7-wheel take up motion and to calculate theoretical and practical loom constant. Driving system of take up motion.

8. Study of negative and positive/automatic let off system.

9. Study of auxiliary motions like warp protector, weft detector and warp stop motion.

10. Study of box changing motion.

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CHEMICAL PROCESSING OF TEXTILES LAB-II
TT-593

Contacts: 3P

Credits: 2

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

List of Experiments (All experiments to be conducted):

1. Dyeing of cotton with
   a) direct dyes
   b) azoic colours
   c) vat dyes
   d) sulphur dyes
   e) reactive dyes

2. Dyeing of wool, silk and nylon fibre with
   a) direct dyes
   b) acid dyes
   c) metal complex dyes

3. Dyeing of polyester fibre with disperse dyes using
   a) carrier
   b) HT-HP

4. Dyeing of polyacrylonitrile fibre with cationic dyes

5. Identification of dyestuff on different substrates

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STATISTICAL QUALITY CONTROL LAB
TT-594

Contacts: 3P

Credits: 2

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

List of Experiments (All experiments to be conducted):

1. Preparation of frequency distribution and histogram, calculation of average, median, mode, variance, standard deviation, minimum, maximum, range, lower quartile, upper quartile, interquartile range

2. Statistical inference testing for mean with variance known, variance unknown, inference on the variance. Study of OC curves, Type I and II error, producers risk, consumers risk

3. Rank correlation, coefficient concordance, preparation of control chart for x-bar, R, process capability, study of correlation coefficient and regression equation

4. Study of simple 2 factorial design, Development of regression model, practical interpretation, response surface plot, study of moving average control charts

5. Use of Excel and Statistical software
Syllabus for B.Tech(Textile Technology) up to Fourth Year
Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011)

TOTAL QUALITY MANAGEMENT LAB
TT-594

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</table>

Contacts: 3P
Credits: 2

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

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

Syllabus
SEMESTER 6

Production & Operations Management
HU-611

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Introduction</td>
<td>System concept of production; Product life cycle; Types and characteristics of production system; Productivity; Process and product focused organization structures; Management decisions – strategic, tactical and operational.</td>
<td>3</td>
</tr>
<tr>
<td>2)</td>
<td>Forecasting</td>
<td>Patterns of a time series – trend, cyclical, seasonal and irregular; Forecasting techniques: moving average, simple exponential smoothing, linear regression; Forecasting a time series with trend and seasonal component.</td>
<td>4</td>
</tr>
<tr>
<td>3)</td>
<td>Materials Management and Inventory Control</td>
<td>Components of materials management; Inventory control: EOQ model, Economic lot size model, Inventory model with planned shortages, Quantity discounts for EOQ model; ABC analysis; Just-in-time inventory management.</td>
<td>4</td>
</tr>
<tr>
<td>4)</td>
<td>Materials Requirement Planning</td>
<td>MRP concept – bill of materials (BOM), master production schedule; MRP calculations.</td>
<td>3</td>
</tr>
<tr>
<td>5)</td>
<td>Machine Scheduling</td>
<td>Concept of Single machine scheduling – shortest processing time (SPT) rule to minimize mean flow time; Earliest due date (EDD) rule to minimize maximum lateness; Total tardiness minimizing model; Minimizing makespan with identical parallel machines; Johnson’s rule for 2 and 3 machines scheduling.</td>
<td>3</td>
</tr>
<tr>
<td>6)</td>
<td>Project Scheduling</td>
<td>Activity analysis; Network construction; critical path method (CPM); Crashing of project network.</td>
<td>3</td>
</tr>
<tr>
<td>7)</td>
<td>Quality Assurance</td>
<td>Meaning of Quality; Quality assurance system; choice of process and quality; Inspection and control of quality; Maintenance function &amp; quality; Process control charts: x-chart and R-chart, p-chart and c-chart; Acceptance sampling: Operating characteristic (O.C) curve, Single sampling plan, Double sampling plan, Acceptance sampling by variables; concept of Six Sigma.</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Lectures= 24

Suggested Readings: Text & References:
2. R. Panneerselvam, Production and Operations Management, PHI.
3. Russell & Taylor, Operations Management, PHI.
4. Adam and Ebert, Production and Operations Management, PHI.
5. Production & Operations Management by Starr, Cengage Learning India

25
# Syllabus for B.Tech (Textile Technology) up to Fourth Year

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

## Yarn Formation - III

**TT- 601**

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction to New spinning processes</td>
<td>a) Summary of new spinning processes, possibilities of use of various spinning processes; b) open-end spinning processes: the basic principle of yarn formation, operating principles of rotor, electrostatic, air vortex, and friction spinning; comparison; c) twist spinning: concept of rubbing (self twist) techniques-concept of Repco spinning, concept of wrap spinning; false twist process-principle of jet spinning, principle of PLYfil spinning; d) Twistless Spinning: adhesive process - concept of Twilo, Pavena and Bobtex process, comparison; e) Recent Trends in the development of New Spinning System; f) commercially popular systems.</td>
<td>8</td>
</tr>
<tr>
<td>2.</td>
<td>Rotor spinning:</td>
<td>a) Overview : tasks of the rotor spinning machine, Principle of operation, raw material requirements and preparation; b) opening unit: sliver infeed, opening by means of an opening roller, clothing of the opening roller, trash removal, fibre guide passage, (feed tube); c) yarn formation: fibre flow into the rotor, formation of a coherent fibre strand, back doubling, formation of the yarn, the false twist effect, wrapping fibres, the rotor, influence of the rotor, form and raw material, rotor groove, rotor diameter, combination of rotor diameter and rotor groove, rotor bearing, rotor revolutions, cleaning the rotor, yarn withdrawal and winding, direction of withdrawal, navel, formation of the navel, withdrawal tube. d) Package: requirements for the package, the winding process. Automation in rotor spinning, Technical data of modern rotor spinning machine. Yarn characteristics - structural difference between rotor spun and ring spun yarns, techno-economic aspects of rotor spinning.</td>
<td>12</td>
</tr>
<tr>
<td>3.</td>
<td>Friction spinning</td>
<td>Operating principles, classification, raw material, technological interrelationships, yarn structure and characteristics, techno-economic aspect, trends in the development. Features of DREF spinning system, Master Spinner with latest development.</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>Jet spinning</td>
<td>Operating principles of MJS, MTS and MVS spinner, classification, raw material, technological interrelationships, yarn structure and characteristics, techno-economics, development trends.</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>Speciality &amp; Textured yarns:</td>
<td>Overview of Fancy Yarns: Introduction and classification; different forms of fancy yarns (spiral; diamond; multifild; gimp; mock chenille; cloud; knop; loop; snarl; spiral; stripe; slab; eccentric; folded chenille etc.); basic principle of fancy yarn production systems using ring system (shubs, marl, loop, gimp, boucle, spiral, corkscrew, eccentric, button etc.), fancy doubling system (spiral, loop, knop, caterpillar, marl, gimp, snarl etc.), Hollow spindle process (Gimp, mock chenille, chenille, spiral etc), Rotor spinning system (shub and lopp yarn). Coloured yarns: solid shades; Gill mixing; re-combing. Melange yarns. Speciality coloured yarns: twist shades; single marl; marl; half marl; double marl; single mottle etc. Overview of Sewing threads: Introduction and Technology of Sewing threads manufacturing Process. Overview of Textured yarns: Introduction. Concept and classification of textured yarns. Different texturing methods and brief working principles. Principles of false twist texturing, air-jet texturing etc. and properties of false twist textured, air-jet textured yarns; Objectives and different methods of producing bulk yarns. Principles of manufacturing high bulk yarn. Testing and evaluation of textured yarns.</td>
<td>8</td>
</tr>
</tbody>
</table>

**Total Lectures= 40**

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**Text Books:**


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**Fabric Formation-III**

**GROUP-A**

(Modern Weaving)
### TT-602

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

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

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Automation in looms</td>
<td>a) Introduction, b) Automatic shuttle looms, c) essential features weft replenishment, d) weft feelers, types of feeler, principles of working of mechanical, electrical, mechatronic feelers etc.; e) shuttle changing looms (concept only) f) single shuttle automatic bobbin change looms- principle of operation, g) bobbin loaders- principle of operation; h) loom winders- principle of operation (Uni-fill); i) comparison among the three systems of bobbin changing) Automation in shuttleless looms.</td>
<td>3</td>
</tr>
</tbody>
</table>
| 2)         | Picking | i. Micro-shuttle/projectile picking: a) introduction, perspective of development (technological, engineering and environmental) b) principles of mono and multi projectile looms, c) picking mechanisms- concept of torsion bar picking system (Sulzer) d) mechanics of torsion bar e) phases of weft insertion, f) guide in the shed, g) picking and projectile flight through the warp, h) projectile checking and related activities. Introduction to selvedge formation, types of selvedges and methods of formation  

ii. Rapier picking: a) introduction, b) detailed classification of rapier looms with respect to insertion and withdrawal of rapier in the shed, c) the gripper heads- basic types, idea of commercially available heads, general principle of operation, principal elements, d) rapier drives- basic types, two commercially popular mechanisms, general principles of operation, e) phases of weft insertion on a divided rigid rapier tip transfer loom, f) flexible rapier and rapier guides in the warp shed.  

iii. Fluid jet picking: a) introduction, types, idea of fundamental difference with other systems of insertion, i) the range of application of fluid jet picking systems,  

A. air jet picking: essential requirements, principal elements of the air jet picking system and general description, principle of operation, character of air velocity during picking and weft motion, systems for maintaining the jet integrity, classification of air jet looms, phases of operations in air jet picking.  

B. water jet picking: essential requirements, principal elements of the water jet picking system and general description, principle of operation, phases of weft insertion, types of loom configurations, fundamental problems of water jet loom, prospect of water jet looms, comparison with air jet looms.  

iv. Direct weft picking: Introduction, general description, principle of operation, different techniques of insertion, fundamental problems, prospects. | 12 |
| 3)         | Continuous weft insertion | Introduction, types;  i) circular weaving: general description, principle of operation, range of application, prospects; ii) flat multiphase weaving: classification, principles of operation, commercially tested shedding mechanisms of weft way and warp way shed looms, fundamental problems, prospects. | 3 |
## Fabric Formation-III
### GROUP-B
#### (Knitting Technology and Nonwoven Technology)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
<th>Lectures</th>
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</thead>
<tbody>
<tr>
<td>1) B</td>
<td>Introduction to Knitting:</td>
<td>Process, History of knitting, comparison of weaving and knitting, warp and weft knitting, classification of weft knitting machines.</td>
</tr>
<tr>
<td>2)</td>
<td>Weft Knitting Elements:</td>
<td>Knitting needles, sinkers, cam systems, type of feeding systems, tensioning devices, stop motions.</td>
</tr>
<tr>
<td>3)</td>
<td>Weft Knitted Structures:</td>
<td>General terms in weft knitting; Machine pitch and gauge, Loop, Face loop and back (reverse) loop, Single-faced structures and double-faced structures, Single jersey and double jersey fabrics, Courses, wales and stitch density, Loop length and course length, Different situations in loop formation, Stitch notation, Held loop, Tucking and tuck loop, Floating and float Loop (or missing and miss loop), Drop or press-off stitch, Timing of knitting in circular double jersey machine. Properties and uses of basic weft knitted structures- Plain, Rib, Interlock and Purl along with their derivatives. Different types of stitches. Devices for patterning in circular knitting machine Electronic needle selection.</td>
</tr>
<tr>
<td>4)</td>
<td>Circular weft knitting machine and mechanism:</td>
<td>Knitting machine, Frame, Drive, Creel, Tensioner, Guides, Feed plate, Methods of yarn feeding, Principles of yarn feeding, Number of feeders and feeder density, Stop motions, Take-down mechanism, Fabric spreader or stretcher board, Open width cloth winding, Sinkless knitting machine, Speed factor,</td>
</tr>
<tr>
<td>5)</td>
<td>Flat-bed Knitting Machines:</td>
<td>Process of loop formation, cam track, features, and structures produced.</td>
</tr>
<tr>
<td>6)</td>
<td>Science of Knitting:</td>
<td>Objectives of studying knitting science, Fields of study, Importance of knitted loop length and loop shape, Loop length, Robbing back, spirality, Parameters of a knitted fabric, Constants of a knitted fabric, Some useful relations, Relation between properties and geometry of a loop, Geometry of weft knitted loop, Tightness factor of knitted fabrics, Relaxation of knitted fabrics, Prediction of finished weight and shrinkage of cotton knits.</td>
</tr>
<tr>
<td>7)</td>
<td>Warp Knitting:</td>
<td>Machines and mechanism Principles of loop formation in warp knitting, Needle bar movement, Guide bar movements, Lapping diagram, Tricot machine knitting cycle with bearded needle, Raschel machine knitting cycle with latch needle, Fabric take-down, Warp let-off, Patterning mechanisms, Displacement of various knitting elements during loop formation; Types of stitches and structures; idea of Double needle bar warp knitting machines.</td>
</tr>
<tr>
<td>8)</td>
<td>Knitting Calculations</td>
<td>Properties, parameters and production calculations</td>
</tr>
</tbody>
</table>

**Total Lectures= 45**

### Text Books:
1. Principles of Weaving by R. Marks and A.T.C. Robinson,
2. Weaving Mechanisms vol. I & II- N.N. Banerjee,
3. Weaving – conversion of yarn to fabric by Lord and Mohammed,
5. Shuttleless Looms, Talavasek and Svaty,
6. Modern Preparation and Weaving Machinery by A. Ormerod,
7. Shuttleless Looms by J.J. Vincent,
8. Handbook of Weaving- S.Adamur. CRC Publisher
9. Textiles- Motivate Series by A. Wynnes,
10. Shuttleless Weaving-Duxbury & Wray
12. Sadhan Chandra Ray, Fundamentals and advances in knitting technology, (Woodhead Publishing India)
Textile Testing

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

Total Lectures= 39

Text Books:
1. Principles of Textile Testing by J. E. Booth,
2. Textile Testing by Skinkle,
3. Physical Properties of Textile Fibres by W.E. Morton and J.W.S. Hearle,
4. Testing and Quality Management by V.K. Kothari,
5. Physical testing of textiles, B. P. Saville, Textile Institute, Woodhead Publishing, England,

TT 604 : Textile Elective - I
Theory of Textile Structure

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
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</thead>
<tbody>
<tr>
<td>1)</td>
<td>Textile Testing by Skinkle,</td>
<td></td>
<td></td>
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<tr>
<td>2)</td>
<td>Physical Properties of Textile Fibres by W.E. Morton and J.W.S. Hearle,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3)</td>
<td>Testing and Quality Management by V.K. Kothari,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4)</td>
<td>Physical testing of textiles, B. P. Saville, Textile Institute, Woodhead Publishing, England,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5)</td>
<td>Textile Testing: Physical, Chemical, and Microscopical, Skinkle, John H.</td>
<td></td>
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<tr>
<td>6)</td>
<td>Fabric testing, Edited by Jinlian HU, Woodhead Publishing.</td>
<td></td>
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</tr>
</tbody>
</table>

Total Lectures= 39

Text Books:
1. Principles of Textile Testing by J. E. Booth,
2. Textile Testing by Skinkle,
3. Physical Properties of Textile Fibres by W.E. Morton and J.W.S. Hearle,
4. Testing and Quality Management by V.K. Kothari,
5. Physical testing of textiles, B. P. Saville, Textile Institute, Woodhead Publishing, England,
### Syllabus for B.Tech (Textile Technology) up to Fourth Year

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

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

**Total Lectures**: 37

**Text Books**:

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### Theory of Elasticity for Textiles

**Textile Elective-I**

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>Introduction and Historic Overview</td>
<td>1</td>
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<tr>
<td>4</td>
<td>Strain:</td>
<td>a. Displacements and Strains, b. Strain at a Point, c. Principal Strains and Principal Coordinates, d. Local Rotation, e. Hydrostatic and Deviatoric Strain Tensors, f. Compatibility Equations,</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Three-Dimensional Problems:</td>
<td>a. Bar Stretched by its Own Weight, b. Torson of a Circular Shaft, c. Bending of a Prismatic Bar</td>
<td>4</td>
</tr>
</tbody>
</table>

**Total Lectures**: 37
Syllabus for B.Tech(Textile Technology) up to Fourth Year
Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011)

8) Two Dimensional Elasticity: a. Plane Strain, b. Plane Stress, c. Airy’s Stress Function 2
11) Torsion: a. Torsion of a uniform circular shaft, b. Torsion of non circular cylindrical Bars, c. Torsion of Hollow Bars, d. Membrane Analogy 3

Total Lectures= 42

Text Books:

Free Elective-II

COLOUR SCIENCE

TT-605A

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<tr>
<th>L</th>
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<th>Credits</th>
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<td>3</td>
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Serial No. | Units | Description | Lecture hours |
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<tr>
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<th></th>
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</thead>
<tbody>
<tr>
<td>1)</td>
<td>Basic concept</td>
<td>Concept of colour and brief idea about the relation between colour and chemical constitution</td>
<td>3</td>
</tr>
<tr>
<td>2)</td>
<td>Visual measures</td>
<td>Visual description of colour, hue, chroma, value colour order systems – Munsell system</td>
<td>3</td>
</tr>
<tr>
<td>3)</td>
<td>Transmission &amp; scattering</td>
<td>Interaction of light with object – reflection, transmission and scattering, factors governing transmission, Beer’s law, Lambert’s law, scattering of light, Kubelka-Munk function</td>
<td>6</td>
</tr>
<tr>
<td>4)</td>
<td>Instruments</td>
<td>Concept and definition of source, illuminant, concept of colour temperature colour measuring instruments – colorimeters, spectrophotometers and their components.</td>
<td>6</td>
</tr>
<tr>
<td>5)</td>
<td>Instrumental measures</td>
<td>Instrumental measures of colour, standard observers functions, tristimulus value, chromaticity coordinates and chromaticity diagram, uniform colour scales, colour difference equations. Instrumental, pass-fail criteria. Measurement whiteness, evaluation of optical whitening</td>
<td>8</td>
</tr>
<tr>
<td>6)</td>
<td>Matching</td>
<td>Brief idea of computer colour matching and formulation</td>
<td>6</td>
</tr>
<tr>
<td>7)</td>
<td>Appearance</td>
<td>Metamerism, metameric indices, Brief idea about chromatic adaptation.</td>
<td>4</td>
</tr>
</tbody>
</table>

Total 36

Text Books:
1. R. McDonald Colour Physics for Industry, SDC publication
INTRODUCTION TO JAVA PROGRAMMING
TT-605B

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction</td>
<td>Introduction to Programming Languages and algorithms, The Evolution of Java, Object-Oriented Programming Concepts and Java, Differences between C++ and Java, The Primary Characteristics of Java, The Architecture, Programming with Java.</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>JAVA Fundamentals</td>
<td>Tokens, Identifiers, Keywords, Literals, Separators, Comments and Whitespaces, Operators; Expressions; Using Data Types, Primitive Data Types, Reference Data Types; Declarations; Control Flow, Blocks and Statements, Conditional Statements, Looping Statements</td>
<td>7</td>
</tr>
<tr>
<td>3.</td>
<td>JAVA Classes, Packages and Interfaces</td>
<td>Introduction, Classes-Defining simple class, Class Variables, Class Methods, Return Types, Method Modifiers, Declaring Method Security and Accessibility, Overloading Methods; Working with Objects, Creating Objects, Destroying Objects, Constructor Packages, Declaring a Package, Accessing Other Packages, Package-Naming Conventions, The CLASSPATH Environment Variable, Overview of the Standard Packages; Inheritance, Sub-classing, Method Overriding; Interfaces, Declaring an Interface, Implementing Interfaces, Modifiers, Using an Interface</td>
<td>10</td>
</tr>
<tr>
<td>4.</td>
<td>JAVA Streams</td>
<td>Data Flow with Java Streams, Input Streams, Output Streams,</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Exception Handling in JAVA</td>
<td>Introduction, Exception Methods, java.lang Exceptions,</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>JAVA Threads</td>
<td>Introduction; Creating Threads; The Life Cycle of a Thread; Thread Methods; Using Threads, Declaring Threads, Creating and Starting the Thread Object new and the Instantiation of Threads, Stopping the Thread, Destroying a Thread, Naming a Thread; Synchronization of Threads, Producer/Consumer Example, Locking an Object, Synchronized Blocks, Using the notify All and wait Methods, Deadlocks</td>
<td>6</td>
</tr>
<tr>
<td>8.</td>
<td>JAVA AWT</td>
<td>Introduction, Control Classes-component, layout and menu classes,</td>
<td>1</td>
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<td></td>
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<td>Total Lectures= 39</td>
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</tr>
</tbody>
</table>

Text Books:
3. Thinking in Java 3rd ed- Bruce Eckel, Publisher: Prentice Hall
5. Sams Teach Yourself Java 1.1 in 24 Hours: Rogers Cadenhead, Laura Lernay, and Charles Perkins
6. LEARNING JAVA by Rich Raposa, Wiley Publications
7. Who's Afraid of Java?, by Steve Heller. Publisher: AP Professional
8. Java: How to Program with an Introduction to Visual Java+, by Harvey M. Deitel, Paul J. Deitel. Publisher: Prentice Hall

INTRODUCTION TO MICROPROCESSORS
TT-605C
Syllabus for B.Tech(Textile Technology) up to Fourth Year
Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011

<table>
<thead>
<tr>
<th>Serial No.</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction to Digital Computers</td>
<td>Computer &amp; Digital Computers ; Architecture of Digital Computers ;Elements of a General Digital Computer ; Input Devices ; Output Devices ; Microprocessors ; Semiconductor Memories ; Introduction to the Programming Assembly Language ; Instructions ; Programs ; Programming Systems ; Instruction Decoder Unit ; Machine Cycle Encoder Unit ; Introduction to Addressing Modes ; Addressing ; Addressing Modes ; Higher Level Language</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Buses and CPU Timings: * Introduction to the Buses ; Types of Buses ; Address Bus ; Data Bus ;Control Bus ;Supporting Elements for Buses ; Tri-state Logic ;Buffer ; Machine Cycles Assembly Language ; Timing Diagrams</td>
<td>2</td>
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<td>3.</td>
<td>Microprocessor Development Systems: Introduction to the Microprocessor; General Architecture of Microprocessors; Elements of Microprocessors ; Registers; ALU; Control Unit; Evolution of Microprocessors; First Generation Microprocessors ; Second Generation Microprocessors; Third Generation Microprocessors; Fourth Generation Microprocessors ; Data Transfer, Data Transfer Schemes ; Programmed Data Transfer Scheme ;DMA Data Transfer ; Advancement Schemes for Microprocessors.</td>
<td>6</td>
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<tr>
<td>4.</td>
<td>8-bit Microprocessors: Introduction to 8-bit Microprocessors ; Characteristics of a General Microprocessor; Specifications of an 8-bit Microprocessors ;Pin configuration of 8085 Microprocessor; Architecture of 8085 Microprocessor ; Register Organization ;Arithmetic and Logical Unit (ALU) ; Interrupt Controller, Serial Communication Controller ; Timing and Control Unit ; Instruction Decoder and Machine Cycle Encoder Unit, Address/Data Buffer, Incrementer/Decrementer Latch</td>
<td>6</td>
<td></td>
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<tr>
<td>5.</td>
<td>Instructions of 8085 Microprocessors: Introduction to the Instructions ; Instruction-set ; Addressing Modes ; Register ; Direct ;Immediate; Implicit ; Register Indirect ; Types of Instructions ;Byte ; Classification of Instructions ; Data Transfer Group ; Arithmetic Group ; Logical Group</td>
<td>3</td>
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<tr>
<td>6.</td>
<td>16-bit Microprocessors: Introduction to 16-bit Microprocessors ; Specifications of 16-bit Microprocessors ; Pin Configuration of 8086 Microprocessor; Architecture of 8086 Microprocessor, Execution Unit ,Bus Interface Unit , Memory Segmentation , Physical Address Generation , Operating Modes , Interrupts of 8086 Microprocessor.</td>
<td>3</td>
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<tr>
<td>7.</td>
<td>Instructions of 8086 Microprocessor: Introduction to the Instructions ;Instruction-set ;Addressing Modes ; Register ;Direct ;Immediate; Implicit ;Register Indirect ;Relative ;Based ,Indexed ;Base-indexed ,Relative ,Indexed ,Base-indexed-relative ;String ;Scalar ,Classification of Instructions , Data Transfer Group ; Arithmetic Group ; Logical Group</td>
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<tr>
<td>8.</td>
<td>Fundamentals of Programming: Assembly Language Programming ;Steps for Assembly Language Programming ;Defining the Problem ; Algorithms ;Flow Charts ;Programs ;Result ;Example of a Program ;Machine Coding ;</td>
<td>3</td>
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<td>9.</td>
<td>Assembler Level Programming: Assembler Level Programming ; Memory Space Allocation ;Assembler Directives</td>
<td>2</td>
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<tr>
<td>10.</td>
<td>Peripheral Interfacing: Introduction to the Peripheral Devices ;Types of I/O Devices ;Memory Mapped I/O ;I/O Mapped I/O ;Interfacing Hardware ;Hardware Interfacing ;Software Interfacing ; Interfacing Devices ;Programmable Timer/Counter (8253/8254),Function ;Pin Configuration ;Architecture ;Control Word ;Functions of Control Word ; Programmable Peripheral Interface (8255) ;Function ;Pin Configuration ;Architecture ;Control Words Functions of Control Word ;Universal Synchronous Asynchronous Receiver and Transmitter (USART)(8251) ;Function ;Pin Configuration ;Architecture ;Control Words Functions of Control Word ;Programmable Interrupt Controller (8259) ;Function ;Pin Configuration ;Architecture ;Control Words Functions of Control Word ;Programmable DMA Controller (8257) ;Function ;Pin Configuration ;Architecture ;Control Word ;Functions of Control Word ;RS 232-C ;Function ;Pin Configuration ;Parallel Printer Interface ;Function ;Pin configuration ;USB ;Function ;Pin Configuration ;</td>
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<td>11.</td>
<td>Data Conversions: Configuration ;Assembler Linker ;Data Conversions ;Data Conversion using Keyboard ;Data Conversion using Video Display ;Introduction to the 8087 ;Data Formats of 8087 ;</td>
<td>2</td>
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</table>

Total Lectures= 41

Text Books:
TT 691 : YARN AND FABRIC FORMATION LAB - III

<table>
<thead>
<tr>
<th>List of Experiments</th>
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1. Yarn Formation Module: Open end Spinning, Friction, Jet and Other advanced Spinning
   1. General study of O.E. rotor spinning machine (flow of material, different components of machines and their function).
   2. Determination of speeds of various machine components of rotor spinning frame
   3. Estimation of twist loss as well as minimum twist required to spin yarn continuously in a rotor spinning machine
   5. General Study of Open-End Friction Spinning Machine (Dref – II, etc.).
   6. General Study of False-twist Friction Spinning Machine (Dref – III, etc.)
   7. General Study of Air-jet Spinning Machine
   8. General Study of Compact/Solo/Vortex spinning Machines

   1. Study of weft replenishment mechanism and its timing with respect to crank shaft in automatic loom.
   2. Study of driving system of a Rapier loom
   3. Study of weft insertion and transfer in Rapier loom
   4. Study of weft selection mechanism in a Rapier loom
   5. Study of torsion bar mechanism in projectile loom.
   6. Study of Weft insertion mechanism and Crank beat-up in projectile loom.
   7. Study of selvedge formation mechanism on a shuttleless loom
   9. Study of Flat bed and Circular Knitting machine.
   10. Study of Single Jersey circular knitting machine

TT 692 TEXTILE TESTING LAB - III

<table>
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<th>List of Experiments</th>
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</table>

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

34
17. Determination of air permeability of fabric
18. Estimation of handle property of fabric by FAST method
19. Analysis of design of plain, simple twill and sateen woven fabric;

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

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

TT 693 B Theory of Elasticity of Textiles Lab

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

TT-694 : FREE ELECTIVE-II LAB
TT-694A : Colour Science Lab

1) Assessment of Colour defect tests of observers using Ishihara Plate test
2) Assessment of Colour defect tests of observers using Munsell-Farnsworth 100 hue test
3) Visual assessment of colour – hue, lightness and chroma using Munsell or Scotdic charts
4) Measurement of colour by spectrophotometer in both transmission and reflectance mode
5) Quality control of colour using colour difference equations
6) Brief idea about metamerism
7) Brief idea about computer colour matching.
TT694B: Java Programming Lab

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

<table>
<thead>
<tr>
<th>Java Programming Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TT- 694 B</strong></td>
</tr>
<tr>
<td><strong>L</strong></td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

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

TT694C : Microprocessor Lab

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

<table>
<thead>
<tr>
<th>Microprocessor Lab</th>
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</thead>
<tbody>
<tr>
<td><strong>TT- 694 C</strong></td>
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<tr>
<td><strong>L</strong></td>
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<tr>
<td>0</td>
</tr>
</tbody>
</table>

1. Introduction to the architecture of 8085 microprocessor kit
2. Program to move a data block without overlap.
3. Program to execute ascending /descending order.
4. Program to perform addition of two 8 bit numbers using 8085 instruction set.
5. Program using 8085 for finding square root of a number.
6. Program to add BCD numbers using 8085 instruction set
7. Program to subtract two 16 bit numbers
8. Program to implement multiplication by successive addition method.
9. Program to implement 16 bit by 8-bit division.
10. Program to find the smallest of N numbers.
11. Program to implement binary to BCD conversion.
12. Program to implement square wave generation using DAC.
13. Program to display ASCII equivalent of the key pressed.
14. Program to interface the ADC with 8255.
15. Study of the architecture of 8086 microprocessor kit.

### Semester 7

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

Total Lectures: 40

### Text Books:

### Design and Structure of Fabric

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units Description</th>
<th>Lectures in hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Elements of woven design: Idea of cloth formation on loom; classification of fabrics; idea of fabric structure; methods of fabric representation; repeat of weave; drafts; requirements of drawing in; weaving plan; lifting plan; relationship between weave; draft and lifting plan; construction of weaving plan from a given weave; construction of weave from a given draft and lifting plan; construction of draft from a given lifting plan and weave.</td>
<td>2</td>
</tr>
<tr>
<td>2)</td>
<td>Basic weaves: General characteristics; Method of construction, features and uses of plain weave and its derivatives, twill weave and its derivatives, Satin and sateen weaves and their derivatives, simple colour and weave effects; idea of compound colour and weave effects</td>
<td>10</td>
</tr>
</tbody>
</table>

Total Lectures: 40
Syllabus for B.Tech (Textile Technology) up to Fourth Year
Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011

3) Special rib, Crepe and cord structure:
   Construction of cork screw weaves; features of crepe weave method of preparation of crepe weave and derivatives; features of Bedford cord, construction of bed ford cords; idea of different types 6

4) Backed cloth:
   Warp backed cloth; weft backed cloth; backed cloth with wadding threads; warp and weft wadded cloths; reversible backed cloths. 3

5) Figuring with extra threads:
   Principles of figuring with extra materials; extra warp figuring-concept of simple techniques; extra weft figuring-concepts of simple techniques; 2

6) Wefts and piques:
   Ordinary, wadded, fast back wefts; piques; idea of loose back, half fast back and fast back fabrics. 2

7) Double and multilayer cloths:
   Classifications of double cloth construction; concept of self stitched; stitched by thread interchange; stitch by cloth interchange; centre stitched; alternate single-ply and double ply construction; idea of wadded double cloths; idea of treble cloth and multiply belting structure. 4

8) Gauze and leno structure:
   Principles of leno structures; methods of producing leno and idea of simple constructions ; idea of Gauge with reference to Madras Muslin structures. 3

9) Pile structures:
   weft-pile introduction; concept of simple constructions; Terry pile introduction; formation of pile; simple terry weaves; idea of a terry pile forming mechanism ; velveteen; all over or plain west pluses; corded and figured felts; velvets; 5

10) Calculations for fabric feeding:
    Standard procedure of fabric calculation; fabric characteristics; dimension of fabric; density of warp and threads in grey fabrics; warp and weft characteristics; take up and crimp of yarn in fabrics; calculation of number of warp and weft threads in fabrics; selecting the selvedges; type of weave and weaving plan; calculation of reed; calculation of harness and healds; calculation of yarn mass per unit area of fabric. 5

Total Lectures= 42

Text Books:

Textile Elective – II (TT-703)

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units Description</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Wool fibre and its properties</td>
<td>Morphological structure; components of fibre; fibre diameter, fibre contour, crimp, length, luster, specific gravity and refractive index; moisture relations, wetability; fibre mechanical properties; gross composition of raw wool, molecular structures; hauteur, barbe, CVH, CVB, romaine; principles of measuring different important fibre physical characteristics.</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2) Manufacturing wastes</td>
<td>Noils, soft wastes, hard wastes, finishing wastes, recovered wool, method of recovery, rag picking and gauging.</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Wool blends with manmade fibres</td>
<td>Purpose of blending, effect of blend composition on performance of fabrics.</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Woolen or carded Yarns</td>
<td>Process flow chart, preliminary processes, blending or mixing, oiling of the stock, woolen carding, woolen spinning, yarn number and wool grade.</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Worsted top making and spinning of worsted yarn</td>
<td>Process flow chart, worsted carding, backing, oiling, gilling or preparing, worsted combing, tow-to-top conversion systems, worsted drawing, worsted yarn spinning, norms and modern developments.</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) Manufacture of Woven Fabrics</td>
<td>Woven Fabrics produced by projectile and raper weaving machines, knitted and nonwoven woolen fabrics, use of FAST in worsted garment manufacturing.</td>
<td>5</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

38
### Syllabus for B.Tech (Textile Technology) up to Fourth Year

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

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7)</td>
<td><strong>Chemical Processing</strong> Objects and different methods of carbonizing of wool batch and continuous methods of scouring fibre, yarn and fabric; peroxide and per-acetic acid bleach of wool; production of anti-shrink wool, basic principle of treatment and parameters; dyeing, printing and finishing, testing and quality control of woolen processing.</td>
</tr>
<tr>
<td>8)</td>
<td><strong>Wool Dyeing</strong> Chemistry of dyeing wool and blend with acidic, mordant, metal-complex and reactive dyes, Top and tip dyeing of wool.</td>
</tr>
<tr>
<td>9)</td>
<td><strong>Wool Finishing:</strong> Scooping, damping, decatissing and paper pressing of wool, Testing and Quality Control.</td>
</tr>
</tbody>
</table>

**Total Lectures:** 35

**Text Books:**

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### Apparel Technology

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td><strong>INTRODUCTION</strong> Factors involved in the study of clothing, general functional descriptions of clothing.</td>
</tr>
<tr>
<td>2)</td>
<td><strong>GARMENT INDUSTRY</strong> General background, origin, location, and growth, structure of apparel industry in India.</td>
</tr>
<tr>
<td>3)</td>
<td><strong>STUDY IN ANTHROPOLOGY</strong> Basic understanding of 3-dimensional body form, fit and silhouettes. Study about anthropology in relation to size charts, ranges, and grading. Understanding of fit and balance of a garment. Draft basic blocks from measurements of body and dress form.</td>
</tr>
<tr>
<td>4)</td>
<td><strong>PROPERTIES FOR COMFORT AND FIT</strong> General functional description of clothing, Heat and moisture relations in clothing, physical properties of clothing and clothing materials in relation to comfort, thermal transmission or resistance, water and air-permeability or resistance, radiation exchange with clothing materials, influence of environmental conditions on the protective performance of garments, thermal protection of clothing, stiffness and bending properties, clothing fit and fabric shear, fabric friction, static electricity; aesthetic aspects of clothing, e.g., drape and wrinkle recovery, abrasion resistance, pilling resistance of fabrics, Tailor ability and sewability, water repellency and shrinkage.</td>
</tr>
<tr>
<td>5)</td>
<td><strong>FIBRES AND THEIR INFLUENCES</strong> Introduction, special for unusual stress environments, trends in fibre usage, influence of fibre yarn characteristic and fabric construction parameters on clothing comfort.</td>
</tr>
<tr>
<td>6)</td>
<td><strong>STUDY OF CLOTHING</strong> Current trends and new developments, new fibres, materials and finishes, new techniques, new concepts, garment finishing.</td>
</tr>
<tr>
<td>7)</td>
<td><strong>GARMENT MANUFACTURE</strong> a) Introduction: Garment manufacture terms and definitions; b) Grading- system of grading, grading of bodice, sleeve, collar etc. and size charts, computer aided pattern making and grading; c) Garment construction- understanding of basic sewing machinery, cut, sew, construct and finish of high quality garments; d) Pattern making- Terminologies lay planning &amp; marker planning, Spreading technology and quality control in pattern making, Application of computer in pattern construction and lay planning’s e) Cutting Process: Marking and cutting Process, Reprographics, drilling and notching .Methods of cutting and automatic cutting f) Sewing and stitching: Stitch classification and seam types, Basic principles and machinery for a variety of sewing operations e.g. chain/lock/blind/multi-needles/over-lock linking etc stitching machines, g) Trimming Operations: Trims, Operations, thread cutting, labeling, QC- check, etc. h) Finishing operations: Garment finishing and packing processes, i) Production Systems: Conventional and advanced garment production systems, Automation and CIM in garment manufacturing.</td>
</tr>
</tbody>
</table>

**Total Lectures:** 40

**Text Books:**
1. Principles of Textile Testing by J E Booth.,
# Syllabus for B.Tech(Textile Technology) up to Fourth Year

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

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

## Advanced Chemical Processing of Textiles

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bio-processing of textiles</td>
<td>Application of enzyme in textile preparatory processes, bio-scouring, bio-polishing etc.</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Modern development</td>
<td>Modern development in textile preparatory processes</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Surfactant</td>
<td>Surfactant, role in textile processing and classification according to their chemical nature, process of micelle, critical micelle concentration, HLB value, cloud point, action, and mechanism of wetting, detergency and emulsification.</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Textile washing and drying</td>
<td>Washing machines, equipment of water removal- mechanical, thermal and radiation. Relative merits and demerits of conventional and radiation dyeing.</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Mass colouration</td>
<td>Objective, principle, method, for different man-made fibre, advantages and disadvantages</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Colouration of blends</td>
<td>Dyeing of polyester/cellulose, polyester/wool, wool/polyamide, wool/acrylic blends by batchwise, semi-continuous and continuous methods</td>
<td>2</td>
<td>0</td>
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<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Garment dyeing</td>
<td>Different types of Garment-dyeing machinery, their working principles, garment dyeing methods – direct, reactive and pigment.</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Modern development in printing</td>
<td>Foam printing, Ink-jet printing etc.</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Low Add-on technique</td>
<td>Different low add-on techniques, foam application, objective, range of application, principle, ingredients of a foam system, half life of foam, blow ratio, foam generator, foam applicator, merits and demerits.</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Plasma finishing</td>
<td>Brief introduction to plasma, different types of plasma, i.e. vacuum plasma, cold plasma, and atmospheric plasma and their characteristic, advantages and disadvantages, textile application.</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>Nano finishing</td>
<td>Brief introduction, characteristic of nano particles, different approaches of nano particle generation, textile application.</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
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<td>12</td>
<td>Total</td>
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<td>35</td>
<td>0</td>
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</tr>
</tbody>
</table>

**Text Books:**

## Application of CAD/CAM in Textiles

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to</td>
<td>Introduction to computer – Computer Systems: computer Software-operating-Programming</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

40
# Syllabus for B.Tech (Textile Technology) up to Fourth Year

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

## Computer Systems

Languages-general Software Features and trends. Data base management system: Data processing. Database Management system fundamentals - database design concepts. Introduction to Computer Algorithms and program logics.

## Computerised Knitting & Weaving


Electronic Jacquards :- Electronic Jacquard Working principle - Constructional variants - Various electronic jacquard systems - Selection system - Pattern data - Transfer and management


Characteristics of Computerized Knitting Machines.

## Computerised Embroidery Machines & Printing Machines


## Computerised Production Planning and process control

Computer aided production planning in Textile and Garment Manufacturing: Application of Computer for purchase, inventory control and sales, Computerized quality control and production control. Introduction to finite scheduling concept and fast react software. Creating product and order planning, concept of ERP, CIM, CAPP etc. updating. Elimination of late deliveries - General set up, Application of DBMS in Apparel Merchandising process. control mechanisms - critical path and time tables.

## Computerised Quality Control

Introduction to image processing and imaging system - Fabric defect identification using image processing - Artificial neural networks – Data acquisition and fault classification. Yarn Scanner - Yarn Fault Identification

<table>
<thead>
<tr>
<th>Reference</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows office XP/MSOFFICE/MSACCESS/</td>
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</tbody>
</table>

## Textile Elective III (TT704)

### Technical Textiles

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hour</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>TT-704A</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
10) **Introduction**
Definition, classification, products, market overview and growth projections of technical textiles. Fibres used in technical textiles, yarns and fabric structures in technical textiles and their relevant properties. Fibres used for technical textile - their characteristics and application areas. Technical Textile wheel.

11) **Agro Textile and Geotextiles**
Textiles for crop covers, bird netting, shades, soil mats and silos. Types and application of geosynthetics. Functions and application areas of geotextiles. Fibres and fabric selection criteria for geotextile applications. Important characteristics of geotextiles and their evaluation.

12) **Medical Textiles**
Textiles in various medical applications. Application oriented requirement of typical medical textiles. Materials used and Classification of Medical Textile: Textiles for implantations; Non-implantations textiles; textiles for extra-corporeal devices; Healthcare and hygiene textiles; Speciality fibre for medical application.

13) **Textile composites**
Type of composites. Textile reinforcement requirement in different types of composites. Properties and uses of rigid composites and flexible composite. Manufacturing technique of producing rigid and flexible composite

14) **Protective clothing**
Clothing requirements for thermal protection, ballistic protection, UV-protection, protection from electromagnetic radiation and static hazards, protection against micro-organisms, chemicals and pesticides. Design principles and evaluation of protective clothing. High visibility and electromagnetic shielding fabrics.

15) **Filter Fabric**

16) **Automotive Textiles**
Application of textiles in automobiles. Requirement and design for pneumatic tyres, airbags and belts. Methods of production and properties of textiles used in these applications.

17) **Sports Textiles**

18) **Textiles in miscellaneous industrial applications**
Introduction, paper makers felt, bearing and sealing materials, sound insulation, battery separators, electrical insulation, automotive application, structural applications Textiles in electronics; Banners and flags; textiles re-inforced products; Transports bags and sheets; Fabrics to control oil spills; Canvas cover and tarpsulins; Rope and nets etc...

Total Lectures= 35

Text Books:
3. John,N.W.M “Geotextile”Blackie publication,Glasgow,1987
4. Gulrajani, North India Textile Institute, New York 1992
5. Industrial Textiles – Horrocks

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

7. Wearable technology
   Wearable motherboard: Manufacture, Properties and Applications; Wearable technology for
   snow clothing
   5

8. Bio-processing for smart
textiles and clothing
   Wool, Cotton and synthetic fibres
   4

9. Tailor-made intelligent
   polymers for biomedical
   applications
   Fundamental aspects of shape memory materials, Concept of biodegradable shape memory
   polymers, degradable thermoplastic elastomers having shape memory properties, degradable
   polymer networks having shape memory properties
   6

10. Textile scaffolds in tissue
    engineering
    Ideal scaffold system, Scaffold materials, textile scaffolds - Micro structural aspects, Mechanical
    aspects
    4

Total Lectures= 36

Text Books:

Textile Elective III

TT-704C Production of Manmade Fibre Production Technology 3 credits (0-0-3)

Class allotted

Polymerization of nylon-6, nylon-66, poly(ethylene terephthalate), and polyacrylonitrile. Batch versus continuous
Polymerisation. Polymer rheology, Shear flow through a capillary, elongational flow in a spinning line. Melt instabilities.
Polymerization lines. Spinning process Stress induced crystallization in high speed melt spinning. Characteristic features
of PET, polyamide and polypropylene spinning. Spin finish and its components. Wet and dry spinning processes. Effect
of parameters on fibre breakage and fibre structure. Importance of dry jet wet spinning of PAN. Introduction to drawing
and heat setting in thermoplastic fibres.
22

Principles of texturing and modern classification; False twist texturing process- mechanisms and machinery, optimization
of texturing parameters, structure-property correlation of textured yarns; Draw-texturing- the need and fundamental
approaches; optimization of quality parameters.
8

Air interlacement - Principle and mechanism, Air jet texturing - Principle, mechanisms, development of jets and
machinery, process optimization and characterization
6

Total Hours 36

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

Free Elective – III (TT-705)

Introduction to Soft computing

<table>
<thead>
<tr>
<th>TT-705A</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
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<td></td>
</tr>
</tbody>
</table>

43
Syllabus for B.Tech(Textile Technology) up to Fourth Year
Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011

1) Introduction

2) Introduction to Fuzzy Logic.
Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Membership functions, interference in fuzzy logic, Fuzzy implications and Fuzzy algorithms, Fuzzifications & Defuzzifications, fuzzy if-then rules and rule base , Fuzzy Controller, Application of Fuzzy logic in Textile Research. 7

3) Fundamentals of Neural Network
Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetero-associative memory. 8

4) Neural Network (Back Propagation network)
Architecture: preceptor model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient back propagation algorithm, factors affecting back propagation training, applications. 6

5) Applications of Artificial Neural network
Introduction, applications in prediction, pattern recognition, image processing, classification, fault diagnosis, machine control etc 4

6) NEURO FUZZY MODELING

7) Genetic algorithm
Basic concepts, working principle, procedures of GA, Flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications. 4

Total Lectures= 40

Text Books:
1. Introduction to Fuzzy Logic using MATLAB by S. N. Sivanandam, S. Sumathi and S. N. Deepa, Springer
2. Fuzzy Logic: Intelligence, Control, and Information by John Yen and Reza Langari
5. N.P.Padhy,“Artificial Intelligence and Intelligent Systems” Oxford University Press.

Reference Books:
1. Siman Haykin,“Neural Networks”Prentice Hall of India
2. Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.

Image Processing Technology

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Chapters/Units Description</th>
<th>Lectures in hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Image restoration</td>
<td>Model of Image Degradation/restoration process – Noise models – Inverse filtering –Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition.</td>
</tr>
</tbody>
</table>
Syllabus for B.Tech(Textile Technology) up to Fourth Year
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| 6 | Morphological Image Processing | Dilation and Erosion , Opening and Closing , Some basic Morphological algorithms , Extensions to gray level images | 5 |

Total Lectures= 40

TEXT BOOKS

REFERENCES

HU 791 Group discussion

TT 791 Textile Chemical Processing Practical - III
1. Direct style printing of cotton fabric using
   a) Reactive colour
   b) Pigment colour
   c) solubilised vat
   d) Vat colour
2. Discharge style printing of cotton fabric using reactive colour
3. Batik printing (resist style of printing)
4. Application of functional finishes on cotton using
   a) Crease recovery finish
   b) Flame retardant finish
   c) Water repellant finish
5. Estimation of fastness properties of dyed fabric
   a) Fastness to Washing
   b) Fastness to Light
   c) Fastness to Rubbing

Textile Elective: TT-792

TT 792A wool technology Lab
1. Scouring of wool in the form of raw wool /woolen fabrics
2. Carbonization of wool in the form of raw wool / woolen fabrics
3. Study of Woolen/Worsted Card:
   a. Study of different zones – Feed zone, carding zone, doffing zone
   b. Draft calculation- Mechanical and actual draft
   c. Waste calculation
   d. Production calculation
4. Study of draw frame with grill pins:
   a. Study of drafting system – pin drive, pin density, speed. depth of penetration etc.
   b. Draft calculation
   c. Production calculation
5. Study of rubbing roving frame:
   a. Study of drafting system, calculation of draft
   b. Study of rubbing mechanism
   c. Production calculation
6. Study of wooden/worsted ring frame:
   a. Study of drafting system- calculation of draft

45
b. Study of twisting mechanism - calculation of twist
   c. Production calculation

TT 792 B Apparel Technology Lab
1. Prepare basic patterns and do variations
2. Grade the basic patterns
3. Construct, finish and press the same using the drafted patterns
   A. Bodice
   B. Cuffs
   C. Sleeves.
   D. Yokes
   E. Pockets
   F. Collars
   G. Plackets
   H. Skirts
   I. Knitwear (Brief and Vest or Ladies T-Shirt)
   J. Salwar-Kameez
4. Planning of Marker. Practical assignments to be given on Marker Planning and Marker Efficiency Calculation

TT 792 C Advanced Chemical Processing of Textile Lab
2. Bio-polishing of cotton fabric
3. Demonstration of various modern dyeing machines
4. Dyeing of cotton fabric with Pigment colour
5. a) Dyeing of polyester/cellulose,
   b) Dyeing of polyester/wool,
   c) Dyeing of wool/polyamide,
   d) Dyeing of wool/acrylic blends
6. Some modern finishing

TT 792 D. CAD CAM in Textiles Lab
APLICATION OF CAD/CAM in Textile LAB
1. Job on COREL DRAW or PHOTOSHOP for Fabric Design plan and Garment Drawing and Designing
2. Job on WEAVING CAD --- Developing different Dobby designs like Twill, Plain, Matt, Satin, Sateen, Huckaback, Mock Leno etc, with Drafting & Lifting Plan.
3. Development of Jacquard Designs on Floral, Geometric and Damask or Paisley Motifs
4. Development of Simple embroidery designs on Embroidery softwares and running of samples on Machine.
5. Illustration of Printing Designs in Software.
Syllabus for B.Tech(Textile Technology) up to Fourth Year
Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011

Free Elective – III Lab

**TT 793A: Introduction to Soft Computing Lab**

**ARTIFICIAL NEURAL NETWORK**

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

**FUZZY LOGIC**

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

**Genetic Algorithm**

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

**TT 793B: Image Processing Lab**

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

TT 794 Industrial training.

Viva-Voce on Training Report

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**Semester 8**

<table>
<thead>
<tr>
<th>Organisational Behaviour</th>
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<tbody>
<tr>
<td><strong>HU801A</strong></td>
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<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Units Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Organisational Behaviour: Definition, Importance, Historical Background, Fundamental Concepts of OB, Challenges and Opportunities for OB.</td>
</tr>
<tr>
<td>2.</td>
<td>Personality and Attitudes: Meaning of Personality, Personality Determinants and Traits, Development of Personality, Types of Attitudes, Job Satisfaction.</td>
</tr>
<tr>
<td>7.</td>
<td>Leadership: Definition, Importance, Theories of Leadership Styles.</td>
</tr>
<tr>
<td>8.</td>
<td>Organisational Politics: Definition, Factors contributing to Political Behaviour.</td>
</tr>
</tbody>
</table>

**Total Lectures:** 24

References:
3. Shukla, Madhukar : Understanding Organisations – Organisational Theory & Practice in India, PHI.

47
## Process Control in Mechanical Processing of Textiles

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Units Description</th>
<th>Lectures in hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Process control of spinning</td>
<td>12</td>
</tr>
<tr>
<td>2.</td>
<td>Process control of weaving &amp; knitting, nonwoven</td>
<td>18</td>
</tr>
</tbody>
</table>

### Text Books:
3. “Norms for spinning Mills” by SITRA, Coimbatore, 2007

## Process Control in Chemical Processing of Textiles

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Units Description</th>
<th>Lectures in hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Process control of Chemical Processing</td>
<td>20</td>
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<tr>
<td>2.</td>
<td>Process Control in fibre Production.</td>
<td>10</td>
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</tbody>
</table>

### Credits:
```
Syllabus for B.Tech(Textile Technology) up to Fourth Year
Revised Syllabus of B.Tech in TT for the students who were admitted in Academic Session 2010-2011

```
Text Books:
8. Manufactured Fibre Technology V. B. Gupta, V. K. Kothari.

### Textile Mill Planning and Organisation

<table>
<thead>
<tr>
<th>Serial No</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>Structure of the textile Industry, sectors of Industry, Product types and organization, Domestic industry, size of the industry, Export industry: Size and nature of the industry.</td>
<td>04</td>
</tr>
<tr>
<td>2</td>
<td>Location and Layout Planning</td>
<td>Factors affecting location, Plant layout, Different types of layouts, Plant location and Selection of site for a textile mill, Principles of machinery lay-outs and different flow plans of material for spinning, weaving and process house. Calculation for Balancing of machines for spinning and weaving mills and process house, Construction of building of a textile mill, Types of buildings, single and multistoried buildings, Fire hazards and their control.</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Engineering services</td>
<td>System of Ventilation and lighting used in textile mill, Humidification systems used in Textile Mills, Developments in humidification systems, Humidifiers and dehumidifiers, Utilization of steam and power, Power consumption - Energy consumption in textile machines, Measures to reduce power consumption.</td>
<td>08</td>
</tr>
<tr>
<td>4</td>
<td>Material Handling</td>
<td>Importance of material handling, Methods and equipment employed-classification of material handling equipments, control of wastes.</td>
<td>05</td>
</tr>
<tr>
<td>5</td>
<td>Costing, elements of cost, fixed and variable cost, Knowledge of cost calculation for spinning, weaving and processing department. Viability evaluation of a project, Break even analysis.</td>
<td>08</td>
<td></td>
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<tr>
<td></td>
<td>Total</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

Text Books:
1. Industrial Engineering and Management by O. P. Khanna.
6. Goal Directed Project Management by E.S. Andersen, K.V. Grude & Tor Hang, Coopers & Cybranl Publication.
8. Plant location, Layout & Maintenance by Ruddele Reed.
10. Norms for Process Parameters, Productivity etc. ATIRA, BTRA, SITRA, NITRA, etc.

### Free Elective IV: TT-802

#### Mechatronics

<table>
<thead>
<tr>
<th>Serial No</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>Definition of mechatronics. Mechatronics in manufacturing, products and design. Comparison between Traditional and Mechatronics approach.</td>
<td>02</td>
</tr>
<tr>
<td>2</td>
<td>Electronics and Mechatronics</td>
<td>Review of fundamentals of electronics, logic gates and their operations, Data conversion devices, sensors, microprocessors, transducers, signal processing devices, relays, contactors and</td>
<td>08</td>
</tr>
</tbody>
</table>
### Syllabus for B.Tech (Textile Technology) up to Fourth Year

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

#### 3. Processors/controllers
- Microprocessors, microcontrollers, PID controllers and PLCs, Time domain analysis, transient response of first and second order systems.

#### 4. Drives and mechanisms of an automated system
- Drives: stepper motors, servo drives. Ball screws, linear motion bearings, cams, electronic cams, indexing mechanisms and transfer systems.

#### 5. Control Systems:
- Open loop and closed loop control, block diagrams, transfer functions, Laplace transforms.

#### 6. Hydraulic system
- Hydraulic elements, actuators and various other elements. Design of hydraulic circuits.

#### 7. CNC technology and Robotics
- CNC machines and part programming., Industrial Robotics.

#### 8. Mechatronics systems
- Design and fabrication

**Total** 40

**Text Books and References:**

2. W. Bolton, Mechatronics, Pearson Education
3. A. Smaili and F. Arnold, Mechatronics, Oxford University Press, Indian Edition
6. HMT Ltd., Mechatronics, Tata McGraw Hill Publication
8. K. Ogata, Modern Control Engineering, Prentice Hall

### Supply Chain Management

<table>
<thead>
<tr>
<th>Serial No</th>
<th>Chapters/Units</th>
<th>Description</th>
<th>Lectures in hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Supply Chain Management</td>
<td>Supply chain – objectives – importance – decision phases – process view, competitive and supply chain strategies – achieving strategic fit, supply chain drivers – obstacles – framework Elements of supply chain.</td>
<td>05</td>
</tr>
<tr>
<td>2</td>
<td>Designing the supply chain network.</td>
<td>Designing the supply chain network; Designing the distribution network – role of distribution – factors influencing distribution – design options – e-business and its impact – distribution networks in practice – network design in the supply chain – role of network – factors affecting the network design decisions – modelling for supply chain.</td>
<td>08</td>
</tr>
<tr>
<td>4</td>
<td>Sourcing and Pricing.</td>
<td>Sourcing – In-house or Outsource – 3rd and 4th PLs – supplier scoring and assessment, selection – design collaboration – procurement process – sourcing planning and analysis. Pricing and revenue management for multiple customers, perishable products, seasonal demand, bulk and spot contracts.</td>
<td>09</td>
</tr>
<tr>
<td>5</td>
<td>Information Technology in the supply chain</td>
<td>IT Framework – customer relationship management – internal supply chain management – supplier relationship management – transaction management future of IT</td>
<td>05</td>
</tr>
<tr>
<td>6</td>
<td>Coordination in a Supply Chain</td>
<td>Coordination in a Supply Chain, Lack of supply chain coordination and the Bullwhip effect – obstacle to coordination – managerial levers – building partnerships and trust – continuous replenishment and vendor-managed inventories – collaborative planning, forecasting and replenishment. Measuring effectiveness of supply management, logistics engineering. Operations Research Models for operational and strategic issues in supply chain management.</td>
<td>07</td>
</tr>
</tbody>
</table>

**Total** 40

**Text Books and References:**

I. Sunil Chopra, Peter Meindal, *Supply Chain Management (Strategy, Planning and Operation)*, Prentice Hall, 2001
Introduction to Bio Technology

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

Total Lectures= 37

Text Books:
1. Text Book of Biotechnology by H K Dass Wley India Publications.
3. Textbook of Biotechnology by R C Dubey
5. Environmental Biotechnology by B C Bhattacharya and Ritu Banerjee, Oxford University Press, 2007
6. Enzymes by Trevor Palmer, East west press
7. Fundamentals of Enzymology by Nicolas C price & Lewis Stevens, Oxford University press

TT 891 Product – Design Lab

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