SYLLABUS

FOR

B.Sc. IN TEXTILE ENGINEERING

UNIVERSITY OF RAJSHAHI

PABNA TEXTILE ENGINEERING COLLEGE
PABNA-6600

Syllabus
for
B.Sc in
Textile Engineering
University of Rajshahi.

Pabna Textile Engineering College.

Pabna-6600

Tel & Fax : 0731-66103

B.Sc IN TEXTILE ENGINEERING
Summary of the course

Se: No	Name of the Year	Hours Per Week			Marks							
					Theory			Practical			Grand Total	Credit
		Theory	Pract:/ Tutorial	Total	A 20%	B 80%	Total	A 40%	B 60%	Total		
1	1st year	22	16	38	150	600	750	80	120	200	950	38
2	2nd Year	22	18	40	140	560	700	100	150	250	950	38
3	3rd Year	23	12	35	160	640	800	100	150	250	1050	42
4	4th Year	16	16	32	105	420	525	170	255	525	1050	42
	Total	83	62	145	555	2220	2775	450	675	1225	4000	160

A˙ = Continuous Assessment.   B˙ = Examination.

1st Year

Code	Name of the Subject	Hours Per Week			Marks							
					Theory			Practical			Grand Total	Credit
		Theory	Practical:/ Tutorial	Total	A 20%	B 80%	Total	A 40%	B 60%	Total		
101	Physics-1	2	2	4	15	60	75	10	15	25	100	4
102	Physics-2	2	2	4	15	60	75	10	15	25	100	4
103	Chemistry-1	2	2	4	15	60	75	10	15	25	100	4
104	Chemistry-2	2	2	4	15	60	75	10	15	25	100	4
105	Mathematics-1	3	0	3	20	80	100	0	0	0	100	4
106	Mathematics-2	3	0	3	20	80	100	0	0	0	100	4
107	Textile Raw Material-1	2	0	2	10	40	50	0	0	0	50	2
108	Introduction to Textile Engineering	2	2	4	15	60	75	10	15	25	100	4
109	Polymer Science	2	0	2	10	40	50	0	0	0	50	2
110	Engineering Drawing	0	4	4	0	0	0	20	30	50	50	2
111	Engineering materials and Practices	2	2	4	15	60	75	10	15	25	100	4
	Total	22	16	38	150	600	750	80	120	200	950	38

A˙ = Continuous Assessment. B˙ = Examination.

2nd Year

Code No	Name of the Subject	Hours Per Week			Marks							
					Theory			Practical			Grand Total	Credit
		Theory	Pract Tutorial	Total	A 20%	B 80%	Total	A 40%	B 60%	Total		
201	Yarn manufacturing-1 (Short & long staple)	2	2	4	15	60	75	10	15	25	100	4
202	Fabric manufacturing-1 (Preparatory & Weaving)	2	2	4	15	60	75	10	15	25	100	4
203	Wet processing-1 (Pretreatment & Dyeing)	2	2	4	15	60	75	10	15	25	100	4
204	Garments manufacturing-1 (Preparatory)	2	2	4	15	60	75	10	15	25	100	4
205	Fabric Structure & Design	2	2	4	15	60	75	10	15	25	100	4
206	Textile Raw Material–2	2	0	2	10	40	50	0	0	0	50	2
207	Textile physics-1	2	0	2	10	40	50	0	0	0	50	2
208	Textile testing & quality control-1	2	2	4	10	40	50	10	15	25	75	3
209	Statistics	2	0	2	15	60	75	0	0	0	75	3
210	Elements of Electrical Engineering & Electronics	2	2	4	10	40	50	10	15	25	75	3
211	Elements of Mechanical Engineering & Machine Design	2	2	4	10	40	50	10	15	25	75	3
212	Computer Science	0	2	2	0	0	0	20	30	50	50	2
	Total	22	18	40	140	560	700	100	150	250	950	38

A˙ = Continuous Assessment. B˙ = Examination.

3rd Year

Code No	Name of the Subject	Hours Per Week			Marks							
					Theory			Practical				
		Theory	Pract./ Tutorial	Total	A 20%	B 80%	Total	A 40%	B 60%	Total	Grand Total	Credit
301	Yarn manufacturing-2 (Short staple & long staple)	3	2	5	20	80	100	20	30	50	150	6
302	Fabric manufacturing-2 (Rest Weaving portion, Knitting & Non-woven)	3	2	5	20	80	100	20	30	50	150	6
303	Wet processing-2 (Rest Dyeing portion, Printing & Finishing.)	3	2	5	20	80	100	20	30	50	150	6
304	Garments manufacturing-2 (Assembling & Finishing)	3	2	5	20	80	100	20	30	50	150	6
305	Textile physics-2	2	0	2	15	60	75	0	0	0	75	3
306	Textile testing & quality control-2	2	2	4	15	60	75	10	15	25	100	4
307	Industrial Psychology & Management	3	0	3	20	80	100	0	0	0	100	4
308	Sociology	2	0	2	15	60	75	0	0	0	75	3
309	Application of Computer in Textiles	2	2	4	15	60	75	10	15	25	100	4
	Total	23	12	35	160	640	800	100	150	250	1050	42

A* = Continuous Assessment. B* = Examination.

4th Year

Code No	Name of the Subject	Hours Per Week			Marks							
					Theory			Practical				
		Theory	Pract./ Tutorial	Total	A 20%	B 80%	Total	A 40%	B 60%	Total	Grand Total	Credit
401	Advanced Yarn / Fabric / Wet processing / Garments manufacturing	3	2	5	20	80	100	20	30	50	150	6
402	Special Yarn / Fabric / Wet processing / Garments manufacturing	2	2	4	10	40	50	10	15	25	75	3
403	*Utility services & Maintenance of Textile Machinery	2	2	4	15	60	75	10	15	25	100	4
404	* Textile testing & quality control-3	3	2	5	20	80	100	10	15	25	125	5
405	* Production Planning & Control	3	0	3	20	80	100	0	0	0	100	4
406	* Industrial Economics, Accounting & Marketing	3	0	3	20	80	100	0	0	0	100	4
407	* Project Work	0	8	8	0	0	0	40	60	100	100	4
408	* Industrial Attachment	0	0	0	0	0	0	80	120	200	200	8
409	* Comprehensive Viva	0	0	0	0	0	0	0	0	100	100	4
	Total	16	16	32	105	420	525	170	255	525	1050	42

A* = Continuous Assessment. B* = Examination.: * Marks Subjects = Compulsory subjects for all

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* Marks Subjects = Compulsory subjects for all.

B. Sc in Textile Engineering
First Year
101. Physics-1

Theory : Marks - 75   **Contact hour/week 2 + 0**

Elasticity: States of matter, Elastic properties of Solids, Woods, Stress, Strain, Hooke's law, Elastic limit, stress-strain diagram of a material, Different types of elasticity, Elastic constants, Poisson's ratio, Relation between elastic constants, Work done in a strain, Twisting couple on a cylinder, Torsional pendulum, Determination of Young's Modulus and Rigidity Modulus, Factor affecting elasticity.

Hydrodynamics: Flow of liquids, Equation of continuity, Laminar and turbulent flow, Reynold's number and its significance, Bernoulli's theorem, Torricelli's theorm, Venturimeter, Pilot tube.

Viscosity: Viscosity and co-efficient of Viscosity, Poiseuille's equation, Motion in a viscous medium-Stoke's law, Determination of the co-efficient of viscosity, Variation of Viscosity with temperature, Eyring equation.

Surface Tension: Surface tension, Molecular theory of surface tension, Surface tension and surface energy, Excess pressure across a curved film, Capillarity and angle of contact, Determination of surface tension.

Moment of Inertia: Moment of inertia- its Physical significance, Radius of gyration, Torque, General theorems of moment of inertia, Calculation of moment of inertia of a body, Determination of moment of inertia.

Light: Wave theory, Huyghens principle of Rectilinear propagation of light, interpretation of law reflection and refraction by huyghen's principle, interference, Young's experiment, determination of wave length light by bi-prism, Newton's ring, Colours of thin films, Diffraction, Diffraction grating and its use. Zone plate, X-ray diffraction, Polarizations, Polarization by reflection, Brewster's law, Double refraction, Nicol's prism, Polorimeter.

Book References:

1. Outlines of Physics by Dr. Giasuddin Ahmed
2. Physics by David Halliday & Robert Resnick

Practical :   Marks - 25   **Contact hour/week: 0 + 2**

General Physics
1. To determine the 'g' by compound pendulum
2. To determine the Young's modulus for the material of a wire by vernier method.
3. To determine the rigidity modulus for the material of a wire by oscilation or dynamical method.
4. To determine the surface tension of water by capillary tube
5. To determine the co-efficient of viscosity of liquid by its flow through a capillary tube.
6. To determine the density of water of various temperature by specific gravity bottle

Light
1. To determine the focal length and hence power of a convex lens by the method of displacement using an optical bench and to verify the result by graphical method.
2. To determine the focal length and hence power of a concave lens using an auxiliary convex lens.
3. To determine the refractive index of a liquid by plane mirror and pin method using a convex lens.
4. To determine (i) the radius of curvature of a lens and (ii) the refractive index of the material of the lens by Boy's method.
5. To determine the radius of curvature of a lens by Newton's rings.

102. Physics-2

Theory : Marks - 75   Contact hour/week 2 + 0

Electricity and Magnetism: Electric charges and coulomb's law, Electric field, Electric flux, Gauss Law and its application, Gaus's law in vector form, Electric potential, Relation between electric field and potential capacitors and capacitance, Capacitors with dielectrics, Laplace's and Poisson's equation, Current and resistance, Kirchoff's law, charging and discharging of a capacitor (RC circuits). Magnetic field and magnetic induction, Magnetic force on a current carrying conductor, Torque on a current carrying loop, Ampere's law and its applications, Laws of electromagnetic induction, self inductance and mutual inductance, LR circuit, Magnetic properties of matter, Magnet motive force Magnetic field intensity, Permeability, Susceptibility, Magnetic materials, Magnetisation curves Hysteresis

Heat and Thermodynamics: Measurement of high temperature Platinum resistance thermometer Thermo-electric thermometer, optical and radiation pyrometers, Specific heats of a gas, General heat energy equation of a gas, kinetic theory of gases, Expression for pressure exerted by a gas, Deduction of gas laws from kinetic theory, Kinetic interpretation of temperature, Maxwell's distribution of molecular speeds, Degrees of freedom of a gas, Principle of equipartition of energy, Mean free path, Brownian motion, Equations of state of a gas, Van der Waal's equation, Critical constants of a gas. Specific heat of gas, Relation between the two specific heats, General heat energy equation of a gas, Isothermal and adiabatic Changes, Adiabatic equation of a perfect gas, Adiabatic and Isothermal elaticities and isothermal elasticities, Work done during expansion or compression of a gas, Zeroth law of thermodynamics, First law of thermodynamics, Reversible and Irreversible process, Efficiency of a heat engine, The Carnot cycle, Efficiency of carnot engine, Refrigerator, The second law of thermo dynamics, Carnot's theorem, Absolute scale of temperature, Entropy and Disorder, Thermodynamic functions, Maxwell relation, Clausius-Clapeyron equation, Gibbs phase rule, Third law of Thermodynamics.

Modern Physics: Radioactivity, Law governing radioactive delay, Half-life, Mean life, Crystalline and non-crystalline solids, Unit cell, Cryptal systems, Co-ordination number, Packing factor, Miller indices, Defects in solids, Point defect, Line defect, Different types of bonds in solids, X-rays, X-rays diffraction, Bragg's law, Introduction to band theory, Distinction between metal, insulator and semi-conductor

Book References:

1. Outlines of Physics by Dr. Giasuddin Ahmed
2. Heat & Thermodynamics by Brijlal & N. Subrahmanyam
3. Thermodynamics: An Engineering Application by Yunus A. Cengel
4. A Text book of Thermal Engineering by R. S. Khurmi & J. K. Gupta
5. Engineering Thermodynamics (3rd ed.) by Rogers, Mayhew

Practical :   Marks - 25   Contact hour/week: 0 + 2

Heat:

   a) Co-efficient of linear expansion of a solid
   b) Specific heat of a solid and liquid by the method of mixture with radiation correction
   c) Specific heat of liquid by the method of cooling
   d) Thermal conductivity of metals
   e) Determination of the boiling point of a liquid by platinum resistance thermometer.

Electricity:

   a) Resistance of Galvanometer by self deflection method
   b) Determination of the end-correction of a meter bridge
   c) Specific resistance of a wire by meter bridge
   d) Determination of the resistance of a wire by P. O. Box.
   e) Verification of Ohm's law using a tangent Galvanometer.
   f) Determination of the E. C. E of copper.
   g) Determination of the mechanical equivalent of heat by electrical calorimeter.

103. Chemistry-1

The structure of Atom:

Rutherford and Bohr's atom model with its limitation, Quantum number and atomic orbital, Distribution of electron in the atoms of elements, Pauli's Exclusion Principle; Aufbau principle, Heisenberg uncertainity principle, Hunds's rule, electronic configuration of the elements.

Nuclear Chemistry: Nuclear reactions, Mass number, Atomic mass units, Mass defect, Nuclear binding energy, Nuclear fission and fusion, Radioactivity, Radio activity decay, Half life. .

The Chemical Bond:

Electronic theory of chemical bond, the concept of balancing , ionic, covalent and coordinate covalent bond

Pollution and its effects in the living world

The atmosphere and its structure, Types of pollutants, Air pollution, green house effect, Acid rain, photochemical smog, Prevention and control, Water pollution, Noise Pollution, Treatment of Industrial effluents and wastes, Industrial hazards and precautions.

Complex Compound

Different theories, Structure, Isomerism and applications

Physical Chemistry

Theory of dilute solution: Colligative Properties

     i)   Lowering of vapour pressure
     ii)   Elevation of boiling point
     iii)   Depression of freezing point
     iv)   Osmosis and osmotic pressure, Deduction of their formulae and molecular weight from Raoults law

Chemical Equilibrium

Law of mass action, Equilibrium constant, Application of law of mass action to some chemical reaction, Heterogeneous equilibrium, Le-chatelier principle and its application to industrial reactions.

Chemical Kinetics:

Rate of reaction order and molecularity, Zero order reaction, 1st and 2nd order reaction with its mathematical formulation, Determination of order of reaction, Activation energy, Activation complex.

Colloids and Colloidal Solution

Classification, Preparation and purification, Properties, Proactive action and application of colloids

Photochemistry:

Law of photochemistry, Quantum yield, Decomposition of hydrogen halide, Photosensitized reaction, Fluorescence and phosphorescence, Luminescence and Chemiluminescence.

Book References:

1. Modern Inorganic Chemistry by R.D. Madan
2. General Chemistry by Ebbing
3. Environmental Chemistry by A.K.Dey
4. Physical Chemistry by G.L. Glaston
5. Environmental Chemistry by H.Kanr and B.K. Shrma
6. Basic Inorganic Chemistry by F. Albert & Paul L. Gaus
7. Basic Inorganic Chemistry by Cotton, Wilkinson & Gaus
8. Essential of Physical Chemistry by B.S. Bahl, G.D. Tuli & Arun Bahl
9. Principles of Physical Chemistry by Haque & Nawab
10. A text book of Environmental Chemistry by S.S. Dara

Practical : Marks - 25   Contact hour/week: 0 + 2

1. Qualitative analyses of inorganic mixtures containing not less than three radicals including insoluble and interfering radicals.

2. Volumetric Analyses:
   - i) Preparation of 0:1M HCl and standardization
   - ii) Preparation of 0.1M NaOH and standardization

3. Inorganic Preparation
   - i) Preparation of potassium dichromate
   - ii) Preparation of chrome alum
   - iii) Preparation of ferrous ammonium sulphate
   - iv) Preparation of potassium permanganate

104. Chemistry-2

Theory : Marks - 75   Contact hour/week 2 + 0

Aliphatic Hydrocarbons
Alkenes: Classification, Structure & Conformation; Nomenclature, General methods of preparation; and important reactions.
Alkenes: Classification, Structure & Conformation; Nomenclature, General methods of preparation; and important reactions.
Alkynes: Classification, Structure & Conformation; Nomenclature, General methods of preparation; and important reactions.

Aromatic Hydrocarbons
Introduction to Aromatic Compounds; Structure of Benzene, Stability of Benzene ring; Reactions of Benzene, Resonance structure of benzene, Orbital picture of Benzene; Aromatic Character; Electrophilic Aromatic Substitution-mechanism, reactivity and orientation.

Hydroxy Compound
Alcohols: Classification, Nomenclature, structure, Isomerism, general methods of preparation reactions of aliphatic and aromatic alcohols
Phenols: Classification, Structure, preparation and important reactions.

Carbon Compounds
Aliphatic aldehydes and ketones: Structure, nomenclature, general methods of preparation and important reactions
Aromatic aldehydes and ketones: Structure, nomenclature, general methods of preparation and important reactions

Carboxylic Acids
Carboxylic acids: Structure, nomenclature, general methods of preparation physical properties and important reactions, Derivatives of carboxylic acid:- chlorides, anhydrides, Esters and amides.

Amines
Aliphatic Amines: Classification, Structure, Nomenclature, isomerism, general methods of preparation and reactions, Aromatic Amines: Structure, preparation and reactions, A brief study of Diazonium salts and Azo compounds

Carbohydrate
Classification, Nomenclature and stereo chemistry and inter conversion of carbohydrates.

Monosaccharide
D-Glucose and Fructose
D-Glucose: Open chain structure, Cyclic structure, physical properties and reactions
Disaccharides: Structure of sucrose, reactions and uses.
Poly sachharides: Starch and cellulose

Cellulose: Preparation, structure, derivatives and uses.

Starch: Source, structure, Derivatives and uses

Amino acids,Proteins and Enzymes.

Classification nomenclature, synthesis and reaction

Isomerism

Structural isomerism, Chain isomerism, Positional isomerism, Functional group isomerism, Metamerism etc

Stereo- isomerism, Geometrical isomerism and optical isomerism. Configuration and conformation

Organo-Metallic compounds

Importance and structure

Grignard reagent: Preparation, Important reactions and application in organic synthesis

Ogano-zinc compound: Preparation, Properties, Reactions and uses.

Tetraethyl lead: Preparation, reaction uses and its adverse effects on environment.

Colour, Dyes and Pigments

Theories of color and color conjugated system, Nomenclature, Classification, Raw materials for synthesis of dyes

Book References:

1. Organic Chemistry by Morrison & Boyd
2. Organic Chemistry by Arun Bahl
3. Organic Chemistry by Finer (Vol. 1 & 2)

Practical :   **Marks - 25**   Contact hour/week: 0 + 2

Identification of organic compounds

   a) Alcohols: Methyl alcohol, Ethyl alcohol, Isopropyl alcohol and tert-buryl alcohol.
   b) Carboxylic acids: Formic acid, Acetic acid, Oxalic acid, Benzoic acid, Salicylic acid etc.
   c) Carbonyl Compounds: Formaldehyde, Acetaldehyde, Acetone, Benzaldehyde etc.
   d) Miscelleneous: Phenols, Aniline, Nitro-benzene, Chloro-benzine, Urea, benzamide etc.

Oxidation, Reduction titration -

   a) Standardization of $KMnO_4$ solution with standard oxalic acid or sodium oxalate.
   b) Determination of Fe^{+2} with standard $KMnO_4$ solution.
   c) Standardization of sodium-thio-sulphate solution with standard $KMnO_4$ solution.
   d) Determination of available chlorine in bleaching powder by iodometric method
   e) Determination of Na_2CO_3 content of washing soda.
   f) Determination of strength of H_2O_2
   g) Determination of total acid and alkali in soap.

105 . Mathematics-1

Theory : Marks - 100   Contact hour/week 3 + 0

Algebra: Matrix, adjoint, inverse, Rank of matrix, determinants, Convergency and divergency; Inequalities, Theory of equations, Sets and functions.

Trigonometry: Demoiver's theorem, Deduction from demoiver's theorem; Complex arguments, Gregory's series, Summation of series, Hyperbolic Functions

Analytic Geometry: Transformation of co-ordinates, Pair of straight lines, General ege. of 2nd degree, Circle, system of circle, conic section.Co-ordinates, Direction cosines, Projections, The plane, The straight line, sphere cone.

Differential Calculus: Function, Limits, Continuity, Simple differentiation, Successive differentiation, General theorem and expansions, Role's of theorem, Mean value theorem, Taylor's series, Machlaurin's series, Indeterminate forms, Partial differentiation, Maxima and minima, Tanget and normal.Curvature, Asymptotes, Euler's theorem, Taylor's Series, Singular points.

Book References:
1. Differential Calculus by B. C. Das & B. N. Mukherjee
2. Differential Calculus by Abu Yusuf
3. Differential Calculus by M.A. Matin & B.B. Chakravarty
4. Linear Algebra by Md. Abdur Rahman
5. Set Theory by S. Lipschutz.
6. Higher Algebra by Hall and knight.
7. Higher Trigonometry by S.A. Sattar.

106. Mathematics-2

Theory : Marks - 100   Contact hour/week 3 + 0
Integral Calculus:

Method of substitutions; special type of Integration, Instegration of rational fractions; Integration by parts, Integrals of special trigonometric functions, Reduction formulae for trigonometric functions, Miscellaneous integral, Definite integrals, Improper integrals, Multiple integrals.

Differential Equations

Variables, Homogeneous equation, Reducible to homogeneous form, Exact differential equations, Linear differential equations, Linear equations with constant Coefficients, Inverse operations, $f(D)Y = x$, $f(D) = z$ $f(D)Y = Sinax$ or Cosan, $f(D)y = e^{ax}.v$, Method of undermined co-efficients, Method of variation of parameters. **Particulars Integrals; Linear Homogeneous equation with variable coefficient, Equation of the first order but of higher degree, Equation solvable for y, Equation solvable for x, Clairaut's equation, System of linear different equations.**

Vector Analyses

Scalar product or Dot product of two vectors, three vectors, four vectors, vector product or cross product vectors, Solution of vector equations, Gradient, divergence, Curl, Application of vectors in Geometry, Vector differentiations, Vector Integration.

Mathematical Methods:

Laplace trams formation, Fourier series and Fourier Integral, The line integral, The surface integral, The volume integral, Green's theomem, Gauss's Divergence theorem, beta and gamma functions, Numerical analyses (method of interaction), Calculation of finite differences, Interpolation, central differceces, Numerical differentiation and integration.

Book References:

1. Integral Calculus by B. C. Das & B. N. Mukherjee
2. Integral Calculus by Abu Yusuf
3. Numerical Mathematical analysis by Jame B. Scarborugh
3. Numerical Analysis by Schaums Outline Series.
4. Numerical Methods by H. Mathews.
5. Numerical Analysis by Kedarnath & Ram Nath
6. Vector Analysis by Spiegel
7. Integral Calculus by M.A. Matin & B.B. Chakravarty
8. Differential Equations by S.L. Ross
9. Integral Calculus by M.L. Khanna
10. Mathematical Physics by Rajput.

107 . Textile Raw Materials (Natural)-1

Theory : Marks - 50   **Contact hour/week 2 + 0**

Definition of textile fibre, Classification of fibres with examples.

Study of cellulosic fibres:

Cotton: Cultivation and harvesting, Growth, Composition, Physical and chemical structure and properties, Geographical distribution, Ginning, Grading classification and End uses.

Bast Fibres

Cultivation and harvesting of different types of bast fibres with special reference to Jute; Growth, Composition, Physical and chemical structure and properties, Retting, Study of fibre ultimates, Sorting, Grading, classification and End uses.

Brief study of other types of cellulosic fibres such as leaf and fruit fibres.

Study of Protein fibres:

Wool: Growth, composition, physical and chemical structure and properties, Geographical distribution of main wool producing countries, Shearing, classing sorting and End uses;

Sources and types of animal hair fibres.

Silk: Production of raw silk-egg production,cocoon production, reeling and throwing, Composition, Physical and chemical structure and properties, Geographical distribution and End uses;

Book References:

1. Hand Book of Textile Fibres 1- Natural Fibres by Cook. J. Gordan.
2. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman
3. Textile Fibres, Dyes & Processes by Howard L. Needles
4. Textiles: Fibres o Fabric by Corbman, Bernard P
5. Textile Fibres by Mathews (John Wieley & Sons Inc.)
6. Textile Raw Materials by Abu sina Md. Ruknul Quader

108 . Introduction to Textile Engineering

Theory : Marks - 75   Contact hour/week 2 + 0

Different terms and definition of textiles, Study of textile sector in Bangladesh, An introduction to the historical development of fibre,yarn,thread,filament,fabric etc. processes industry, its application and products.

Yarn Manufacturing :

Ginning, Mixing and Blending, Flow chart of different spinning processes, different terms related to cotton and jute spinning, spinning process and machinery used for different spinning and working principle of individual Cotton and Jute spinning machinery

Fabric Manufacturing :

Different basic terms of weaving process, preparatory of weaving process(winding, warping, sizing, drafting and denting) and its functional effects. Flow chart of weaving process, Basic principle of weaving, weaving process and machines, motions of loom, difference between weaving and knitting, knitting process and machines, non-woven fabric formation.

Wet Processing : Flow-Chart of wet Processing, Flow-Chart of dyeing and printing for cotton, synthetic and cotton synthetic blended fabric, Preparatory process for different textile goods for proper wet processing according to flow-chart, .Basic concept of dyes and chemicals used in textiles, Basic concept of theory of dyeing, Different machinery used in woven and knit dyeing industry, Dyeing, printing and finishing process of major types of fabrics.

Garments Manufacturing :

A brief history of the development of the garments industry with particular reference to Bangladesh Garments Industry. Nomenclature of different types of garments, Flow chart of garments manufacturing process, Basic idea of pattern making sample making, marker making, cutting, sewing, Trimming and garments finishing.

Book References:

1. Textile Terms and Definition by Melintyre, J.E.
2. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman
3. Modern Techniques of Textile Dyeing, Bleaching & Finishing by S.M. Arora
4. Textile Fibres, Dyes & Processes by Howard L. Needles
5. Textiles: Fiber to Fabric by Corbman, Bernard P
6. General Technology of Cotton Manufacturing (Mir Publisher) by P.T. Bukayer
7. General Textile Processing by Abu sina Md. Ruknul Quader

Practical :   Marks - 25   Contact hour/week: 0 + 2

An introductory study on Spinning, Weaving, Dyeing, Printing, Finishing and Garments Processing

109 . Polymer Science

Theory : Marks - 50   Contact hour/week 2 + 0

Introduction and history of polymer science

Definition of different terms: Polymer, monomer, oligomer, repeating unit, Degree of polymerization , end group etc.

Classification of Polymers: Based on the origin, Chemical and geometrical structure. Chain Architecture, monomer or Chemical Microstructure, the side Chain Structure / Configuration of Polymer Chain/ Stereo regular Polymer

Criteria of fiber forming polymers

Different types of chain polymerization: Free radical polymerization, Ionic polymerization, Co-ordination polymerization.

Kinetics of Polymerization: Introduction, Free radical chain polymerization, Ionic Polymerization etc.

Different types of step polymerization: Polycondeasation, Polyaddition, Ring-opening etc.

Techniques of polymerization: Liquid, Gas and Solid phase.

Molecular Weight and Size

Number average molecular weight, Weight average molecular weight, Viscosity average molecular weight and their measurements, molecular weight distribution,Effect of molecular weight on mechanical properties.

Glass Transition Temperature: Defination , Melting temperature (T_m) Flow temperature(T_f) etc.Transition and associated properties, melting temperature, Factors influencing the Glass transition temperature, Importance of glass transition temperature.

Crystallinity in Polymers: Crystalline solid and their behavior, Degree of Crystallinity, Crystallisability, Polymer Crystallization, Structural regularity and crystallisability, Amorphous and their effect on T_g and T_m

Preparation and properties of different polymers: Polyethylene, PolyVinyl Chloride, Polyvinyl alcohol, Polystyrene, Polyester, Nylon, Polyisoprene, Polyurethane, Silicone polymers etc

Polymer degradation: Types of degradation , Thermal degradation, Photo degradation, Mechanical Degradation, Oxidative degradation etc.

Polymer Processing: Introduction, Compounding, Processing Techniques

Book References:

1. Polymer Science by Gowariker, V.R. (Publisher: Wiley Eastern Limited)
2. Text Book of Polymer Science by Fred W. Billmeyer, Jr. (Publisher: Interdcience Publishers, a Division of Joha Wiley and Sons)
3. Polymer Chemistry by Bruno Vollmert (Publisher: Springer-Verlag, New York)

110 . Engineering Drawing

Practical :   Marks - 50   Contact hour/week: 0 + 4

Introduction:

Instruments and their uses, Planning of drawing sheets, dimensioning, projection and its types, First and third angle- Projection of elementary machine parts, models of pictorial, orthographic drawings, Isometric projection of simple solids and its components. Pictorial projection in oblique and maxillary planes, Assembly drawing from orthographic projection & pictorial views, Sectional views.

Specifications for manufacture; Working drawings; plan and elevation of building; Drawing of gear tooth profile, cam profile, fasteners, key & springs. Free-hand drawing of different textile machinery parts, drawing of assemblies of textile machinery parts from given details; Computer Graphics

Book References:

1. Any book on Engineering Drawing

111 . Engineering materials & Practices

Theory : Marks - 75   Contact hour/week 2 + 0

Definition of stress and strain, various types of stress and strain - tensile, compressive, shear, calculation of various stress, Mohr's circle of stresses.

Hook's law of elasticity, definition of modules of elasticity and rigidity, analyses of typical tensile strain curve for a ductile material showing yield points, breaking point, yield stress and ultimate stress, Poison's ratio.

Springs, Types of spring, closely coiled spring, spring subjected to axial loads and axial twist, open coiled spring.

Columns and strut, Buckling of column, Euler's column theory, Euler's crippling load for column, Ranking's crippling load for column, Eccentric loading on column.

Mechanical properties of iron and steel, strain, energy and resilience, breaking energy and toughness, repeated loads and fatigue, hysteresis, and endurance limit, time effect, creep and relaxation of stresses, hardness and its methods of measuring, structure and properties of wood, Alloys of metals and their properties, Material in hostile environment (high temp., sub-normal temp. and corrosion).

Book References:

1. Introduction to Physical Metallurgy by S. H. Avner
2. Physical Metallurgy for Engineers by D. S. Clark & W. R. Varney
3. Engineering Physical Metallurgy by Y. Lakhtin
4. Introduction to Modern Steel Making by R. H. Twpkary
5. Introduction to Engineering Materials by B. K. Agrawal
6. Metallurgy for Engineers by E. C. Rollason
7. Engineering Materials- Properties & Selection by K. G. Budinski
8. Mechanics of Materials 1 (3rd ed) by E. J. Hearn

Practical :   Marks - 25   Contact hour/week: 0 + 2

Identification and use of hand-tools and measuring instruments, reamers, taps and dies, bench, vice and carpentry tools, models making. Identification, use and practices on Lathe, Drill, Grinder, Shaper, Planner, Circular saw and milling machine.

Sheet metal work – Cutting of sheet material to make some useful objects. Metal joining processes – Soldering, Brazing, riveting, gas welding and electric are welding. Heat treatment of steel such as annealing, normalizing, quenching, tempering and surface hardening, Sand moulds, core moiding, pattern for casting and sand casting.

B.Sc. in Textile Engineering
Second Year

201 . Yarn Manufacturing –1

Theory : Marks - 75   Contact hour/week 2 + 0

Short Staple
Characteristics of Fiber considered by a spinner; Flow chart for the production of carded and combed yarns; Importance of mixing and blending;

Blow Room
Principles of Opening and Cleaning; Study of Blow Room Machines for Blending, Opening. Cleaning and control of regularity of mass per unit length; Extraction and control of waste; Settings for waste; Blow room lines for different purposes; Use of suitable sequences of machines; Production of scutcher laps; Advantages and disadvantages of chute feeding to cards, Safety; Prevention of fires, methods of extraction of metal objects; Main settings, Speeds, Production calculation.

Carding
Principles and objects of carding; Detailed study of the revolving flat card; Types and care of wire; Stripping and Grinding, Doffing mechanism; Extraction and control of waste and dust, Can coiling; Speeds, Production calculation, Settings, Cleaning efficiency, Control of nep and Fiber damage; Variation in sliver mass per unit length;

Draw Frame
Principles of roller drafting; Drafting forces; Fiber control; Drafting wave and effect of short fibers with hooked ends created in carding; Mechanical fault causing periodic variation; Minimum theoretical variation, Effects of doubling and drafting Study of draw frame, Drafting system, Stop mechanism, Can coiling, Roller setting, Production, Introduction and functions of autolevellers.

Long Staple
Flow charts for production of yarns from bast fibers, Woolen and worsted and silk;
Processing of Jute; Importance and methods of batching and batch selection; Emulsion preparation of application, Softening technique and machinery; Treatment of cuttings;

Carding
Principles and objects of Jute card; Detailed study of carding systems and machinery, Methods of spreading, Differences in treatment on breaker and finisher cards, pinning, Control of opening and waste, Cleaning efficiency, Settings, Speeds and productions;

Book References:
1. Textiles: Fiber to Fabric by Corbman, Bernard P
2. General Technology of Cotton Manufacturing (Mir Publisher) by P.T. Bukayer
3. A Practical Guide to Opening & Carding-2 by W. Klein
4. Jute Fiber to Tarn by R.R. Atkinson (Publisher: A Heywood Book, Temple press Book Ltd.)
5. A guide to Jute Technology by Sadruddin Ahmed
6. Yarn Manufacturing-1 by Abu Sina Md. Ruknul Quader.
7. Manual of Cotton Spinning by
8. Jute Spinning by Hafijuddin Ahmed
9. Speed and gearing calculation of Jute spinning by Hafijuddin Ahmed

Practical :   Marks - 25   Contact hour/week: 0 + 2

Short Staple
Detailed practical study of Mixing, Blow room, Carding and Draw frame of Cotton Spinning.
Long Staple
Details practical study of batching, softener, Spreader, Breaker card and finisher card of jute spinning.

202 . Fabric Manufacturing – 1

Theory : Marks - 75   Contact hour/week 2 + 0

Weaving Preparation: Introduction and historical background of fabric manufacture; Flow chart for weaving; Introduction to yarn preparation.
Winding: Winding requirements, Different types of winding methods and packages, Precision and non-precision winding. Winding defects and remedies.
Warping: Techniques of warping – Direct warping of cotton and jute and sectional warping, Essential parts of warping machines and their function, Faults in warping and their remedies.
Sizing: Introduction to sizing: Ingredients of a size mixture and their functions; Chemistry of sizing and technological changes due to sizing, Typical recipes, Choice of size ingredients, Size cooking, short description of different techniques of sizing, Methods of drying, Dressing of jute yarn, Warp sizing and weaving efficiency, Mechanism of size take up, Defects in sizing and their remedies, Calculations related to winding, warping and sizing.
Weaving Mechanism: Basic principle of weaving, Classification and brief description of looms, Classification and definition of motions of loom. Study of primitive, pit, frame fly shuttle, Chittaranjan and Hattersley looms, Study of Hessian and Sacking loom, Relevant calculations.
Chronological Development of looms. Loom drive and brakes. Different types of sheds.
Shedding: Tappet shedding, Construction of shedding Tappet.
Dobby Shedding: Scope and classification, negative, positive and cross-border, Peg-plan, Timing and dwell of dobby.
Picking: Classification, over picking and under picking mechanisms, Construction of picking tappet, picking faults.
Beating: Principle of crank and crank arm beating, Effect of crank arm and crank length, Sley eccentricity and its effects, Forces involved in beating action.
Take-up and let-off mechanisms. Calculation of take-up constant, picks/cm and rate of let off. Necessary calculations.

Book References:

1. Textiles: Fiber to Fabric by Corbman, Bernard P
2. General Technology of Cotton Manufacturing (Mir Publisher) by P.T. Bukayer
3. Weaving Calculations by R. Sen Gupta (Publisher: B.D. Taraporevala Sons & Co. Private Ltd.

Practical :   Marks - 25   Contact hour/week: 0 + 2

Weaving
Practical study of the process and machinery involved in the warping, sizing and weaving. Visits to manufacturing plants, Operation of machinery.
Knitting
Practical study of the machinery involved, Understanding of the principles of loop formation in different circular, flat and warp knitting machine.

203 . Wet Processing – 1

Theory : Marks - 75   Contact hour/week 2 + 0

Water Materials and chemicals for wet processing : Water , Water importance in wet processing (hydrogen bonding, Cluster formation, Heat of evaporation, Dissolving ability), Water treatment (Estimation and Removal of Hardness), Soap ; detergents etc.

General concepts of Soaps:, Classification of detergents, Detergency (Mono molecular layer, Middle formation, Surface and interface tension, Wetting and dispersing. Different types of surface active agents (Synthesis, Effects, Degradability);

Chemistry, properties and uses of various Acids, Alkalis, salts, Oxidizing Agents and Reducing Agents in Textile Wet Processing.

Pretreatment: Flow-chart of wet processing, Chemistry of various impurities in fibers and their removals; Singeing, Desizing, Scouring of cotton, Jute, Wool and silk fibers, Methods of bleaching of cotton, Jute, wool and silk fibers, Mercerization of cotton.

Technology of Dyeing: Elementary concepts of colour and constitution, Chromophore, Chromogen, Auxochrome, Antiauochrome, Resonance theory.

Definition of dyestuffs: Pigments and their classifications, Commercial dyestuff preparations (Powder, Paste, Lump, Solution and presscake).

Colour measuring instruments.

History of dyeing, Classification of dyes according to their chemical constitution and application. Structure and application of direct, Acid, Basic and Vat dyes on different fibers;

Book References:

1. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman
2. Modern Techniques of Textile Dyeing, Bleaching & Finishing by S.M. Arora
3. Technology of Bleaching & Mercerizing by Prof. V. A. Shenai
4. General Technology of Cotton Manufacturing (Mir Publisher) by P.T. Bukayer
5. Textile chemistry – 1 & 2 by Abu sina Md. Ruknul Quader

Practical :   Marks - 25   Contact hour/week: 0 + 2

Study on Wet Processing Machineries
Preparation for dyeing, Desizing, Scouring and bleaching of cotton, Jute, Wool and silk fibers, practical application of direct, Acid, Basic and Vat dyes for Dyeing of Cotton, Jute, Wool and Silk fibers.

N.B. Per year 3 to 4 Running Textile Mill visit necessary.

204. Garments Manufacturing – 1

Theory : Marks - 75   Contact hour/week 2 + 0

Historical Development of Garments industry in Bangladesh and other countries of the world. Garments terms and definitions; Garments manufacturing sequence, General discussion on pattern making, Sample garments making, Components of shirt, trouser and their types, Standard body measurement for Gents, Standard body measurement for ladies, Principle of pattern making for shirt and trouser, Pattern grading.
Marker Making: Definition, marker efficiency, objectives, constraints, method, drawing, duplicating and wastage in marker making.

Book References:
1. Apparel Manufacturing by Glock, Ruth
2. Garments and Technology by M.A. Kashem.

Practical :   **Marks - 25**   Contact hour/week: 0 + 2

Sewing machine handling and adjustment, General sewing practices, Marker Planning and Marker Making, Marker copying, Pattern making for shirt and Trousers Pattern grading, Fabric cutting, Industrial visit.

N.B. Per year 3 to 4 Running Textile Mill visit necessary.

205. Fabric structure & Design

Theory : Marks - 75   Contact hour/week 2 + 0

Introduction – Classification of woven fabrics, Plain weave fabric and its representation, Factors affecting the fabric structure.
Plain Weave Fabrics – Derivatives of plain weave and their characteristic. Ornamentation of plain weave fabrics by varying set, yarn linear density, crimp, twist and material.
Twill weaves – Definition of the terms balanced, warp-faced and weft-faced twill weaves. Developed twill weaves, i.e. waved, herringbone, diamond and elongated.
Relative firmness of twill weave, Large twills influence of the twist of the yarns. Angle of inclination of twill weaves.
Statin and sateen weaves, Drafts, denting and pegging plans.
Fancy designs of fabrics – Characteristic, appearance and texture of simple fancy weaves (viz. mock leno including distorted thread effects), huckaback honeycomb, basic crepe weaves and Bedford cord structures.
Stripe and check effects using basic and simple fancy weaves, Colour in combination with weave effects, i.e. pinstripe, crowfoot, dog's tooth, shepherds check.
Designs of fabrics figured with extra weft and extra warp and weft.
Designing of double width, tubular, multiply and stitched double cloth, designing of double equal plain fabrics figured by inter change.

Knitted Fabric Structure
Structure of 1 x 1 rib and 1 x 1 purl weft knitted fabrics and their representation on design paper. Comparison of the properties of plain, 1 x 1 purl weft knitted fabrics.
Structures of simple, tuck and miss stitches and their representation using loop diagrams.
Representation using conventional notation 1 x 1 straight lock, 1 x 1 cross lock, half-cardigan, full-cardigan, 1 x 1 weft locknit and 2 x 1 weft locknit structures.

Book References:
1. Grammer of Textile Design by H. Nisbet
2. Laboratory Practice in Knitting Technology by L. Kudriavan (Publisher: Mir Publishers, Moscow)
3. Watson's Textile Design and Colour by Z. Grosicki

Practical : Marks - 25   Contact hour/week: 0 + 2

General procedure for the analyses of woven and knitted fabric. Determination of specifications for the reproduction of fabric samples of all types. Practical setting of sample and compound structures. Calculations relevant to woven and knitted fabric structure.

N.B. Per year 3 to 4 Running Textile Mill visit necessary.

206. Textiles Raw Materials(Man made) - 2

Theory : Marks - 50   Contact hour/week 2 + 0

Introduction and historical development of man-made fibres,Definition and classification of man-made fibres, Significance of man-made fibres, Advantages and disadvantages of man-made fibres, Principles of different spinning systems, Different fibre structures and their effects on fibre properties, Yarn texturing.

Technologies of formation of regenerated fibres. Their properties and uses: Different types of viscose rayon and acetate rayons, derivatives of cellulose, different types of regenerated protein fibres.

Technologies of formation of purely synthetic fibres, their properties and uses: Polyamides, Polyesters, Polyacrylics, Polypropylenes, PVA, PVC and Elastomeric fibres.

Formation of carbon fibres, Bi/Multi-component fibres, glass fibres and metallic fibres, their properties, their properties and uses.

Present trends of chemical fibres production and their economic and social aspects.

Book References:
1. Hand Book of Textile Fibres 1- Natural Fibres by Cook. J. Gordan.
2. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman
3. Textile Fibres, Dyes & Processes by Howard L. Needles
4. Textiles: Fibre to Fabric by Corbman, Bernard P
5. Textile Fibres by Mathews (John Wieley & Sons Inc.)
6. Textile Raw- Materials by Abu sina Md. Ruknul Quader

207.   Textile Physics-1

Theory : Marks - 50   Contact hour/week 2 + 0

Physical structure of fibers

Crystallinity and orientation, Basic concepts of methods for investigating fiber structure, e.g. X-ray diffraction, optical and electron microscopy infra-red absorption, relations between fiber properties and structure of fiber.

Detailed study of fiber properties

Mechanical properties — Tensile strength(tenacity), flexural and torsional properties, stress/strain relations under various conditions, Modules of elasticity, plasticity, creep and relaxation.

Effects of moisture — Effect of water on fiber e.g. swelling.

Frictional properties – Importance in drafting experimental methods of measurement. Effect of lubricant and dyes. Relationship of frictional properties of knitting, stitching and sewing.

Optional properties — Reflection, refraction, scattering, polarization, bire fringence.

Thermal properties — Absorption and emission of radiation, Energy changes asociated with changes of state including transition temperature of fibers. Moisture content and heat of wetting.

Book References:
1. Physical Properties of Textile Fibers by W.E. Morton & J.W.S. Hearle
   (Publisher: Butterworth & Co.Ltd. and Textile Institute)
2. Textile Fibre and their uses by Hess

208 . Textile Testing and Quality Control — 1

Theory : Marks - 50   Contact hour/week 2 + 0

Introduction to Textile Testing and Quality Control, Importance of Textile Testing and Quality Control, Sampling methods for fiber.

Moisture: Moisture content and moisture regain standard moisture regain of different fibers, Relative humidity measurement of relative humidity, standard conditions for testing importance of moisture regain, methods of measurement of moisture in textiles.

Fiber Testing: Length, staple length, effective length, span length, fiber length dispersion, Short fiber percentage, methods of test, Fineness and maturity of cotton, Importance in processing, Relationship between fineness and maturity, Methods of measurement and expressions of results, Maturity ratio, measurement of foreign matters in fiber sample.

Tensile strength(Tenacity) — Single fiber and fiber bundle test, comparison of different methods and between single fiber and bundle test.

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

Book References:
1. Principles of Textile Testing by J.E. Booth (Publisher: Newnes Butterworths)
2. Textile Testing by Skinkle
3. Technology of Textile Testing and Quality Control by Elliot B. Grover D.S. Hamby

Practical :   Marks - 25   Contact hour/week: 0 + 2

Determination of Moisture regain and moisture content of cotton, Fiber length and length characteristics, Fiber fineness, Maturity ratio of cotton fiber, Trash content in cotton, Fiber strength by pressley, Strength tester, Fiber properties measurement by High Volume Instrument (HVI) and Advanced Fiber Information System (AFIS), Hank of sliver and roving, count of yarn by wrap reel and balance in different counting systems, Count of yarn by (i) Knowles balance (iii) Inadrant balance, Twist of single and double yarn.

209 . Statistics

Theory : Marks - 75   Contact hour/week 2 + 0

Introduction to descriptive statistics: Collection of data; Organizing and presentation of data; Importance of Statistical data; Population and sample.

Frequency Distribution: Grouped frequency, distribution and their presentation in the form of frequency polygon and histogram

Measurement of Central Tendency: Mean, Arithmetic mean, Geometric mean, Harmonic mean, Median, Mode, definition, computation, advantages, disadvantage and uses

Measurement of Dispersion: Absolute measurement, Range, Mean deviation, Quartile deviation, Standard deviation, Relative measurement, Co-efficient of variation. definition, computation and uses.

Moment, Skewness and Kurtosis: Definition, computation and uses

Probability: Simple idea of probability, Different definitions related to probability, Addition law of probability, Multiplicative law of probability, Dependent and independent probabilities, Bayes' Theorem, Discrete and continuous probability distribution, Concept about probability distribution, Binomial, Poisson distribution and Normal distribution and their practical applications, ideas on multiple correlation, Concept of sampling, Types of Sampling distribution and their application in statistics.

Correlation and Regression: Basic idea about correlation, Measure of correlation, Pearson correlation coefficient, and Spearman's rank correlation coefficient, Computation correlation coefficient and rank correlation coefficient

Concept on simple regression: Scatter diagram, Distinction between regression and correlation, importance of regression analyses in statistics, Concept of dependent and independent variables Computation of regression parameters, Practical exercises on the regression line, Concept of multiple regression, Regression coefficients and their interpretations, R- square and its interpretation

Test of Significance: Basic idea on test of significance, Different test statistics, Student's t, Fisher's t Chi- square, Paired t- test and variance ratio, Concept on test of hypothesis, Types of hypothesis importance of test of hypothesis in statistics, Types one and two errors, confidence interval, the P-value, Design of experiments, one way and two way of analyses of variance, Computation of analyses variance table

Sampling fundamentals: Drawing random sampling, Sampling frame, Steps of designing a sample survey, Sampling frame, Steps for designing a sample survey, Sampling and non sampling errors, Probability sampling and non probability sampling, Types of sampling and sample size determination

Statistical quality control:

Introduction, The classical time series model, Description of trend, Measurement of seasonal variations, Concept on Quality of control process and product control, Control chart and control limits, Computation of quality control limits, CL, UCL, LCL

Book References:

1. An Introduction to statistics and probability by M.N.Islam
2. Theory and problems of statistics by M.R.Spiegel
3. Methods of statistics by Ahmed, Bhuiya, Rezard Hossain
4. Introductory statistics wiley and sons, NY; by Hool, P.G
5. An Introductory statistics 3rd Ed. wiley and sons, NY; by wonnacot, T.H. and Wonnacot R.J
6. Probability McGrow Hill, NY; by lipschutz.T
7. Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor.

210. Elements of Electrical Engineering & Electronic

Theory : Marks - 50   Contact hour/week 2 + 0

Electrical Engineering

D.C. Current – D.C. fundamentals, Generators and their characteristics motors and their characteristics, Speed control process.

A.C. Current – A.C. Fundamentals, Flow of A.C. through coils, Inductance and resistance in series and in parallel, Power in A.C. Circuits, Power Factor and Power Factor Improvement, Resonance circuit, Transformer, Poly phase circuits, Induction motors.

Sub-station – Its purpose, Substation equipments (HT. LT Switch gear etc.), Distribution board and sub-distribution board.

System network – Typical distribution circuits, cables and wiring systems and their selection

System protection – Types of faults, (transformer and motor) principles of protection, Protective devices – circuit breaker, switches, starter.

Electrical hazards – Protection against shock and fire, earthing and its importance, procedure to be adopted when a person is in contact with a live contact.

Electronics- Amplifiers, Rectifiers and Transistors Diodes and their uses voltage amplification. Power amplification, Photo sensor and Transducer, Integrated Circuits (I.C.).

Book References:
1. Introductory Circuit Analysis by Boylestad
2. Introduction to Electrical Engineeringby R. P. Ward
3. A Text Book of Electrical Technology (Vol 1 & 2) by B. L. Theraja
4. DC & AC machinery by Rosenblatt
5. Electrical Machine by Bhattacharje
6. Alternating Current Machine by T. C. Lloyd

Practical :   **Marks - 25**   Contact hour/week: 0 + 2

Study on – D.C. circuits, A.C. circuits, D.C. motors, Induction motor, A.C. and D.C. generators, single phase transformer, 3-Phase transformer, Star-delta starter, Half-wave and Full-wave rectifier. Transistor amplifier circuit, Transducer and sensor application circuits.
Application of I.C's in every day and industrial use.
House wiring and layout of a factory (Electrical).

211. Elements of Mechanical Engineering & Machine Design
Theory : Marks - 50   Contact hour/week 2 + 0

Thermodynamics and Heat Transfer
Fundamental concepts and definitions. Revision of gas laws; properties of perfect gas and steam, laws of thermodynamics; thermodynamic process and cycles, Vapour power cycles-Rankine, Reheat.
Different modes of heat transfer – conduction, convention and radiation. One dimensional steady state conduction of heat in solid plane wall. Radiation heat transfer, the law of black-body radiation.
Hydraulics – Properties of fluids, pressure head of a liquid, pressure gauges, flow of fluids, Bernoule's equation, General energy equation for steady flow. Laminar flow and turbulent flow, head loss due to friction in a pipe, flow through circular orifices.
Compressed air – General discussion, textile applications and safety.
Pumps – Characteristics and application of reciprocating and centrifugal pumps.
Boilers, Steam engine, Diesel and Petrol engine, Gas turbine.
Friction : Limiting friction and co-efficient of friction, screw friction, efficiency of screw jack, friction in journal bearing, friction clutches, rolling resistance.
Mechanism : Crank connecting rod mechanism, Quick return mechanism, links, Kinematics pairs
Transmission of motion and power – by belt, ropes, chains and gears; geartrains.
Conversion of motion – Shedding, tappets and cams, Shearing force and bending moment, impact of forces, momentum, torque, torsion, moment of forces and its application in textile machines. Methods finding radius of gyration of revolving or oscillating bodies.
Machine Design: Tolerances and allowances, variable loads and stress concentration. Design of screw joints, riveted joints; Spring; Columns; Keys and couplings; Journal, ball and roller bearings, pressure vessels.

Book References:
1. Heat Transfer by Kreith
2. Heat Transfer by Holman
3. Heat Transfer by Gebhat
4. Mechanical Engineering Design (5th Edition Mc-Graw Hill Int.) by J.E. Shigley & C.R. Mischke
6. Mechanics of Machine (2nd ed. SI metric) by Stephen & Hanna
7. Mechanics of Materials 1 by E. J. Hearn
8. Theory of Machine by R. S. Khurmi & J. K. Gupta
8. Fluid Mechanics by Shames
9. Fluid Mechanics by Fox & Mcdonald
10. Fluid Mechanics (1st SI metric ed.) by Streeter, Wylie

Practical :   **Marks - 25**   Contact hour/week: 0 + 2
Study and experiments based on TXE 307. Conduction and Convection heat transfer, Bernoulli's experiment, flow through pipes and circular orifice, Centrifugal pump, boilers, I.C.E.

212 . Computer Science

Basic Programming Technique

Writing Algorithm and Drawing Flowchart, Use of different commands, C / C'' / JAVA (variables, operators and formulas, input-output statements, branching and looping, library functions, defining functions and subroutines, arrays and subscripted variables, sequential and random data files, use of colour and sound, microcomputer graphics).

Introduction to different types of microprocessor

Microprocessor architecture, Instruction set, I/C operations, Interrupt structure, Interfacing and interfacing ICs, Microprocessor based system design

Introduction to robotics: Definitions, Industrial robots, Robot structure and robot configuration, Robot drives and control systems, Robot sensors, Robot Applications

Introduction to control systems and their representation

Different types of control systems, Hydraulic and pneumatic control systems, Elements of electro mechanical controls, Introduction to digital computer control

Book References:

1. Mechatronics by D. A. Bradley
2. Mechatronics by W. Bolton
3. Modern Control System (8th ed.) by Dorf & Bishop
4. Automatic Control Engineering by Francis H. Raven
5. Feedback & Control System by Di Stefano
6. Engineering Instrumentation & Control IV by Adams
7. Measurements & Instrumentation by Adams
8. Pneumatics & Hydraulics by Stewart

B.Sc. in Textile Engineering
Third Year
301. Yarn Manufacturing – 2

Theory : Marks - 100   Contact hour/week 3 + 0

Short Staple

Comber – Objects of the combing process. Methods of comber lap preparation and importance arrangement of fiber in card sliver. Principles of comber, Cycle of operations. Comber waste and waste control. Main comber settings, effect of change of settings on sliver quality, waste quality and percentage extraction, Methods of waste removal, Drafting system. Sliver system. Sliver coiling system.

Speed frame – Objects of speed frames. Detailed study of types of drafting systems, amount and distribution of draft. Twisting and amount of twist for different materials, use of false twist. Winding and Bobbin Building, Drives to Bobbins, Bobbins rail and Spindles. Object and action of cone drum drive and differential motion, alternative methods of bobbin drive. Builder mechanism. Setting, Speeds and Productions.

Ring frame – Function of ring spinning process, description of main working parts, Drafting systems, types of spindle, ring and travellers, Yarn tensions and forces acting on the traveller. Winding, building mechanism, Settings, Speeds and Production. End breaks.

Study of doubling and Twisting machines, different systems of doubling. Reeling, building, baling Brief outline of modern spinning systems

Long Staple

Objects and functions of jute drawing. Detailed study of jute drawing frames, drafting system. Suitable drafts and roller settings.

Objects and functions of flyer and other spinning machines, types of drafting system, Twisting and winding. Bobbin building mechanisms. Amount of twist necessary in jute yarns. Brief outline of modern spinning systems for jute yarns.

Book References:

1. Textiles: Fiber to Fabric by Corbman, Bernard P
2. General Technology of Cotton Manufacturing by P.T. Bukayer (Publisher: Mir Publisher)
3. The Technology of Combing & Drawing Vol-3 by W. Klein
4. A Practical Guide to Ring Spinning V-4 by W. Klein
5. Jute Fiber to Tarn by R.R. Atkinson (Publisher: A Heywood Book, Temple press Book Ltd.)
6. A guide to Jute Technology by Sadruddin Ahmed

Practical :   Marks - 50   Contact hour/week: 0 + 2

Short Staple: Practical study of Comber, Speed frame, Ring frame, Doubling and Reeling machine of cotton spinning

Long Staple: Practical study of Drawing frame, Spinning frames of jute spinning.

302. Fabric Manufacturing – 2

Theory : Marks - 100   Contact hour/week : + 0

Weaving

Features of automatic looms. Weft replenishment, Methods of weft patterning, Warp protector motion Side and center weft fork motion, Warp stop motions.

Jacquard Weaving – Scope, Types and Basic principle of Jacquard shedding Classification of Jacquards, S.L.S.C., D.L.S.C. & D.L.D.C. Open shed, center shed fine pitch and cross border Jacquard shedding. Systems of harness mounting, Method of increasing the figuring capacity of Jacquard costing out, Card cutting and lacing, Jacquard calculations.

Study of board (C.B.C.) loom. Time studies in weaving and calculation of weaver's load, Cloth costing. Causs of warp and weft breakage in weaving, Cloth faults and their remedies, Factors controlling loom efficiency and means of increasing loom efficiency, Relevant calculations.

Knitting: Introduction and historical background of Knitting Technology, Hosiery yarns.

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General terms and principles of knitting Technology, Knitting action of latch, bearded and compound needle. Basic mechanical principles of Knitting Technology, Elements of knitted loop structure Warping. Plain circular latch needle machine. Description, knitting action, Cam system, Sinker timing.

Circular Rib machine – Description, knitting action, needle timing etc.

Circular Interlock machine – Description, knitting action, interlock cam system, etc.

Purl knitting machine – Description, purl needle transfer action, Use of dividing cams, use of spring loaded cams, characteristic features of the knitted fabric. Hosiery machine drive, control mechanism and sequences.

Hosiery machines – Mechanism for welts, heels and toe production, Hosiery stitch control mechanism.

Study on weft knitting machines – Fabric machine, Garment length machine

Stitches produced by varying the timing of the needles, loop intermeshing

Straight bar frame – Development, Fully fashioned article, knitting action of straight bar frame, Rib to plain machines.

Double cylinder hosiery machine, Closed toe hosiery machine, Knitting Argyle designs on circular half hose machine, Fish net, stockings and panty house production.

Basic warp knitting principles – Terminology mechanism and Classes of warp knitting machinery Tricot and Raschel machines, knitting cycle of bearded beedle Tricot and single needle bar Raschel machines. Compound needle warp knitting machine, Crochet machine, warping.

Tricot two full set guide bar m/c and its product. Rules for product. Rules for locknit, Tricot, Sharkshin etc. fabric production. surface interest, relief and open work fabrics. Calculations related to weft and warp knitting.

Non-woven

Definition and classification. Methods of web formation Conventional method of non-woven fabric formation. Modern techniques for the production of non-wovens. Properties and uses of non-woven fabrics. Fault and remedies of non-woven fabrics, Environmental problems caused by non-woven fabrics.

Book References:

1. Textiles: Fiber to Fabric by Corbman, Bernard P
2. Weaving Conservation of Yarn to Fabric by Lord, P.R.& Mohamed, M.H.
3. Weaving Calculations by R. Sen Gupta (Publisher: B.D. Taraporevala Sons & Co. Private Ltd.)
4. General Technology of Cotton Manufacturing by P.T. Bukayer (Publisher: Mir Publisher)
5. Laboratory Practice in Knitting Technology by L. Kudriavan (Publisher: Mir Publishers, Moscow)
6. The Mechanism of Weaving by Thomas W. Fox
7. Fabric manufacturing -2 by Abu sina Md. Ruknul Quader

Practical :   Marks - 50   Contact hour/week: 0 + 2

Weaving

Practical study of the relevant machinery. Dismantling and reassembling of various parts. Operation of machinery. Visit to manufacturing plants etc.

Knitting

Practical study of different mechanisms – feeding, drawing-off, winding and receiving, driving and stopping mechanisms. operational technique of knitting machinery. Detection of fabric specification from given samples.

303. Wet processing – 2

Theory : Marks - 100   Contact hour/week 3 + 0

Technology of Dyeing – Structure and application of Sulphur, Azoic, Reactive and Disperse dyestuffs on different fibers, Stripping.

Dyeing machineries: For different types of dyeing processes loose Fibers, Yarn, Packages, Fabrics) Continuous, Semi-continuous and discontinuous process.

Technology of Printing: Flow chart of Printing, Thickener and types of Thickeners, Methods and styles of Printing; Machineries used in printing; Printing processes for different fibres with Direct, Acid, Basic and Vat dyes.

Printing process for different fibers with reactive, Azoic and Disperse dyestuff. Assistants used in printing operations and their functions; Structure of Pigments, Pigment printing, Computer aided print designs, Garment printing, Novelty printing effects, economics of printing processes.

Technology of Finishing – Definition and classification of finishing; Physical and Mechanical Finishing of Cotton, Jute, Wool and fabrics; Shearing and Cropping, different types of calendering, measuring and cutting, making up of different jute goods. Hoop-length and dead weight measurement calculations, raising, beetling, breaking, folding sanforising; chemical finishing; mercerization and parchmentisation, resin finishing, water repellency, flame retardancy.

Book References:

1. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman
2. An Introduction to Textile Finishing by J.T. Marsh
3. Modern Techniques of Textile Dyeing, Bleaching & Finishing by S.M. Arora
4. Chemistry of Dyes & Principles of Dyeing by V.A. Shenai
5. An Introduction to Textile Printing by Butterworth
6. Textile Chemistry-2 & 3 by Abu sina Md. Ruknul Quader
7. Textile Printing by L.W.C Miles
8. An Introduction to Textile Printing by W. Clark

Practical :   Marks - 50   Contact hour/week: 0 + 2

Dyeing of various fibers with sulphur, Azoic, reactive and Disperse dyestuffs. Printing of different fabrics with Direct, Basic, Acid, Vat, sulphur, Azoic, Reactive and Disperse dyestuff. Pigment printing, Production of water repellent and flame retardant effects on different fabrics.

304 . Garments Manufacturing – 2

Theory : Marks - 100   **Contact hour/week 3 + 0**

Sewing: Seam properties, types and usages; Stitch types, properties and usages; Principle of lock stitch and chain stitch formation; Sewing machine-feed mechanism, needles, Sewing thread, Sewing problem and remedies, Sewing machines, Work aids in sewing, Simple automatic machines.

Alternative methods of joining fabrics – Welding, adhesives, Fusing, Moulding and their comparison.

Trimmings – Discussion on label and motifs, Chain, Buttons, lining, Hood and loop fastening, shoulder pad, lace braid and elastic, performance of trimmings.

Pressing and finishing – Objects, types, methods and International care labeling codes.

Folding and Packing – Types, methods, equipments, symbol and markings.

Discussion on garments washing, dyeing and drying machines.

Garments washing – Concept of washing, requirements of washing, different types of washes –

305. Textile Physics – 2

Theory : Marks - 75   **Contact hour/week 2 + 0**

Electrical properties – Electronic properties of solids, conductors and insulators, capacitance, di-electric constant, effect of moisture. Measurement of di-electric constants of fibers, yarns and fabrics.

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

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

Yarn geometry, effect of yarn strength (obliquity effect) luster, yarn diameter and handle.

Fiber migration, theory and causes of migration of fibers to surface or core of yarn.

Geometry of plain woven fabrics, calculation knowing crimp ratio and thread spacing. Geometry of jumped conditions, crimp interchange, effect of yarn flattening, deformation of fabric.

Application of cloth geometry, Tensile testing, geometrical change during extension of fabrics.

Fabric buckling, shear and drape, Geometry of plain knitted structure.

Engineering design of fabric to meet specific mechanical properties.

Prediction of tensile properties of fabrics

Book References:

1. Physical Properties of Textile Fibers by W.E. Morton & J.W.S. Hearle
   (Publisher: Butterworth & Co.Ltd. and Textile Institute)
2. Textile Fibre and their uses by Hess

306. Textile Testing and Quality Control – 2

Theory : Marks - 75   Contact hour/week 2 + 0

Yarn Testing

Sampling methods, irregularity; measurement of sliver, roving and yarn by cutting and weighing methods, thickness under compression, capacitance and other methods; length variance curves. Use of spectrogram for analyses of periodic, random and drafting wave variation, Measurement of imperfections. Comparison of results with Uster statistics. Measurement of yarn hairiness

Measurement of tensile strength of yarn; single thread, skein or lea strength and ballistic test; comparison of results, CRT, CRE, and CRL machines and methods of loading.

Fabric Testing: Fabric dimension, measurement of length, width, thickness; ends and picks per unit length in woven fabric; courses and wales per unit length in knitted fabric. Crimp of yarn in woven and knitted fabric.

Methods of measurement for tensile, tearing, bllistic and bursting tests. Relationship of fiber yarn and fabric strength.

Measurement of fabric stiffness and its relation to handle and drape.

Measurement of air, water permeability/retention, water pressure; crease recovery. Serviceability, wear and abrasion tests, pilling of fabrics. Flame retardant/flame resistance tests.

Measurement of fastness to light, washing and rubbing. Estimation of damage to materials caused by physical and chemical treatments viz. Singeing securing, bleaching, Determination of size and filling.

Carpet testing – Carpet thickness, compression and durability, Identification of fibers

Book References:

1. Principles of Textile Testing by J.E. Booth (Publisher: Newnes Butterworths)
2. Textile Testing by Skinkle
3. Repair & Adjustment of Textile Machines

Practical :   Marks - 25   Contact hour/week: 0 + 2

Determination of (i) Single yarn strength by single strength tester (ii) Lea strength and C.S.P. of yarn (iii) Irregularity of sliver, roving and yarn (iv) Imperfections Analyses of spectrogram

Determination of (i) Woven and Knitted fabric dimensions (ii) Fabric weight/unit area (iii) Cloth thickness (iv) Size percentage in fabric (v) Porosity of fabric (vi) Fabric strength (tensile, tearing, ballistic and bursting) (vii) abrasion resistance of fabric (viii) Fabric crease recovery (ix) Water repellency, water absorption, Carpet testing, Identification of fibers from a given sample (single or blended).

307 . Industrial Psychology & Management

Theory : Marks -100   Contact hour/week 3 + 0

Industrial Psychology : Principles of human behaviors, Motivation of behavior and mechanism of adjustment of conflief , analysis of human and any antirational behaviors.

Management and Organization

Definition, Function and role of management, Nature and scope of business, Direction and Communication, Controlling-budgetary control; Organization-structure, Type of structure, Work measurement and Wage plan operational research, Span of Supervision, Motivation, Leadership, Nature of Behaviour, Personality, Psychology of labour/management reactions from different types of companies.

Personnel Management

Concepts, Policy, Structure and Functions of personnel department. Line and staff organization, Recruitment, Training, Job evaluation, Methods of remuneration, Organization of employers and work people, ILO, Trade union organization, Collective, Bargaining, Labour Welfare, Disputes, Job specifications, Job descriptions, disciplinary actions show cause, charge sheet etc. Health, Safety and working conditions.

Textile Industry and law, Health and hazard, Waste management.

Production Economics

Basic concepts in economics – utilities of goods, wealth, value, price and want. Theory of utility of supply and demand. Elasticity of supply and demand. Problems of allocation and investment study capital.

Production - factors of production-division of labour, location of industries, specialization. The economics of small scale and large scale production. Producers curves and production function.

Investment Decisions

Feasibility studies to set up a new Mill – Economic, Market, Financial and technical feasibility studies. Economic evaluation and comparison of alternative investments – Capital budgeting technique. Project Management through CPM/PERT.

Textile industry and laws, Health and hazard, Waste management.

Book References:

1. Management by James A.F. Stoner & R. Edward
2. Management by Ricky W. Griffin
3. Management by Harold Koontz & Heinz Weihrich
4. Management by Kathryn M. Bartol & David C. Martin
5. Management byW. Rue & Lloyd L. Byars
6. Financial Management- Texts & Problems by M.Y. Khan & P. K. Jain
7. Fundamentals of Financial Management by E. F. Brigham & J. F. Hauston
8. Financial Management by I. M. Pandey
9. Financial Decision Making- Concepts, Problems & Cases by John J. Hampton
10. Labor & Industrial Laws of Bangladesh (1st ed.) by Chowdhury
11. Basic Labor Laws of Bangladesh by Iqbal Ahmed
12. Bangladesh Labor & Industrial Law by A. A. Khan
13. Industrial Relations by M. Arora
14. Industrial Relations- Theory& Practices, Prentice Hall by Michael Salamon
15. Industrial Relations, Tata McGraw Hill Publishing Inc. by Arun Monappa
16. Industrial Labor Ordinance (ILO 1969), People's Republic of Bangladesh
17. Personnel Management & Industrial Relations, The world Press Private Ltd. by Biswanath Ghaosh
18. J.P poe- American business.

308 . Sociology

Theory : Marks -75   Contact hour/week 2 + 0

Scope of sociology: Micro and Macro sociology. Some fundamental concepts. Society from savagery to civilization.

Social evolution and techniques of production: Social structure of Bangladesh.

Oriental and occidental societies: Feudalism.

Industrial revolution: the growth of capitalism, Features, Social consequences. Social fascism.

Social Pathology: Crime, Juvenile delinquency, Slum

Urban ecology: city, Pre industrial and industrial, growth and nature of cities in Bangladesh. Rural sociology: Features of Village community in Bangladesh, Social mobility, Urban-rural contrast. Social structure of the tribal people of Bangladesh.

The concept of work: Work and art, Nature of industrial work, Work ideology, Work values.

Role of work in Man's life: Work and mental health. Work attitudes, Work involvement. The motivation to work, Work satisfaction, Commitment to industrial work, Development and commitment of the industrial labor force in Bangladesh.

The concept of work: Work and art, Nature of industrial work, Work ideology, Work values.

Role of work in Man's life: Work and mental health. Work attitudes, Work involvement. The motivation to work, Work satisfaction, Commitment to industrial work, Development and commitment of the industrial labor force in Bangladesh.

The worker and the factory: The factory system and its characteristics. The formal relations of production in the factory system.

The industrial Bureaucracy: The executives in the industrial bureaucracy.

The role of worker: Industrial production and the worker's role, Social relations at work motivation.

Book References:

1. Sociology: A guide to Problems and Literature by Blackie and Son (India) Ltd; Bottomore, T.B.1975.
2. Environmental Sociology, Routledge, London by Horton, P.B. and Hant, C.L., 6th Ed., Mc-Graw Hill. Hanningan, J.A. 1995.
3. Planning Commission: Taskforce Report on Urbanization and Industrialization
4. Environment and Development in Bangladesh by Rahman, Atiqur et.el.
5. Sociology by Worth Publishers, Ince. New York; Robertson, I., 1977.
6. World Commission on Environment, Our Common Future
7. Survey Methods in Social Investigation, the English Language Book Society and heinemann Educational Books Ltd. London; Moser, C.A. and Kalton, G., 1979,

309 . Application of Computer in Textiles

Theory : Marks - 75   **Contact hour/week 2 + 0**

Use of computer in Textile Manufacture (Machine/process control, dye recipe formulation, quality control, colour matching, mixing ratio formulation etc.), General programming principles used in developing business and Textile applications of computers (Payroll, stock control, whole retailing etc.), Series of structure on C-language.

Principles - System analyses, system design, documentation, and planning.

Applications – Critical path analyses, linear programming, accounting, forecasting etc. use of available textile related software.

Practical :   Marks - 25   **Contact hour/week: 0 + 2**

Practical application and practice of the above topics

401. Advanced Wet Processing (Optional)

Theory : Marks - 100   Contact hour/week 3 + 0

Pretreatment

Special scouring processes (solvent scouring and Vapour-loc scouring); Estimation of scouring Bleaching and mercerizing effects; Estimation of available chlorine in bleaching powder, Faults and damages in bleaching.

Dyeing

Dye Aggregation; interaction of dyes and fibers, Mechanism of Dyeing, Dyeing Kinetics (Diffusion, Pore, Model, Free volume model). Thermodynamics of dyeing (dyeing Isotherms, Affinity/Standard Chemical Potential difference).

Structure and application of Mordant dyes, Pigments and Mineral colorants on different fibers

Additive and subtractive colour mixing. Colour measurements, CIE and Lab Systems of Colour . Measurement, Spectrophotometers. Colour fastness. Assessment of colour-fastness with gray scale Faults in dyeing and their remedies. Dyeing of blended fibers and fabrics.

Printing

Special printing methods (Transfer Printing, Jet printing, Flock printing, Burn-out printing) Faults in printing and their remedies.

Special types of thickeners (Synthetic Polymers, Emulsion thickeners); methods of screen and roller preparation; detailed study on screen printing technology.

Finishing

Removal of excess water and various drying systems in wet processing. Low-wet pick-up finishing and its Importance, application of optical brightening agents. Lectures on recently published research and developments in wet processing.

Softening agents (different types, applications, special finishing treatments (rot-proofing, mildew proofing, insect and bactericidal finishes, soil lease finishes).

Book References:

1. Dyeing and Chemical Technology of Textile Fibres by E.R. Trotman
2. An Introduction to Textile Finishing by J.T. Marsh
3. Modern Techniques of Textile Dyeing, Bleaching & Finishing by S.M. Arora
4. Chemistry of Dyes & Principles of Dyeing by V.A. Shenai
5. An Introduction to Textile Printing by Butterworth
6. Textile Chemistry -1, 2 & 3 by Abu sina Md. Ruknul Quader
7.. Technology of Printing by Prof. V.A. Shenai

Practical :   Marks - 50   Contact hour/week: 0 + 2

Determination of hardness of water, Removal of hardness by different methods. Dyeing of different fibers with mordent dyes and pigments, Preparation of screen and printing of different fabrics by flat bed and rotary printing machines. Production of crease resistant cotton fabrics with different types of cross-linking agents.

Identification of dyestuffs. Colour fastness tests of different dyeings. Dyeing of blended fabrics with appropriate dyes. Colour matching by production of combination shade. Practical estimation of Scouring, Bleaching and Mercerizing effects. Printing of blended fabrics with appropriate dyestuffs Transfer printing.

402 . Special Wet Processing (Optional)

Theory : Marks - 50   Contact hour/week 2 + 0

Foam technology in wet processing (foam generation, application, advantages and disadvantages); Solvent dyeing, Dyeing under hypercritical conditions; Computer assisted recipe calculations. Human colour vision, Metamerism, Tri-chromatic theory of colour vision and colour matching equations. Effluents in wet processing, their effects on environment, various types of effluent treatment and disposal systems.

Practical :   **Marks - 25**   Contact hour/week: 0 + 2

Practical application and practice on the above topics.

*403. Utility Service & Maintenance of Textile Machinery

Theory : Marks - 75   Contact hour/week 2 + 0

Maintenance – Types of maintenance, planning and organizing maintenance, repair cycle, maintenance stages, lubrication and lubricants, Inspection.

Inventory Management – Types of inventory, cost analyses of inventory, inventory control, economic order quantity (EOQ), economic lot size, lead time, Mean absolute deviation (MAD), Re-order level.

Material handling – Conveyors used in textile mill – belt conveyor, chain conveyer, hydraulic press and lift, truck hoist.

Air conditioning – Comfort condition, psychometric chart, Heating, cooling, dehumidification, humidification, Ventilation, Filtration, Mill illumination

Ergonomics – Definition, importance and application of erogonomics to work place and layout

Machine erection – Floor preparation, foundation, machine fixation, leveling etc.

Safety in textile mill – Industrial hazards, safety rules, factory act, first aid and pollution control

Practical :   **Marks - 25**   Contact hour/week: 0 + 2

Practical application and practice on the above topics of respective departmental machineries as follows

Maintenance of Wet processing Machinery (Optional)

Preparatory machineries: Maintenance of singeing, kier boiler, J-box, Rope washing machines, boilers

Dyeing Machineries: Maintenance of jigger dyeing, Wich dyeing, HTHP, dyeing, Hank dyeing machineries.

Finishing machineries: Maintenance of different padding maugles, Dying machineries, Stenter Mercerinzizng machines, Calendaring and folding machines.

Printing machineries: Maintenance of different roller printing and screen printing machineries.

Laboratory machineries: Maintenance of different laboratory machineries.

Book References:

1. Technology of Printing by Prof. V.A. Shenai

*404. Textile Testing and Quality Control – 3

Theory : Marks - 100   **Contact hour/week 3 + 0**

Definition and purpose of Q.C., S.Q.C., Q.A., T.Q.M

Introduction to and Administration of Quality Control Department. Duties and responsibilities of quality control officers. Use of standards BSTI, ISO, ASTM, British, Pakistan and Indian standards. Quality Control and Inspection Planning.

Quality control charts use of charts and setting of limits. Analyses of variance, acceptance sampling, correlation analyses to determine relationship between various factor, tests of significance.

Acceptance tests and inspection of raw materials for each sector of the industry.

Yarn manufacturing – raw cotton/jute/chemical fibers.

Fabric manufacturing – yarns.

Wet processing – yarn and fabric, Dyes and auxiliaries. Garment manufacturing finish fabric, sewing thread.

Process and finished goods control for each sector of the industry. Effects of process control on costs and quality. Parameters measured, Sample sizes, Tests made, Results expected at each stage of processing from fiber to finished garment production.

Book References:

1. Process Control in Spinning by A.R. Garde & T.A. Sabramian
2. Technology of Textile Testing and Quality Control by Elliot B. Grover & D.S. Hamby

Practical :   Marks - 25   **Contact hour/week: 0 + 2**

Quality control practices for yarn, Grey fabrics, finished fabrics and garments including use of control charts, Industrial visits.

*405. Production Planning and Control

Theory : Marks - 100   **Contact hour/week 3 + 0**

Functions and types of production; production life cycle; capacity planning, process planning; process design; PPC function – Forecasting, Loading, scheduling, dispatching, order control; Line balancing; plant layout; Plant location factors; Inventory control, Purchasing Principles – make or buy decisions Quality control in production life cycle, Maintenance and productivity.

Work Study

Method study, Purpose and techniques used; Procedure of select, Record, Examine, Develop, Install and Maintain.

Precautions when introducing new methods, Relationship with work measurement.

Work measurement, purpose and techniques used, Rating, Elements, Break points, Basic time, Use of allowances.

Activity sampling. Definition, purpose and procedures, use of pilot study, Interpretation of results.

Production studies. Machine utilization and operator performances. Hok (operator hours per 100 Kg production) Machine interference. Materials handling. Mechanical and static handling.

Book References:

1. Production & Operation Management (2nd ed.) by S. N. Chary
2. Operation Management (5th ed.) by Heigeh & Render
3. Production & Operation Management by R. Panneerselram
4. Operation Research- An Introduction by Taha
5. Probability & Statistics for Engineers & Scientists by Walpole & Meyer
6. Apparel Manufacturing by Glock, Ruth

*406. Industrial Economics, Accounting and Marketing

Theory : Marks - 100   **Contact hour/week 3 + 0**

Industrial Economics : Types of interest, nominal and effective interest rates, present worth and discount, Types of taxes, Capital gains tax, tax returns; Insurance, types of insurance, Types of depreciation, service life, salvage value, present value, methods for determining depreciation, Profitability, attentive investments and replacements, Mathematical methods for profitability evaluation.

Asset and Cost Accounting

Principles and practice of book-keeping, single entry and double entry system, journal, ledger, cash book, trial balance, partnership, shares joint stock company, sole trader ship, manufacturing, Trading and profit and loss accounts, Balance sheet, consignments, forms of sales consignments, consignee proforma invoice, bill of exchange, Description of Assets and Equipment.

Function and advantage of costing, Methods of cost accountancy, Elements of cost accounting, direct and indirect expenditures, cost of overhead and cost accounts and financial accounts for firms, Standard cost preparation of cost sheets and statements, break even analyses, stock taking and control of stock and stores, payroll, Dummy worker on payroll.

Marketing

Concept, Scope and Functions of marketing tools, product concept, types and product development, types of markets, market segmentations, approaches of marketing Sales promotion and advertisement, export marketing, Distribution channel and pricing of product for local and export markets, Export Marketing and documentation methods of market study, Elementary marketing research.

Book References:

1. Advanced Accounting (Vol 1)
2. International Marketing by Cartler
3. Marketing Management by Cartler
4. H.E. Schwayer-Process Engineering economics ((chem, Engg. Series)
5. M.S. Peters and K.D.Timmerhaus-Plant design and economics for chemical engineering

*407. Project Work

Practical :   Marks – 100   **Contact hour/week: 0 + 6**

For successful completion of course work every students shall submit a project report on his project work, which would be selected and approved by the department. Every candidate shall be required to appear at an comprehensive oral examination on a date fixed by the head of the department and must satisfy the examiners that he is capable of intelligently applying the results of this research to the solution of problems of undertaking independent work and also afford evidence of satisfactory knowledge related to the theory and technique used in his research work

*408 . Industrial Attachment

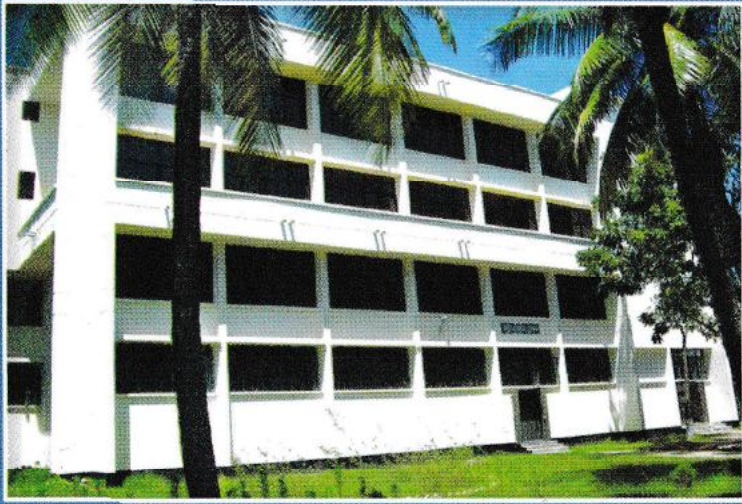**Practical :   Marks – 200**   **Contact hour/week: 0 +12**

For Industrial training or internship, the students will be placed in selected textile mills or organizations for eight weeks. On completion of the internship, the student will prepare and submit a industrial training report for assessment & examination.

*409 . Comprehensive Viva

Marks : – 100

A Comprehensive Viva will be taken for all students though who completed their all final years formalities by the head of the respective department.

PABNA TEXTILE ENGINEERING COLLEGE