Semester – IV (w.e.f. Session 2016-2017)

S N	Course No.	Course Title	Teaching Schedule (hrs)				Allotment of Marks				Duration of Exam (hrs)
			L	T	P	Hrs / Wk	Theory	Sessional	Practical	Total	
1	TT-202N	Yarn Manufacturing-II	3	1	---	4	75	25	---	100	3
2	TT-204N	Fabric Manufacturing-II	3	1	---	4	75	25	---	100	3
3	TT-206N	Textile Chemical Processing-II	3	1	---	4	75	25	---	100	3
4	TT-208N	Textile Testing-I	3	1	---	4	75	25	---	100	3
5	TT-210N	Textile Fibre - II	3	1	-	4	75	25	---	100	3
6	TT-212N	Yarn Manufacturing-II Lab	---	-	3	3	---	40	60	100	3
7	TT-214N	Fabric Manufacturing-II Lab	---	-	3	3	---	40	60	100	3
8	TT-216N	Textile Chemical Processing-II Lab	---	--	3	3	---	40	60	100	3
9	TT-218N	Textile Testing-I Lab	---	--	3	3	---	40	60	100	3
Total			**15**	**5**	**12**	**32**	**375**	**285**	**240**	**900**	
10	MPC-202N	Energy Studies*	3	---	---	3	75	25		100	3

*MPC-202N is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.

Note: All the students have to undergo six weeks industrial training after IV semester and it will be evaluated in V semester.

TT-202N
YARN MANUFACTURING-II

L T P	Sessional : 25 Marks
3 1 -	Exam : 75 Marks
	Total: 100 Marks
	Time: 3 hrs

Note : Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I
Combing
Objective, Different combing preparatory process for lap preparation – Sliver lap, Ribbon lap and Unilap machine, Different types of comber, Combing cycle of rectilinear cotton comber, Timing diagram for combing operation, Configuration of fibre feed and its effect on quality of product, noil percentage and fractionation efficiency of comber, Influence of type of feed on noil extraction and cleanliness of sliver, Calculation pertaining to draft, production and noil percentage.

UNIT-II
Speed frame
Objective, Working principle of speed frame, Construction and working of important parts, Mechanism of drafting, twisting and winding, Basic principle of designing of cone drum, Differential motions & Building motions, Common defects in roving packages, their causes and remedies, Processing of man-made fibres on speed frame , Recent development in speed frame. Calculations pertaining to draft, TPI and production, twist multiplier and roving twist.

UNIT-III
Ring frame
Objective, Principle and mechanism involved in drafting, twisting and winding, Ordinary and high draft systems, Rising and falling lappets, balloon control rings, Design and types of spindle, ring and traveler, Concept of twist multiplier and yarn contraction due to twisting, types of builds, Mechanism of package formation, Causes and remedies to control end breaks, Recent developments in ring frame, Concept of average mill count and 20's conversion.

UNIT-IV
Doubling
Objective and terminology, Requirement of feed package for yarn plying, Systems of doubling (dry &wet) study of ring doublers, Two for one twister (TFO)- objective & working principle, Calculation of draft, TPI and production of ring frame & doubling frame.

Suggested Text Books and References:

1. Klein, W., "Manual of Textile Technology: Vol. I. Technology of Short Staple Spinning", – Textile Institute, Manchester, 1998.
2. Klein, W., "Manual of Textile Technology: Vol. III. A practical Guide to Combing & Drawing", – Textile Institute, Manchester, 1995.
3. Klein, W., "Manual of Textile Technology: Vol. IV. A practical Guide to Ring Spinning", – Textile Institute, Manchester, 1995.
4. Klein, W., "Manual of Textile Technology: Vol. VI. Manmade Fibres and their Processing", – Textile Institute, Manchester, 1994.
5. Salhotra K R, "Spinning of Man Made Fibres and Blends on Cotton Spinning System",The Textile Association, Mumbai, 1989.
6. Salhotra, K.R., Alagirusamy, R. and Chattopadhayay (Eds.), R., "Course Material of Pilot Programme on Spinning: Ring Spinning, Doubling and Twisting", NCUTE Publication, 2000.

7. Chattopadhyay, R., and Rengasamy(Eds.), R., “Course Pilot Programme on Spinning: Drawing Combing and Roving”, NCUTE Publication, 1999..
8. Oxtoby, E. “Spun Yarn Technology”. Butterworths, London.
9. Khare A R, “Elements of Combing”, Sai book center, Mumbai, 1999.
10. Khare A R “Elements of Ring Frame and Doubling”, Sai book Centre, Mumbai, 1999.
11. Lawrence C A, “Fundamental of Spun Yarn Technology” CRC Press, USA,2003.
12. Booth J E, “Textile Mathematics”, Part II, Textile Institute, Manchester, 1978.

TT-204N
FABRIC MANUFACTURING – II

L	T	P
3	1	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note : Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I

Basic Concepts: General loom elements, classification of looms, primary motions of loom.

Tappet shedding: Negative tappet shedding, eccentric motion of shedding, designing of a shedding tappet, movements of healds, geometry of warp shed, calculation of the stroke of shedding tappet, Positive tappet shedding-link mechanism, Heald reversing motion, shedding motion principles-open shed, closed shed, semi open shed, Loom timing diagram, early shedding, late shedding, split shedding or stragerring of shed, Asymmetric shedding, lease rods, back rest, effect of shed timing and back rest settings on properties of fabrics.

Shuttle Picking : Function of picking, essential features of good picking, over picking, under picking- cone under picking mechanism, disadvantages of shuttle picking, Shuttle box and shuttle checking device.

Velocity and acceleration of picking elements, energy consumed, power of picking

Factors affecting the initial speed of shuttle, nominal movement of shuttle, theory of picking, picking cams- linear cam, parabolic cam, Factors affecting retardation of shuttle, Weft tension during propulsion and retardation of shuttle.

Beating: Function of beating,kinematics of sley, sley eccentricity ratio, reed drive by matched cams, accelerating force on sley, mechanics of beat up, relation between cloth fell position & beat up force, relation between pick spacing & beat up force, relation between cloth fell position & pick spacing, bumping of loom, effect of yarn irregularity on pick spacing.

UNIT-II

Secondary and auxiliary motions of loom, Secondary motion, Take up motion- negative take up, positive take up, five wheel take up motion, seven wheel take up motion, electronic take up.

Let Off Motion: Objective, negative let off motion, positive let off motion- basic requirements, tension control mechanism, electrical let off motion, warp tension variation. Auxiliary motions of loom, Objective, classification

Weft Stop motion: objective, side weft fork motion, centre weft fork motion

Warp Stop motion: objective, mechanical warp stop motion, electrical warp stop motion,

Warp Protecting motion: objective, loose reed warp protecting motion, fast reed warp protecting motion, electromagnetic warp protecting motion.

Unit III

Automatic looms- basic features, advantages over plain looms, classification of automatic looms, weft feeling mechanism, mechanical weft feeler, electronic weft feeler, optical weft feeler, pirn changing mechanism, shuttle changing mechanism, bobbin loader mechanism.

Weft mixing motion, Multiple box motion, 4X1 drop box motion, preparation of pattern cards, pick at will motion.

Unit IV

Dobby Shedding: Main parts of dobby loom, types of Dobby, negative dobby, single, double lift single jack dobby, double lift double jack dobby, design & peg plan for dobbies, positive dobby, electronic dobby, types of shed formed in dobby

Jacquard Shedding:

Principle parts of jacquard machine, types of jacquard, types of shed formed in jacquard, single lift single cylinder jacquard, double lift single cylinder jacquard, double lift double cylinder jacquard, harness building, harness ties, design ties, card cutting, card lacing.

Suggested Text Books & References

1. Marks and Robinson,"Principles of Weaving".Textile Institute,Manchester,1986.

2. Thomas fox,"Mechanism of Weaving",Bombay Universal Publishing Co,1993.
3. Lord and Mohemad,"Conversion of Yarn to Fabric",Merrow Publishing Co.Ltd, England,1988.
4. Aswani,K.T.,"Plain Weaving Mechanism",Mahajan Publishers,Ahmedabad,1996.
5. Aswani,K.T.,"Fancy Weaving Mechanism",Mahajan Publisher,Ahmedabad,1990.
6. Sengupta,R.,"Weaving Calculations",Taraporwala Sons,Bombay 1990.
7. Banerjee,N.N.,"Weaving Mechanism Vol,-I & Vol.II",West Bengal,1994.
8. Rai,Hasmukh,"Fabric Forming",S.S.M.Institute,Kuomarapalyam Tamil Nadu,1996.
9. Talukdar,M.K.,"Modern Weaving Technology",NICTAS,Ahmedabad,1998.
10. Rapier Looms,WIRA Research & Technical Service Manual for industry.
11. Kharwani,P.A.,"Weaving I shuttle looms",NCUTE Publication,1999.
12. Khatwani,P.A.,"Weaving II Shuttleless Looms",NCUTE Publication,1999.
13. Khatwani,P.A."Filament Weaving",NCUTE Publication,2000.

TT-206N
TEXTILE CHEMICAL PROCESSING - II

L	T	P
3	1	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note: Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-1

Printing: Introduction to printing methods Block, screen and roller printing. Advantages and disadvantages of each method. Various styles of printing like Direct, Discharge and Resist styles on natural, man-made and blended textiles. Ingredients of print paste with their details. Classification and mechanism of working of thickeners.

Transfer Printing: Types, mechanism of transfer printing and machineries.

Pigment Printing: Mechanism and recipe details of pigment printing.

UNIT-2

Finishing:

Mechanical Finishes: Calendaring - its types, construction and function of various calendaring m/cs. Sanforizing - method, mechanism and machineries involved. Sueding /raising, Napping and Shearing finishes. Foam finishing technology.

Chemical Finishes: Problem of creasing, anti-crease finish on cotton. Drawback and advantages associated with use of various anti-crease chemicals. Water repellency and water repellent finishes on cotton. Evaluation of water repellency. Flame proofing and its evaluation. Softeners and their application.

UNIT-3

Developments in preparatory and dyeing: Continuous pre-treatment and Continuous dyeing. Mass coloration principle, technology and different methods. Problems in dyeing and their solutions. Tie and dye, Batik printing.

UNIT-4

Identification of dye on dyed natural and manmade textiles.

Ecofriendly processing and Effluent generated from textile processing and its treatment.

Fastness properties: Light fastness, Rubbing fastness, Sublimation fastness, Perspiration fastness, Washing fastness properties evaluation.

Suggested Text Books and References

1. Shenai, V.A., “Technology of Textile Processing Vol. 2,3,4,6, and 10”, Sevak Publisher, Bombay.
2. Marsh, J.T., “Mercerising”, Chapman Publication, London.
3. Marsh, J.T., “An Introduction to Textile Finishing”, Chapman Publication, London.
4. Trotman, E.R. “Textile Technology and Dyeing of Textile Fibres”. Griffin Publication, London.
5. Shenai, V.A. “Principle and Practice of Dyeing”, Sevak Publisher, Bombay.
6. Shenai, V.A. “Fundamentals of Principles of Textile Wet Processing”, Sevak Publisher, Bombay.
7. Datye, K.V. and Vaidya, A.A., “Chemical Processing of Synthetic Fibres and Blends”, Wiley Publication, New York
8. Peter, R.H., “Textile Chemistry Vol. 2”, Elsevier Publishing, London.
9. Marsh, J.T., “Textile Science”, Chapman, London
10. Garde, A.R. and Modi, “Chemical Processing of Cotton and Polyester Blend”, ATIRA, Ahmedabad.
11. Prayag, C.R., “Dyeing of Sild and Manmade Fibre”.
12. Prayag, C.R., “Bleaching, Mercerising and Dyeing of Cotton”.
13. Vankar, Padma, “Textile Effluents”, NCUTE Publication, 2001.

TT-208N
TEXTILE TESTING -I

L	T	P
3	1	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note: Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

Unit I:

Sampling Methods and Moisture Calculation

Introduction of textile testing, Reason for Testing, standardization of testing, sampling, sampling techniques, square, cut square, zoning technique, Routine sampling techniques used in the textile industry

Moisture: - effect of moisture or physical properties regain and content, correct invoice wt, Atmospheric conditions for testing, Control of testing room atmosphere, moisture regain & moisture content, importance of moisture in textiles, measurement of moisture regain & content, effect of moisture on properties (physical & mechanical) of textile material, factors affecting the regain, shriley moisture meter.

Unit II:

Cotton Fibre Testing

Fibre Dimension: fibre fineness, fineness measurement, fibre length, method of measurement: direct method high volume instrument, advance fibre information system Grading of cotton fibre with respect to staple length, laboratory measurement of fibre length, span length,Baer sorter, servo fibro graph, maturity coefficient measurement by NaOH method, fibre fineness by airflow meter. Fibre bundle strength by Pressley, stelometer, determination of trash content: Shirley trash analyzer.

Fibre quality index, salient features of HVI, AFIS, Nep count.

Wrapping test for lap, sliver and roving.

Unit III:

Yarn Evenness Testing

Yarn testing, Linear density,

Yarn numbering systems, conversion methods, and measurement of yarn number.

Twist, classification of twist, twist measurement, Twist, Measurement of twist in continuous filament spun and plied yarns.

Evenness testing of yarns. Nature and causes of irregularities, principles and methods of evenness testing: evaluation and interpretation of evenness measurements. Measurement of sliver and yarn unevenness, Capacitative and optical principle of measuring unevenness, salient features of Uster evenness tester, yarn imperfections and classimat yarn faults.

Unit IV:

Yarn Tensile Testing

Strength and elongation test, Definition, force- elongation curve, Factor affecting tensile testing, Fibre strength and Yarn strength.

Various terms related to tensile testing, stress-strain curve, various methods for finding the yield point, Application of tensile force by CRL, CRE and CRT method, various principles (pendulum lever, balance principle, inclined plane, strain gauge principle, etc) to apply tensile load on textile specimen.

Yarn testing machines- single yarn strength tester, Uster, Instron testing machine, lea strength testing.

Hairiness: Determination of yarn hairiness.

Suggested Text Books & References:

1. Booth, J.E., "Principles of Textile Testing", Butterworths, London
2. Quality control and testing management by Dr. V.K. Kothari
3. Slater, "Textile Progress – Physical Testing and Quality Control", Textile Institute, Manchester

4. “Handbook of Methods of Tests for Cotton Fibres, Yarns and Fabrics”, CTRL, Bombay
5. “Cotton Assessment and Appreciation”, SITRA Report, Coimbatore.
6. Savile, B.P.,” Physical testing of textiles”
7. Grover, E. and Hamby, D.S., “Handbook of Textile Testing and Quality Control”, Wiley Eastern, New Delhi, 1969.

TT-210N
TEXTILE FIBRE -II

L	T	P
3	1	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

Note: Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

UNIT-I
Polymerization:

Introduction of polymerization, monomer, oligomer, comonomer, polymer, classification of polymers, homopolymers and copolymers, Thermo sets , Thermoplastic, Elastomers, Tg, Tm, Polymerization techniques- bulk polymerization, solution polymerization, suspension polymerization and emulsion polymerization, New polymerization techniques-Gas Phase polymerization, Polymerization mechanisms addition polymerization, condensation polymerization. Criteria for fibre forming polymers

UNIT-II
Polymerization of different fibers:

Polymerization of polyester by DMT and TPA route, Polymerization of Nylon-6 and Nylon-6,6
Polymerization of polyacrylonitrile by suspension and solution polymerization, polymerization of polypropylene by suspension and gas phase polymerization.

UNIT-III
Melt Spinning:

Melt Spinning Line and its equipment, cooling system, General principle of spinning, fluid flow through a capillary, die-swell effect, melt extrusion, spinning conditions such as spinneret size, rate of extrusion, spinning stretch and its effect on filament structure and properties with reference to polyester, polyamide and polypropylene fibers

UNIT-IV
Solution Spinning:

Solution Spinning, Classification of solution spinning-dry spinning, wet spinning, dry jet wet spinning, wet and dry spinning of viscose and acrylic fiber, effect of spinning variables on structure and properties in gel and final fibers, high shrinkage acrylic fiber. Drawing and heat setting.

Suggested Text Books & References:

1. Gupta, V.B. & Kothari, V.K.,"Manufactured Fibre Technology". Chapman & Hall, London, 1977
2. Mukhopadhyay, S. "Advances in Fibre science", Textile institute, Manchester.
3. Deopura, B.L., "Course Material of Pilot Programme on Manmade Fibres", NCUTE Publication, 1999.
4. Mishra, S.P., "A Textbook of Fibre Science & Technology", New Age International Publishers, New Delhi, 1999.
5. Pajart & Oldrich "Textile Science & Technology- Processing of Polyester Fibres", Elsevier Scientific Publishing Co., 1979.
6. Robinson. J.S., "Spinning & Extruding of Fibres".
7. Pattabhiram, T.K., "Spinning Fundamentals of Manmade Fibres", Mahajan Publishing Pvt. Ltd., Ahmedabad, 1996.

TT-212N
YARN MANUFACTURING-II LAB

L	T	P
-	-	3

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 Hrs

Combing

1. To the study the different methods of lap formation in combing preparatory.
2. To study the combing cycle of a rectilinear cotton comber.

Speedframe

3. To study the drafting, twisting and winding zone of speed frame.
4. To study the building motion in speed frame.
5. To study the differential motion of speed frame and calculation of bobbin speed.
6. Calculation of break draft constant, draft constant and twist constant and production of speed frame.

Ringframe

7. To demonstrate the working principle of a ringframe.
8. To study the different components of drafting system and twisting system.
9. Calculation pertaining to gearing, speed, constant, draft and production.

Note: The above experiment should be conducted and shall be decided on factors like:

a) Facilities installed at Institute
b) Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat.
c) Trend of technological developments in National & International perspective.

TT-214N
FABRIC MANUFACTURING-II LAB

L	T	P
-	-	3

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 Hrs

Basic Concept

1. To show actual working of all motions of simple loom & with multiple boxes.

Automatic Loom

2. To show and compare all mechanisms of automatic loom with plan loom.

Introduction to Dobby, Jacquard and Terry Weaving

3. To show all type of mechanisms (Mechanical/Electronic) used for producing fabrics with different structures & designs.

Principles of Weft Insertion

4. To show all latest weft insertion methods -difference, comparison, need.

Shuttleless Looms

5. To show actual working of all latest looms- Advantages, Comparison.

Special Weaves

6. To analyze all type of weaving fabrics with different weaves.

Weaving Calculations

7. To do all types of calculations needed for all type of weaving machines.

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

TT-216N
TEXTILE CHEMICAL PROCESSING – II LAB

L	T	P
-	-	3

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 Hrs

1. Conduct practicals on Conventional and latest machines (Preparatory / dying / Finishing).
2. Conduct practicals on Recent developed methods of dyeing using different type of dyes
   (a) Natural
   (b) Synthetic
   (c) Blends
3. Dyeing of cotton yarn with vat, reactive and sulphur in a sample pot dyeing machine.
4. Dyeing of cotton fabric with vat, reactive and sulphur dyes in laboratory jigger machine.
5. Calibration of dyeing and recipe prediction with the help of CCM.
6. Study of fastness to washing and rubbing with the help of CCM.
7. Reproduction of shade with the aid of computer as well as visual methods.
8. Printing with kerosene and synthetic based thickeners. Evaluate the printing with qualitative and quantitative methods on different materials.
9. Conduct practical with transfer printing technique on different materials.
10. Compare the solvent dyeing and solvent assisted dyeing on a chosen piece of material.
11. Quantitative analysis of different textile blends in fibre, yarn and fabric form.

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

TT-218N
TEXTILE TESTING - I LAB

L	T	P
-	-	3

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 Hrs

1. To determine moisture parameters of the fibers.
2. To determine the staple length of Natural Fibers.
3. To determine the fineness of Natural Fibers.
4. To determine the maturity of the Fibers.
5. To find the strength and elongation of Natural, Manmade& synthetic fiber.
6. To determine the linear density of fibers.
7. To determine the spin finish percentage in manmade fibers.
8. To determine blend percent of the material.
9. To determine the linear density of a given Yarn.
10. To determine the twist per inch of the yarn.
11. To determine the hairiness of the yarn.
12. To determine the strength& elongation of a given Yarn.
13. To determine the count strength product of the yarn.
14. To determine the hairiness of the given yarn.

Note: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

MPC-202N ENERGY STUDIES

L	T	P
3	-	-

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

UNIT-I

Introduction: Types of energy, Conversion of various forms of energy, Conventional and Nonconventional sources, Need for Non-Conventional Energy based power generation.
Energy Management: General Principles of Energy Management, Energy Management Strategy.
Energy Audit & Tariffs: Need, Types, Methodology and Approach.

UNIT-II

Conventional Energy sources: Selection of site**,** working of Thermal, Hydro, Nuclear and Diesel power plants and their schematic diagrams & their comparative advantages- disadvantages.

UNIT-III

Non Conventional Energy sources: Basicprinciple, site selection and power plant layout of Solar energy, photovoltaic technologies, PV Systems and their components, power plant layout of Wind energy, layout of Bio energy plants ,Geothermal energy plants and tidal energy plants.

UNIT-IV

Energy Scenario: Lay out of power system, Role of Energy in Economic development, energy demand, availability and consumption, Commercial and Non-commercial energy, Indian energy scenario, long term energy scenario, energy pricing, energy sector reforms in India, energy strategy for the future.
Paper Setter's Note: 8 questions of 15 marks each distributed in four sections are to be set taking two from each unit. The candidate is required to attempt five questions in all, taking at least one from each of the four sections.
Suggested Text Books & References:

1. Energy Studies-Wiley and Dream tech India
2. Soni, Gupta, Bhatnagar: Electrical Power Systems – DhanpatRai& Sons
3. NEDCAP: Non Conventional Energy Guide Lines
4. G.D. Roy: Non conventional energy sources
5. B H Khan: Non Conventional energy resources - - McGraw Hill
6. Meinel A B and Meinal M P,Addison :Applied Solar Energy- Wesley Publications
7. George Sutton: Direct Energy Conversion - McGraw Hill