

Study & Evaluation Scheme (MCS)
3rd Year B. Tech TEXTILE ENGINEERING
Uttar Pradesh Textile Technology Institute Kanpur
Affiliated to

DR. APJ ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

3rd Year V-Semester

Effective from Session-2024-25

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	BTT501	Textile Testing	3	1	0	20	10	30		70		100	4
2	BTT502	Fabric Structure & Design	3	1	0	20	10	30		70		100	4
3	BTT503	Chemical Processing of Textile-I	3	1	0	20	10	30		70		100	4
4	BTT051/ BTT052/ BTT053	Structure & Properties of Fibres / Multi & Long Fibre Spinning / Mechanism of Machines	3	0	0	20	10	30		70		100	3
5	BTT054/ BTT060	Non-Woven Technology/Textured yarn Technology	3	0	0	20	10	30		70		100	3
6	BTT551	Textile testing Lab	0	0	2				50		50	100	1
7	BTT552	Fabric Structure & Design Lab	0	0	2				50		50	100	1
8	BTT553	Chemical Processing of Textile-I Lab	0	0	2				50		50	100	1
9	BTT554	Mini Project or Internship Assessment*	0	0	2			100				100	2
10	BTT501/ BTT502	Constitution of India, Law and Engineering/ Indian Traditions, Culture and Society	2	0	0	15	10	25		50			
11		MOOCs (Essential for Hons Degree)											
		Total	17	3	8							900	23

*The Mini Project or internship (3-4 weeks) conducted during summer break after II semester and will be assessed during III semester.

The noncredit courses **AS per AKTU or** shall be conducted through NPTEL@MOOCS.

Constitution of India and environmental governance: https://swayam.gov.in/nd1_noc20_lw02/

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DR. APJ ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

3rd Year VI-Semester

Effective from Session-2024-25

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	BTT601	Yarn Manufacture-III	3	1	0	20	10	30		70		100	4
2	BTT602	Fabric manufacture-III	3	1	0	20	10	30		70		100	4
3	BTT603	Chemical Processing of Textile-II	3	1	0	20	10	30		70		100	4
4	BTT061/ BTT062/ BTT063	Theory of Textile Structure / Clothing Science / Mechanical Machine Design	3	0	0	20	10	30		70		100	3
5		Open Elective-I	3	0	0	20	10	30		70		100	3
6	BTT651	Yarn Manufacture-III Lab	0	0	2				50		50	100	1
7	BTT652	Fabric manufacture-III Lab	0	0	2				50		50	100	1
8	BTT653	Chemical Processing of Textile-II Lab	0	0	2				50		50	100	1
9	BNC601/ BNC602	Constitution of India, Law and Engineering/ Indian Traditions, Culture and Society	2	0	0	15	10	30		70			
10		MOOCs (Essential for Hons. Degree)											
		Total	17	3	6	150	100	250	75	500	75	800	21

Essence of Indian Traditional Knowledge/Constitution of India shall be conducted through NPTEL (MOOCS)

Open Elective-I: As per AKTU Lucknow

Textile Testing BTT 501

Unit I: Physical and chemical structure of cotton, wool, silk, and manmade textile fibres, models of fine structure of fibre, Methods of investigation of physical structure by IR spectroscopy, FTIR, and X-ray diffraction techniques, . Measurement of density and crystallinity by density gradient column.

Total Lectures Required = 8

Unit II: Moisture regain and content. Significance of moisture in textiles, relation between regain and relative humidity, hysteresis of moisture absorption, effect of various factors on moisture regain, difficulties involved in drying of textile specimen, heat of sorption and heat of wetting, their relationship, swelling of fibres, Quantitative theory of moisture absorption, concept of contact angle and surface energy on textile surface.

Total Lectures Required = 8

Unit III: Tensile properties of fibre, Factors affecting results of tensile experiment, experimental methods; effect of variability and weak-link theory, Elastic recovery, Effect various factors on recovery, Cyclic loading and fatigue, Fibre fracture. Time effect, Creep and stress relaxation. Dynamic testing. Concept of viscoelastic effects, Kelvin and Maxwell model. Bending and torsional rigidity of fibre.

Total Lectures Required = 8

Unit IV: Thermal behaviour of textile fibres by Differential Scanning Calorimeter (DSC), Difference between Heat Flow and Heat Flux DSC, Various types of DSC and their applications, Thermo-gravimetric analysis(TGA), thermo-balance principle in TGA, Applications of TGA Analysis or Thermogravimetry, thermal mechanical analysis (TMA), and Dynamic Mechanical Analysis (DMA), Various types of DMA, Different types of loading in DMA, Application of DMA

Total Lectures Required = 8

Unit V: Optical and electron microscopy, Brief Introduction to Scanning Electron Microscope, Optical properties of fibres, Define Refractive index and dichroic ratio. Birefringence and overall orientation of fiber. Dielectric properties of Fibres, Fibre friction, Particle Size analysis, various techniques to measure particle size,

Total Lectures Required = 8

Grand Total of lectures required = 40

Reference Book: -

1. Morton W E and Hearle J W S, Physical Properties of Textile Fibres, 1st reprint, The Textile Institute, Manchester,1986.
2. Gupta V B and Kothari V K, "Manufactured Fibre Technology"1st Ed., Chapman and Hall, London,1997.
3. Hearle JWS, Polymers and their properties, Vol. I, John Wiley and Sons, NY,1982.
4. Turi E A "Thermal characterization of polymeric materials", Vol I and II, Academic Press,1997.
5. Gedde, U. L. F. (1995). Polymer physics. Springer Science & Business Media.
6. Billmeyer F W, "Text book of polymer science", John Wiley and Sons,1984.
7. Meredith R, The Mechanical Properties of Textile Fibres, North Holland Publishing Co; Amsterdam1959.

Multi & Long Fibre Spinning (BTT052) (L T P 300) Credit =3

Course Outcomes:

After this course students will be able to

CO1: Explain the critical parameter difference in processing of long

fibres
CO2: Explain the process condition & need for dyed fibres processing

CO3: Explain the machine used for spinning wool fibres & blends using woollen & worsted system

CO4: Explain the process sequence for jute fibre processing.

CO5: Apply measures for process control during jute, wool & other long fibre spinning

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
KTT-012.1	3	3	3	2	2							2
KTT-012.2	3	2	3	3								2
KTT-012.3	3	3	2	3	3							2
KTT-012.4	2	3	3	2	2							2
KTT-012.5	3	3	1	1	2							1
Avg.	3	3	3	2	2							2

Unit 1: Characteristics of manmade fibres, Spinnability, blending, and its objectives, Spinnability, blending & its objectives, processing of Man- made fibres & blends on short, medium and long staple spinning systems.

Total Lectures Required = 8

Unit 2: Spinning of dyed fibres, estimation of blends intimacy, factors affecting the blend irregularity, structural properties of blended yarns.

Total Lectures Required = 8

Unit 3: Production of bulked yarn, characteristic difference in the physical & mechanical properties of various long staple fibres & their influence in the choice of preparatory & spinning machinery.

Total Lectures Required = 8

Unit 4: Retting of flax, & jute, Jute & flax spinning, manufacturing of spun silk.

Total Lectures Required = 6

Unit 5: Woollen, semi-worsted & worsted systems of spinning.

Total Lectures Required = 6

Grand total lectures required =36

Reference book:-

1. Wool Spinning by Vickerman, Abhishek Publication
2. Principle of woollen spinning by Priestman
3. Woollen & Worsted yarn manufacture by J. W Redcliff
4. Jute Spinning Calculation by AndrewSmith
5. Worsted Drawing & Spinning by Miles

Mechanism of Machines (BTT053) (L T P 3 0 0) Credit3**Course Outcomes:** At the end of this course, student will be able to

CO1	Understand the principles of kinematic pairs, chains and their classification, DOF, inversions, equivalent chains and planar mechanisms.
CO2	Analyze the planar mechanisms for position, velocity and acceleration.
CO3	Evaluate gear tooth geometry and select appropriate gears for the required applications.
CO4	Design cams and followers for specified motion profiles, Characterize and design flywheels.
CO5	Understand free and forced vibrations of single degree freedom.
CO6	Analyze balancing problems in rotating and reciprocating machinery.

Unit	Topics	Lect ures
1.	Introduction : Rigid body, Mechanism and Machine, Kinematic Link, Kinematic Pair, Degrees of Freedom, Classification, Kinematic Chain, Linkage, Mechanism and Structure, Gruebler's Criterion for degrees of freedom. Inversions of mechanism: Four Bar Chain mechanism, Slider- Crank mechanism, Kinematic inversions, Double slider-crank mechanism, Inversions.	8
2.	Velocity Analysis: Instantaneous centre method, Kennedy's theorem, Locating instantaneous centres, Relative velocity method for slider-crank mechanism, and crank and slotted lever mechanism. Acceleration Analysis : Klein's construction, slider crank mechanism, Coriolis acceleration component, Crank and slotted lever mechanism	8
3.	Cam & Follower : Definition of cam, Classification of cams, Followers and their classification, Brief description of different types of cams and followers with simple line diagram, Simple cam profile for uniform velocity, SHM and uniform acceleration and deceleration with Flat, knife edge and roller type follower. Flywheel: Functions of flywheel, Kinetic Energy of rotating masses, turning moment diagram, Types of flywheels, Co-efficient of energy & speed.	8
4.	Gears & Gear Trains: Classification of gears, Law of gearing, forms of teeth, Path of contact, Arc of contact, Interference in involute gears, Minimum number of teeth, undercutting, Differential gears, Simple gear train, Compound gear train, Reverted gear train, epicyclic gear train. Sun and planet gears. Belt & Chain drives: Open and cross belt drives, Action of belts on pulleys, velocity ratio, slip, crowing of pulleys, power transmitted by belt drives.	9
5.	Vibrations: Types of vibrations, Free longitudinal vibrations, Damped vibrations, Logarithmic decrement, Forced vibrations, Forced Damped vibrations, Vibration isolation and transmissibility, Torsional vibrations. Balancing: Static balancing, Dynamic balancing, Balancing of masses in different planes, Balancing of reciprocating masses.	9

Text Books:

1. Theory of Mechanisms and Machines by Ghosh and Malik.
2. Theory of Machines by S.S. Rattan.
3. Textile mechanism in spinning and weaving machines by Ganapathy Nagarajan

5. Department Elective II: Credit 3 (L T P 3 0 0)

a) Non-Woven Technology (BTT054) (3 00) Credit 3

After successful completion of this course, the students should be able to;

CO1 Describe on woven market & classification of non-woven

CO2 Explain the different methods of non-woven manufacturing processes and description of non-woven machines.

CO3 Explain properties of fibres required for non-woven, structure of fibres in non-woven & non-woven fabric properties & their application.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	3	3	2	2							2
2	3	2	3	2								2
3	3	3	2	2	2							2
Avg.	3	3	3	2	2							2

Unit 1: National and international scenario on non-woven fabric production, Concept about felts and non-woven, Classification of non-woven fabrics, fibres for non-woven fabrics, Felt Manufacturing process
Total Lectures Required =9

Unit 2: Various method of web formation, web characteristics and their influence on properties of non-woven fabrics, (3) non-woven fabric by Needle punch, Description of needle punching machine, effect of process variables on properties of needle punch fabric **Total Lectures Required =9**

Unit 3: Non-woven fabric by hydro entanglement, Description of hydro entanglement machine, effect of process variables on properties of hydro entanglement non-woven fabric, non-woven fabric by adhesive bonding, mechanical bonding, Melt blown process of non-woven fabric manufacturing **Total Lectures Required =8**

Unit 4: Non-woven fabric by Stitch bonding, Non-woven fabric by chemical bonding, Non-woven fabric by bonding with thermoplastic adhesives, Non-woven fabric by Spun laced, Effect of process variables on properties of stitch bonding, chemical bonding spun laced non-woven fabrics. **Total Lectures Required =8**

Unit 5: Flocked fabric, Laminates, latest development in non-woven industry: ultrasonic bonding, Infra-red bonding, bonding by bi-component fibres. Application of various non-woven fabrics

Total Lectures Required =8

Grand total of Lectures required= 42

Reference & Text Books

1. Russel, S. J., Handbook of nonwovens, Woodhead Publishing Ltd., 2006 (Edited)
2. Chapman, R.A., "Applications of Nonwovens in Technical Textiles", The Textile Institute,2010.
3. Horrocks A.R. and Anand S.C., "Handbook of Technical Textiles", The Textile Institute,2000.

4. Adanur, S. "Handbook of Weaving", CRC Press,2001
5. Russel S.J. "Handbook of Nonwoven", The Textile Institute,2007
6. Krecma, R., Manual of Nonwovens, The Textile Trade Press, Manchester, UK,1971.
7. Purdy, A. T., Developments in Nonwoven Fabrics, Textile Progress, Vol. 12, No. 4, The Textile Institute, Manchester, UK,1983.

5.2 Department Elective II

Textured Yarn Technology (BTT060) (3-0-0) Credit 3

CO1: Explain the need for texturing of thermoplastic filament yarn for apparel & other uses.

CO2: Explain the influence of raw material & process parameters on textured yarn quality

CO3: Explain the development of different texturing system and their merits

CO4: Decide selection of texturing methods based on raw material characteristics

CO5: Explain the bulking quality by different bulking methods.

Unit (1): Importance of texturising, Methods of texturising, Basic principles of heat setting and texturising, False twisting, Process variables, developments of false twist texturing machines.

Total Lectures Required = 7

Unit (2): Structural geometry of textured yarn, characterization of textured yarn, Stuffer box crimping, Edge crimping & other methods of texturing thermoplastic yarns.

Total Lectures Required = 7

Unit (3): Textured yarn properties and fabric characteristics, principles of draw texturing, Draw texturising machines, and properties of draw textured yarn, Effect of process variables, time, temperature, twist and tension on properties of textured yarn.

Total Lectures Required = 8

Unit (4): Principles of air bulking and properties of air bulked yarn, Texturing of non-thermoplastic yarns cross linking and effect of process variables on properties of textured yarn, Texturing with the aid of solvent.

Total Lectures Required = 7

Unit (5): Yarn characteristics, Morphological changes induced by mechano-thermal forms of texturing and their effect on properties of textured yarns.

Total Lectures Required = 7

Grand total lectures required =36

Reference book:-

1. Textured yarn Technology by J.W.S. Hearle
2. Synthetic fibre by Vaidhya

**6 Textile Testing Lab (BTT551) (0 0 2) Credit1 Atleast 10 of thefollowing
Fibre& Yarn Testing**

1. To determine the bundle strength of cotton fibre
2. To determine the fibre fineness by air-flow method
3. To determine the span length of fibre & analyse it.
4. To determine the Hank and Hank C.V% of the given sliver / Determination of the within bobbin and between bobbin hank C.V % of the given roving.
5. To determine the count of a yarn by using physical/electronic balance.
6. To measure the Single yarn and Ply yarn twist of the given yarn sample using Twist Tester.
7. To determine the Yarn count, Lea Strength and CSP of the given yarns ample.
8. To determine the single yarn strength.
9. To Study evenness and imperfection in the given yarn and compare the results with Uster statistics.
10. To Study the spectrogram and irregularity trace to determine type of irregularity.
11. To prepare yarns Appearance Boards and compare with ASTM standards.

Fabric & garment Testing

12. To characterize a woven fabric with respect to its dimensional properties: thread density, yarn number, crimp, weave, cover factor, weight, skewness, thickness
13. To determine the tensile strength of a woven fabric by strip test method. Draw load-elongation curve of a woven fabric.
14. To determine the tear strength of a fabric using Elmendorf tear tester or ballistic tester.
15. To determine the bursting strength of a fabric using hydraulic bursting tester.
16. To determine the abrasion resistance of a fabric.
17. To determine the bending length and flexural rigidity of a woven fabric using the Shirley tester.
18. To determine the crease recovery of fabric and observe the effect of loading time and recovery time on crease recovery.
19. To determine the drape coefficient of woven and knitted fabric using the drape meter.
20. To measure the Air permeability and Fabric Impact Strength of the given fabric.
21. To measure the water permeability of the given fabric.

7. Fabric Structure & Design Practical (BTT552) (0 0 2) Credit1

Analysis of the fabric in respect to yarn and fabric parameters and their weave representation with draft and peg plan:

1. Plain weave
2. Plain derivative- Rib weave
3. Twill weave
4. Satin/sateen weave
5. Diamonds weave
6. Honeycomb weave
7. Huck-a-back weave
8. Mock leno weave
9. Crepe weave
10. Bedford cord weaves/ welt structure
11. Extra thread figured weave
12. Velvet/velveteen weave
13. Double cloth

8. TEXTILE CHEMICAL PROCESSING– I Lab (BTT553) L T P002 At least 10 of the following

1. Desizing of grey cotton yarn/fabric using chemicals/enzyme and determine the desizing efficiency.
2. Scouring of desized cotton yarn/fabric and determine the scouring loss%, drop absorbency and degree of impurities.
3. Scouring of P/C blended fabrics.
4. Bleaching of scoured cotton yarn/fabric with hypochlorite agent and measurement of the whiteness index and change in mechanical properties.
5. Bleaching of cotton fabric with hydrogen peroxide agent and measurement of the whiteness index and change in mechanical properties.
6. Cold and Hot mercerization of cotton yarn and measurement of the BAN and change in mechanical properties.
7. Scouring and Bleaching of Wool.
8. Degumming of Silk.
9. Dyeing of cotton yarn/fabric using direct dyes and studying the influence of temperature, Time and Electrolyte on dye adsorption and fastness properties.
10. Dyeing of cotton yarn/fabric using vat dyes and assessment of fastness properties of dyed material.
11. Dyeing of cotton yarn/fabric using hot and cold brand reactive dyes and assessment of dye exhaustion % on dye bath and fastness properties.
12. Dyeing of cotton yarn/fabric using azoic dyes and assessment of fastness properties of dyed material.
13. Dyeing of cotton yarn/fabric using sulphur dyes and assessment of fastness properties of dyed material.
14. Dyeing of Wool fibres with Acid and metal complex dyes and assessment of fastness properties of dyed material.
15. Dyeing of Silk yarn / fabric with Acid dyes and direct dyes and assessment of fastness properties of dyed material.

9. Mini Projector Internship Assessment (BTT554) (0 0 2) credit1

10. Non Credit Course:: As per AKTU

11. NPTEL/ MOOCS Courses for Hons Degree: As per AKTU

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Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	BTT601	Yarn Manufacture-III	3	1	0	20	10	30		70		100	4
2	BTT602	Fabric manufacture-III	3	1	0	20	10	30		70		100	4
3	BTT603	Chemical Processing of Textile-II	3	1	0	20	10	30		70		100	4
4	BTT061/ BTT062/ BTT063	Theory of Textile Structure / Clothing Science / Mechanical Machine Design	3	0	0	20	10	30		70		100	3
5		Open Elective-I	3	0	0	20	10	30		70		100	3
6	BTT651	Yarn Manufacture-III Lab	0	0	2				50		50	100	1
7	BTT652	Fabric manufacture-III Lab	0	0	2				50		50	100	1
8	BTT653	Chemical Processing of Textile-II Lab	0	0	2				50		50	100	1
9	BNC601/ BNC602	Constitution of India, Law and Engineering/ Indian Traditions, Culture and Society	2	0	0	15	10	30		70			
10		MOOCs (Essential for Hons. Degree)											
		Total	17	3	6	150	100	250	75	500	75	800	21

Essence of Indian Traditional Knowledge/Constitution of India shall be conducted through NPTEL (MOOCS)

Open Elective-I: As per AKTU Lucknow

3rd B. Tech (Textile Engineering) 6th Semester

1. Yarn Manufacture-III (BTT601) LTP 3 1 0 = Credit4

Course Outcomes:

CO1	Explain the principles & mechanism involved in reeling & bundling.
CO2	Explain the principle involved in compact spinning/ Siro yarn spinning& understand techno-economic aspects of compact & rotor spinning.
CO3	.Explain the principle involved in open-end spinning, its manufacturing process
CO4	Explain the process of friction yarn manufacturing & mechanism of friction spinning
CO5	Explain the process of Air-jet & Vortex spinning manufacturing & mechanism of yarn formation.

Course Articulation Matrix of Yarn Manufacture-III:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BTT-501.1	3	3	3	3	3				3	1		1
BTT-501.2	3	3	3	3	3				2	2		2
BTT-501.3	3	3	3	3	2				3	2		2
BTT-501.4	3	2	2	2	3				2	1		1
Avg.	3	3	3	3	3				3	2		2

Module-I (6 Hours): Doubling and Reeling Process: Objectives and principle of doubling. Study of different components of ring doubler- creel, yarn guiding roller, rings, travellers and spindle. Building motions. Concept of balanced twist in doubled yarn, direction of twist in doubled yarn and its relation to single yarn. TFO- Construction details and principle of operation.

Module-II (08 Hours): Development in Ring Spinning: Compact spinning - **working principles of different compact** spinning systems-Elitwist-Comfor twin, structure and properties of compact yarns, applications of compact yarn - Techno economics of compact spinning. SIRO Spinning- Principle and mechanism of SIRO spinning system, structure, properties and end use of SIRO yarn, Solo spinning system.

Module-III (14 Hours): Non-conventional spinning processes: Causes leading to the advent of non-conventional systems of spinning.

Rotor spinning : Tasks of the rotor spinning machine; Mechanism of yarn formation on rotor spinning; Raw material requirements and preparation - raw materials requirements (fibre lengths, fineness, strength, dirt & dust, foreign matter); Designing features of chief organs and their functions, sliver in-feed unit, feeding roller & guide plate, opening unit - opening roller - clothing of the opening roller, trash removal, fibre guide passage, fibre flow into the Rotor - rotor groove, rotor diameter, combination of rotor diameter and rotor groove, rotor bearing, rotor revolutions, formation of a coherent fibre strand and, back doubling, formation of the yarn, the false twist effect, wrapping fibers, yarn withdrawal and winding unit, navel, types of the navel, withdrawal tube, direction of withdrawal, package formation unit- requirements for the package, the winding process; Effect of rotor machine variables and fibre properties on the properties of rotor spun

yarns. techno-economic aspects of rotor spinning system; Limitation of rotor spinning.

Module-IV (6 Hours): Friction spinning: Operating principle; Designing aspects of feed device, opening roller and spinning drum, classification, raw material requirements, technological interrelationships, yarn structure and characteristics, techno-economic aspect.

Module –V (8 Hours) Air-jet spinning: Mechanism of yarn formation on Air-jet spinning; Designing aspects of nozzles; Raw material requirements; Structure, properties and end uses of yarns spun on Air-jet spinning, techno- economics aspects. Comparison of properties of ring spun, rotor spun, friction spun and air-jet spun yarn. Technology of Vortex spinning.

Books Recommended:

1. Klein W, “A Practical Guide to Ring Spinning “, The Textile Institute, Manchester,1999.
2. Lawrence C A, “Fundamental of Spun Yarn Technology” CRC Press, USA,2003.
3. Lord P R, “Handbook of Yarn Production”, The Textile Institute, Woodhead Publication Limited, Cambridge,2003.
4. Shaw J, “Short-staple Ring Spinning, Textile Progress”, The Textile Institute, Manchester,1982.
5. Murty HVS, TFO- Technology & Techniques.
6. Mahendra Gowda R V, “New Spinning Systems”, NCUTE Publication, IITDelhi,2006.
7. Eric, Oxtoby, "Spun Yarn Technology", Butterworths, London,1988.
8. Klein. W, “New Spinning Systems: Vol 5”, The Textile Institute”, UK,1993.

**2. Department Core-2: Fabric Manufacture-III (L T P 3 1 0) (BTT602) credit
Course Outcomes:**

CO1	Show various parts of a shuttle loom, demonstrate various motions of loom
CO2	Classify and explain shedding and picking mechanisms with their limitations and scopes.
CO3	Classify and explain let-off and take-up mechanisms with their limitations and scopes.
CO4	Demonstrate various auxiliary motions in shuttle loom.
CO5	Explain various automations in shuttle loom

Course Articulation Matrix of Fabric Manufacture III:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO9	PO10	PO11	PO12
BTT-602.1	3	3	3	3	3	1	1	1		1
BTT-602.2	2	2	2	3	3		2	1		2
BTT-602.3	3	3	3	3	2		1	1		2
BTT-602.4	2	2	3	2	3	1	1	1		1
BTT-602.5	3	3	3	3	3		1	2		2
Avg.	3	3	3	3	3	1	1	1		2

Module I (10 Hours): Introduction: Automatic loom and its merit over plain shuttle loom.

Multiple box motion: Types of multiple box motion, working principle of multiple box motion, two colour and four colour drop box motion, brief description of pick-at-will, pick and pick Motion. Pattern card and use of this to make some design in drop box mechanism.

Terry weaving: Essential feature of terry weaving loom, various principle of terry pile formation and its Application.

Module II (10 Hours): Development of shuttle less looms: - Limitation of shuttle looms, Classification of shuttle less Looms. Yarn preparation & pre-requisites for shuttle less weaving. Techno economics of shuttleless weaving. Principles of positive shedding, Selvedge and salient features of shuttle less loom. Different types of accumulators and its important.

Projectile Loom: Working elements and weft insertion cycle in projectile loom-Torsion bar picking mechanism-Weft selection device-Salient features of projectile loom, Weft insertion rate and production calculation.

Module III (10 Hours): Rapier Loom: Classification of rapier loom: Flexible, Rigid rapiers-Principles of tip and loop transfer- Weft insertion cycle-Rapier drives-Salient features. Zero velocity and non-zero velocity tip transfer. Weft insertion rate and production calculation.

Air-jet loom: Working principle – weft insertion mechanism - types of nozzles, profile reed. Air requirements. Weft insertion rate and production calculation.

Module IV (10 Hours): Water-jet Loom: Working principle - Weft insertion system – Nozzles - Water requirements – Weft insertion rate and production calculation.

Multiphase loom: Classification, principles of operation, shedding mechanisms of weft way and warp way, supply systems for weft, Fabric Defects

Narrow fabric production: Importance of narrow weaving. It's manufacturing process. Unconventional Fabric Production: Concepts of 3D fabric production and circular loom.

Books Recommended:

1. Talukdar M K, Sriramulu P K and Ajgaokar D B, "Weaving – Machine, Mechanism and Management", Mahajan Publisher Private Ltd., Ahmedabad, India, 1998.
2. Aswani K T, "Fancy Weaving mechanism", Mahajan Publisher Private Ltd., Ahmedabad, India 1990.
3. Ormerod & W. S. Sondhelm "Weaving – Technology and Operations,
4. R. Sengupta "Weaving Calculation".
5. Woven Fabric Production I, II, NCUTE Publications 2002.
6. Handbook of weaving, By Sabit Adanur

3. Chemical Processing of Textile- (BTT603) LTP 3 1 0 Credit 4

Course Outcomes:

After successful completion of this course, the students should be able to;

1. Perform dyeing of textiles made up synthetic fibres and their blends.

2. Control process parameters and use of dyeing machines for dyeing of textile materials.
3. Select the dyes and recipe for preparation of printing paste for printing of textile materials.
4. Explain finishing treatment process and treat the fabric with different finishing agent.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	2	3	1								1
2	3	2	2	2								1
3	3	2	3	1								1
4	3	2	3	1								1
5	2	2	2	1								1
Avg.	3	2	3	1								1

Module I (10 Hours): Dyeing of synthetic fibres: Dyeing of polyester with disperse dye, dyeing of Nylon with acid dye, dyeing of acrylic with cationic dye.

Dyeing of blends: Classification of blends and shades, Methods for dyeing of blends. Suitability of each method for dyeing of specific blend- P/C, P/V, P/W. W/A.

Module II (08 Hours): Identification of dyes:

Dyeing machineries: Loose fibre, yarn and package dyeing machines. Jigger, winch, jet and HTHP beam dyeing machine. Padding mangle, Continuous dyeing range.

Module III (10 Hours): Printing: Objective, Difference between dyeing and printing, Characteristics of printing paste ingredients, classification and mechanism of thickeners.

Printing methods: Hand block, screen printing processes, screen preparation, drawback and advantage of each method. **Styles of printing:** Direct, Discharge and Resist. Printing of cotton with reactive, vat and pigment, Polyester with disperse dye and Acrylic with basic dyes. **Printing after treatments:** Steaming, curing, ageing in printing.

Digital Printing: Mechanism, process parameters and machinery.

Module IV (10 Hours): Finishing: Significance and classification of finishing.

Mechanical finish: Temporary and durable finishes, Sanforizing and their evaluation.

Chemical and functional finish: Mechanism, process parameters and trouble shootings of Softening, anti-crease finish, water proof and water repellent finish, flame-retardant and fire proof finish, Soil release finish; Organdi finish; Bio-polishing, Stonewashing of denim, Anti-microbial finish, antistatic finish and their evaluation.

Module V: 04 Hours: Waste minimization: **Need for waste minimization. water conservation, energy conservation. Textile effluent management. Techniques of effluent treatment**

Books Recommended:

1. Miles L W C, "Textile Printing", Dyers Company Publication Trust, Bradford, England, 1981.
2. Shenai V A, "Technology of Printing", Sevak Publications, Mumbai, 1990.
3. Shenai V A and Saraf, N M, "Technology of Textile Finishing", Sevak Publications, Mumbai, 1990.

4. Karmakar S. R., “Chemical Technology in the Pre-treatment Process of Textiles”, Elsevier sciences,1999.
5. Cavaco-Paulo A. and Gubitza G. M., “Textile Processing with enzymes”, Woodhead Publication Ltd.,2003.

4. Department Elective-III (L T P 3 0 0) credit3

4.1 Theory of Textile Structure (BTT061) (L T P 3 0 0)

Course Outcomes:

After successful completion of this course, the students should be able to;

1. Explain ideal helical model of yarn and different structural parameters.
2. Illustrate method of measuring structural parameters.
3. Determine effect of different parameters affecting the structure of yarn and on its properties.
4. Illustrate structural characteristics of knitted and nonwovens and design the fabric to get the desired property

CO	PO1	PO2	PO3	PO4	PO12
1	3	2	3	1	1
2	3	2	2	2	1
3	3	2	3	1	1
4	3	2	3	1	1
Avg.	3	2	3	1	1

Module I (10 Hours): Geometry of twisted yarn: Idealized helical yarn structure; yarn count and twist factors, twist contraction; Limits of twist.

Packing of fibres in yarn: Idealized packing; measurement of packing density and radial packing density of yarn; Packing in actual yarns; Specific volume of yarns; Equation of yarn diameter.

Fibre Migration: Ideal migration, tracer fiber technique, characterization of migration behavior, migration in spun yarns, mechanisms of migration, effect of various parameters on migration behavior.

Module II (10 Hours): Structural Mechanics: Translation of fiber properties into yarn properties; Extension of continuous filament yarn for small strains and large strains; Prediction of breakage, Nature of rupture for continuous filament yarn. Extension and breakage of spun yarn, Blended yarn structure, Structure property relationship of ring, rotor, air-jet, friction spun yarn, Extension of continuous filament yarn.

Module III (10 Hours): Fabric Geometry: Engineering approach to the analysis of fabric, Pierce geometrical model, flexible thread model and rigid thread model, Square fabric, Jammed Structure, square and jammed fabric, Crimp interchange, Maximum possible cover factor. Yarn cross sections in the fabric, Pierce elastic thread model. Geometry of weft and warp knitted structures.

Module IV (10 Hours): Fabric deformation under tensile stress; prediction of modulus; tensile properties in bias direction. Other fabric deformation: compression, shear, bending and buckling; fabric handle; Structure of felts and stitch bonded fabric; Basic of braided fabrics structure.

Books Recommended:

1. Hearle J. W. S., “Structural Mechanics of Fibers, Yarns and Fabrics”, Wiley-Interscience, New York, 1969.
2. Goswami B. C., “Textile Yarns: Technology, Structure and Applications”, Wiley-Interscience, New York, 1977.
3. Jinlian Hu., “Structure and Mechanics of Woven Fabrics”, Woodhead Publishing Ltd., 2004.
4. Hearle J. W. S., John J., Thwaites. And Jafargholi Amirbayat., “Mechanics of Flexible Fibre Assemblies”, Sijthoff and Noordhoff, 1980.
5. Hassan M. Berery., “Effect of Mechanical and Physical Properties on Fabrics Hand”, Wood head publishing Ltd., 2005.
6. Behera BK, Hari PK, “Woven Textile Structure: Theory and Applications”. Woodhead publishing.

4.2 Clothing Science (BTT062) (L T P 3 00)

Course Outcomes:

After successful completion of this course, the students should be able to;

- 4.2.1 Describe thermal and non-thermal components of clothing comfort.
- 4.2.2 Explain the role of body components in maintaining body temperatures
- 4.2.3 Recognize the Principles of heat transfer to and away human body
- 4.2.4 Explain various aspects of thermal & skin sensational clothing comfort

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO10	PO11	PO12
1	3	1	3	2	1				2
2	3	2	3	2					2
3	3	1	3	2	1				2
4	2	3	3	2	1				2
Avg.	3	2	3	2	1				2

Module I (10 Hours): Introduction: Concept of selection of fabrics for clothing purpose. Types of fabric required for apparel use for different age group, occasions, purpose. Fabric properties and performance for apparel use.

Serviceability of Fabrics: Abrasion resistance - flat abrasion, flex abrasion, edge abrasion, Pilling - mechanism of pilling formation, anti-pilling techniques, Snagging, Strength, Tearing strength - Tensile strength - Bursting strength , seam strength and seam slippage.

Tailorability of fabrics: tailorability of woven and knitted garments, Tailor ability of leather garments and fur garments

Module II (10 Hours): Aesthetic properties: Drape, Crease and Wrinkle recovery - Lustre. Yarn unevenness: neps, thick place, thin place, periodic fault, Scroopiness, Colour- Colour fastness: to light, washing, perspiration, rubbing, dry cleaning.

Dimensional Stability of Fabrics: Hygral expansion, Relaxation shrinkage, swelling shrinkage, Felting shrinkage. Mechanism of fabric shrinkage- Relationship between Hygral Expansion, Relaxation shrinkage and extensibility - Knitting Process Parameters and fabric stability. Methods of measuring dimensional stability to dry cleaning and dry heat.

Fabric Hand: smoothness, fullness and stiffness, subjective hand judgment, objective evaluation of fabric hand and its applications.

Module III (10 Hours): Clothing Comfort: Definition of comfort - Human clothing system - Physical, Physiological and psychological aspects of comfort. Tactile and pressure sensation aspects. Applications of clothing comfort research.

Thermal Comfort: Introduction. Thermal transfer processes. Dry heat transfer and Rapid heat transfer. Function of Textiles in enhancing thermal comfort. Comparison of thermal comfort properties for different textile structures.

Module IV (10 Hours): Functional Properties: Elasticity: elastic recovery, residual strain; Thermal insulation. Water repellence, water resistance and water proof; Wicking: vertical and horizontal transportation of liquid; Water absorbency; UV protection; Soil release

Safety: Toxicity - residual dye stuff and other finishing agent; Flammability

Books Recommended:

1. Kothari, V K, “Testing and Quality Management”, CBS Book Publishers, New Delhi,2000.
2. Li. Y, “The Science of Clothing Comfort”, Textile Progress, Volume: 31, No. 1/2, Textile Institute.
3. Saville B P, “Physical Testing of Textiles”, The Textile Institute, Woodhead publication limited, Cambridge.
4. Billie J Collier and Helen H Epps, “Textile Testing and Analysis”, Prentice- Hall Inc., New Jersey.
5. Lyman Fourt& Norman R.S. Hollies, “Clothing: Comfort & Functions”, Marcel Dekker, Inc, New york.
6. G. Song, “Improving Comfort in Clothing”, Woodhead Publication.
7. A. Das, R. Alagirusamy, “Science in Clothing Comfort”, Woodhead Publication

4.3 Mechanical Machine Design (BTT063) L-T-P (3-0-0)

Unit	Topics	Lect ures
I	Introduction Definition, Design requirements of machine elements, Design procedure, Standards in design, Selection of preferred sizes, Indian Standards designation of carbon & alloy steels, Selection of materials for static and fatigue loads. Design for Static Load: Modes of failure, Factor of safety, Principal stresses, Stresses due to bending and torsion, Theory of failure.	8
II	Design for Fluctuating Loads: Cyclic stresses, Fatigue and endurance limit, Stress concentration factor, Stress concentration factor for various machine parts, Notch sensitivity, Design for finite and infinite life, Soderberg, Goodman & Gerber criteria. Riveted Joints: Riveting methods, materials, Types of rivet heads, Types of riveted joints, Caulking and Fullering, Failure of riveted joint, Efficiency of riveted joint, Design of boiler joints, Eccentric loaded riveted joint.	8
III	Shafts: Cause of failure in shafts, Materials for shaft, Stresses in shafts, Design of shafts subjected to twisting moment, bending moment and combined twisting and bending	8

	moments, Shafts subjected to fatigue loads, Design for rigidity. Keys and Couplings: Types of keys, splines, Selection of square & flat keys, Strength of sunk key, Couplings, Design of rigid and flexible couplings.	
IV	Belt rope and chain drives: Design of belt drives, Flat & V-belt drives, Condition for Transmission of max. Power, Selection of belt, design of rope drives, and design of chain drives with sprockets Clutches: Various types of clutches in use, Design of friction clutches – Disc, Multidisc, Cone and Centrifugal. Brakes: Various types of Brakes, Design of shoe brakes – Internal & external expanding, band brakes.	9
V	Spur Gears Tooth forms, System of gear teeth, contact ratio, Standard proportions of gear systems, Interference in involute gears, Backlash, Selection of gear materials, Gear manufacturing methods, Design considerations, Beam strength of gear tooth, Dynamic tooth load, Wear strength of gear tooth, Failure of gear tooth, Design of spur gears, AGMA and Indian standards. Helical Gears Terminology, Proportions for helical gears, Forces components on a tooth of helical gear, Virtual number of teeth, Beam strength & wear strength of helical gears, Dynamic load on helical gears, Design of helical gears.	9

Text Books

1. Design of Machine Elements – V.B. Bhandari – Tata McGraw Hill, New Delhi.
2. Design of machine elements-C S Sharma, Kamlesh Purohit,PHI.

5. Open Elective-1: As per AKTU Syllabus. The students have choice to go through course via MOOCS/NPTEL/SWAYAM

6. Yarn Manufacture-III (BTT551) Practical L T P 0 0 2 credit1

1. To study the construction details and passage of materials in Ring frame.
2. To outline the main gearing diagram of ring frame and calculate Draft Constant and Twist Constant. & Production.
3. To study the building motion in ring frame.
4. To calculate required speed, draft and twist level and produce yarn from a given roving and determine the yarn count & production.
5. To study the construction details and passage of materials in Ring doubler.
6. To study the construction details and passage of materials of TFO.
7. Production & twist calculation in TFO with 3 positions and its effect on yarn strength.
8. Study of flow of materials in Rotor spinning machine.
9. Study of different elements of Rotor spinning machine.
10. Study of draft distribution in Rotor spinning machine.
11. Study of twist level in Rotor spun yarn.
12. Calculation of production of rotor spinning machine

7. Fabric Manufacture-III Practical (BTT552) L T P 0 0 2 credit1

1. Study and working of pirn change motion.
2. Study and working of shuttle change motion
3. Study & working of multiple box loom

4. To study fabric formation in Terry towel loom.
5. To study the yarn passage in different shuttle less loom
6. To study path of warp yarn in rapier loom.
7. To study picking mechanism in rapier loom.
8. To produce a fabric by changing the design in rapier loom.
9. To study path of warp yarn in air-jet loom.
10. To study picking mechanism in air-jet loom.

8. TEXTILE CHEMICAL PROCESSING II Lab (BTT553) Credit 0 0 2 Credit 1
At least 10 of the following

1. Dyeing of Polyester fibres/yarn/fabrics with Disperse Dye using carrier dyeing process.
2. Dyeing of Polyester fibres/yarn/fabrics with Disperse Dye using HT-HP dyeing process.
3. Dyeing of Nylon yarn/fabric with Acid Dye.
4. Dyeing of poly acrylonitrile fibre with cationic dyes.
5. Dyeing of blended fabric with suitable dyes.
6. Printing of cotton fabric with direct style printing and assessment of fastness properties of printed material.
7. Printing of cotton fabric with discharge style printing and assessment of fastness properties of printed material.
8. Printing of cotton fabric with resist style printing and assessment of fastness properties of printed material.
9. Finishing of cotton fabric using starch and evaluation of stiffness and add-on%.
10. Finishing of cotton fabric using softeners and evaluation of drape and add-on%.
11. Crease Proofing of cotton fabric and evaluation of crease recovery angle.
12. Assessment of shrinkage of woven and knitted fabrics.
13. Finishing of cotton fabric with anti-pilling finish and evaluation of pilling.
14. Finishing of cotton fabric with water repellent finish and evaluation of wetting angle.
15. Finishing of cotton fabric with flame retardant finish and evaluation of LOI.
16. Finishing of cotton fabric with soil release finish and measure the ability of fabric to release oily stains during home laundering.
17. Determination of the colour difference and colour strength value of dyed material using computer colour matching system

9. Non Credit course: As per AKTU Guidelines

BNC501/BNC601: Constitution of India, Law and Engineering: L: T: P: 2: 0:0

Module 1--Introduction and Basic Information about Indian

Constitution: Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947, Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local

Self Government – Constitutional Scheme in India.

Module 2-Union Executive and State Executive:

Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, Lok Pal, LokAyukta, The Lokpal and Lokayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.

Module 3- Introduction and Basic Information about Legal System:

The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.

Module 4- Intellectual Property Laws and Regulation to Information:

Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.

Module 5 -Business Organizations and E-Governance:

Sole Traders, Partnerships: Companies: The Company's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.

COURSE OBJECTIVE:

- To acquaint the students with legacies of constitutional development in India and help those to understand the most diversified legal document of India and philosophy behind it.

- To make students aware of the theoretical and functional aspects of the Indian Parliamentary System.
- To channelize students' thinking towards basic understanding of the legal concepts and its implications for engineers.
- To acquaint students with latest intellectual property rights and innovation environment with related regulatory framework.
- To make students learn about role of engineering in business organizations and e-governance.

COURSE OUTCOME: At the end of the course, learners should be able to

1. Identify and explore the basic features and modalities about Indian constitution.
2. Differentiate and relate the functioning of Indian parliamentary system at the center and state level.
3. Differentiate different aspects of Indian Legal System and its related bodies.
4. Discover and apply different laws and regulations related to engineering practices.
5. Correlate role of engineers with different organizations and governance models

Pedagogy: Lecture, Problem based learning, Group discussions, Visual media, Films, Documentaries, Debate forums.

Suggested Readings:

- Brij Kishore Sharma: Introduction to the Indian Constitution, 8th Edition, PHI Learning Pvt. Ltd.
- Granville Austin: The Indian Constitution: Cornerstone of a Nation (Classic Reissue), Oxford University Press.
- Subhash C. Kashyap: Our Constitution: An Introduction to India's Constitution and constitutional Law, NBT, 2018.
- Madhav Khosla: The Indian Constitution, Oxford University Press.
- PM Bakshi: The Constitution of India, Latest Edition, Universal Law Publishing.
- V.K. Ahuja: Law Relating to Intellectual Property Rights (2007)
- Suresh T. Viswanathan: The Indian Cyber Laws, Bharat Law House, New Delhi-88
- P. Narayan: Intellectual Property Law, Eastern Law House, New Delhi
- Prabudh Ganguli: Gearing up for Patents: The Indian Scenario, Orient Longman.
- BL Wadehra: Patents, Trademarks, Designs and Geological Indications Universal Law Publishing - LexisNexis.
- Intellectual Property Rights: Law and Practice, Module III by ICSI (only relevant sections)
- Executive programme study material Company Law, Module II, by ICSI (The Institute of Companies Secretaries of India) (Only relevant sections i.e., Study 1, 4 and 36).
<https://www.icsi.edu/media/webmodules/publications/Company20Law.pdf>

- Handbook on e-Governance Project Lifecycle, Department of Electronics & Information Technology, Government of India, https://www.meity.gov.in/writereaddata/files/eGovernance_Project_Lifecycle_Participant_Handbook-5Day_CourseV1_20412.pdf
- Companies Act, 2013 Key highlights and analysis by PWC. <https://www.pwc.in/assets/pdfs/publications/2013/companies-act-2013-key-highlightsand-analysis.pdf>

Referred Case Studies:

- Keshavanand Bharati V. State of Kerala, AIR 1973 SC 1461.
 - Maneka Gandhi V. Union of India AIR, 1978 SC 597. • S.R. Bammai V. Union of India, AIR 1994 SC 1918.
 - Kuldeep Nayyar V. Union of India, AIR 2006 SC312.
 - A.D.M. Jabalpur V. Shivkant Shakla, AIR 1976 SC1207. • Remshwar Prasad V. Union of India, AIR 2006 SC980.
 - Keshav Singh in re, AIR 1965 SC 745.
 - Union of India V. Talsiram, AIR 1985 SC 1416.
 - Atiabari Tea Estate Co. V. State of Assam, AIR 1961SC232.
 - SBP & Co. Vs. Patel Engg. Ltd. 2005 (8) SCC 618.
 - Krishna Bhagya Jala Nigam Ltd. Vs. G. Arischandra Reddy (2007) 2 SCC 720.
 - Oil & Natural Gas Corporation Vs. Saw Pipes Ltd. 2003 (4) SCALE 92 – 185.
- ** (Other relevant case studies can be consulted by the teacher as per the topic).

Prescribed Legislations:

1. Information Technology Act, 2000 with latest amendments.
2. RTI Act 2005 with latest amendments.
3. Information Technology Rules, 2000
4. Cyber Regulation Appellate Tribunal Rules, 2000

Suggested aid for Students and Pedagogic purpose

- RSTV debates on corporate law, IPR and patent issues
- NPTEL lectures on IPR and patent rights

Episodes of 10 -part mini TV series “Samvidhan: The Making of Constitution of India” by RSTV.

BNC502/BNC602: INDIAN TRADITIONS, CULTURAL AND SOCIETY L: T:P: 2:0:0

Module 1- Society State and Polity in India State in Ancient India:

Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship, Council of Ministers Administration Political Ideals in Ancient India Conditions of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, the representation of Women in Historical traditions, Challenges faced by Women. Four-class Classification, Slavery.

Module 2- Indian Literature, Culture, Tradition, and Practices

Evolution of script and languages in India: Harappan Script and Brahmi Script.

The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist and Jain Literature in Pali, Prakrit and Sanskrit, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature, Malayalam Literature, Sangama Literature Northern Indian Languages & Literature, Persian and Urdu, Hindi Literature

Module 3- Indian Religion, Philosophy, and Practices

Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines, Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.

Module 4-Science, Management and Indian Knowledge System

Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India, Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India, Writing Technology in India Pyrotechnics in India Trade in Ancient India/, India's Dominance up to Pre-colonial Times

Module 5- Cultural Heritage and Performing Arts

Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Seals, coins, Pottery, Puppetry, Dance, Music, Theatre, drama, Painting, Martial Arts Traditions, Fairs and Festivals, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema.

COURSE OBJECTIVES:

- The course aims at imparting basic principles of thought process, reasoning and inference to identify the roots and details of some of the contemporary issues faced by our nation and try to locate possible solutions to these challenges by digging deep into our past.
- To enable the students to understand the importance of our surroundings and encourage the students to contribute towards sustainable development.
- To sensitize students towards issues related to 'Indian' culture, tradition and its composite character.
- To make students aware of holistic life styles of Yogic-science and wisdom capsules in Sanskrit literature that are important in modern society with rapid technological advancements and societal disruptions.
- To acquaint students with Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.

COURSE OUTCOMES: Ability to understand, connect up and explain basics of Indian Traditional knowledge modern scientific perspective.

Suggested Pedagogy for Teachers

- Project based learning
- Case studies
- Group discussion
- Presentations

Suggested Text & Reference Books

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material,

Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014

2. S. Baliyan, Indian Art and Culture, Oxford University Press, India
3. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
4. Romila Thapar, Readings in Early Indian History Oxford University Press, India
5. Fritz of Capra, Tao of Physics
6. Fritz of Capra, The wave of Life
7. V N Jha (English Translation), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Amaku, am
8. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
9. GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasham, Delhi, 2016
10. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016
11. P R Sharma (English translation), ShodashangHridayam
12. Basham, A.L., The Wonder that was India (34th impression), New Delhi, Rupa& co
13. Sharma, R.S., Aspects of Political Ideas and Institutions in Ancient India (fourth edition), Delhi, Motilal Banarsidass,
- 10. MOOCS (Essential for Honors degree)**