Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

ES TT 301 Theory of Machines

Name of the Course:	THEORY OF MACHINES
Course Code: ES TT 301	**Semester: 3rd**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 2 hrs./week	Mid Semester Exam.: 50 Marks
Tutorial: Nil	Assignment: 40 Marks
	Quiz: 10 Marks
Practical: hr./week	Attendance: 5 Marks
Credit Points: 2	End Semester Exam.: 70 Marks

Objective:	
1	To acquire the basic knowledge about Mechanism
2	**To understand the various types of belt drives and estimate the transmission of power by belts**
3	To be able to draw the cam profile for various followers
4	To understand the kinematics of gear trains
5	To understand the balancing of rotating masses and vibrations

Pre-Requisite:	
1	
2	
3	

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	Units	Objective Questions (MCQ only with one correct answer)	Subjective Questions

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

		No. of questions to be set	Total marks	No. of questions to be set	To answer`	Marks per question	Total marks
A							
B							
C							

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Unit	Content	Hrs/Unit	Marks/Unit
1	**Concepts: Basic concepts:** Kinematics and Kinetics; Introduction to Mechanisms; nce between Machine, Mechanism and Structure; Classification of Pairs of Elements; Frames and Kinematic Chains; Pairs, Higher Pairs, Lower Pairs, Linkages, Types of a chain; Four & six -bar linkage: Motions of links, Grashof's criterion of movability; of freedom for plane Mechanisms, Gruebler's criterion for plane mechanism; ction to Kinematic inversions.	6	
2	**Belt, Rope and Chain Drives:** Types of belt and belt drives, Materials used for belt drives, Various types of Flat belt drives, Velocity ratio in belt drives, Slip and Creep of belt, Length of belt in flat and cross belt drives, Power transmission in belt drives, Ratio of driving tension, Adjustment of belt tensions, Angle of contact belt in belt drives, Centrifugal tension, Maximum tension in belt, Initial tension, V-belt drives, Advantages and disadvantages of V-belt drive, Toothed belt drives; Rope drives and its types, Chain drives and its advantages and disadvantages, Applications of belt, chain and rope drives.	6	
3	**Cams:** Introduction, Cam Mechanisms, Classification of Cam Mechanisms; Types of follower; Follower Arrangement- In-line; Cam Shape - Disk cam, Groove cam, Cylindrical cam; Constraints on the Follower; Cam Nomenclature- Trace point, Pitch curve, Working curve, Pitch circle, Prime circle (reference circle, Base circle, Stroke or throw, Follower displacement, Pressure angle; Motion events- Constant Velocity Motion, Constant Acceleration Motion, Simple Harmonic Motion and Cycloidal motion; Cam Design- Parameters, Cam profile design principle, Design equations, Manual drawing examples of some textile and apparel cams especially 1-up 1-down, 2-up 1-down, 2-up 2-down etc.	6	

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

4	**Gears:** Introduction, Advantages and disadvantages of gear drives, Classification of gears, Gear terminology, Laws of gearing, Types of gears – Spur, Bevel, Helical, Worm and Warp wheel; Tooth profile, Interference; Gear trains – Simple, Compound, Reverted, Epicyclic, Sun and planet gear train; Velocity calculation analysis of gear trains.	6	
5	**Balancing of Masses:** Introduction to balancing of rotating masses and reciprocating masses, Causes of unbalance, Static and dynamic balancing, Balancing of single rotating mass by a single mass rotating in same plane, Balancing of single rotating mass by two masses rotating in different plane, Balancing of several masses rotating in same plane**.**	4	
6	**Vibrations:** (a) Longitudinal and Transverse Vibrations: Introduction, Terms used in vibratory motion, Types of vibratory motion, Types of free vibrations, Natural frequency of free Longitudinal vibrations, Natural frequency of free Transverse vibrations, b) Introduction to Torsional vibrations,	4	

Text and reference books:

Course Outcome: Accord knowledge about the various machine, mechanism and motion transmission in Textile and Apparel Machineries and able to draw the cams profile which are used in the field of Textile and Apparel.

Special Remarks (If any):

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)
<u>**ES TT 391 Theory of Machines Lab**</u>

Name of the Course:	**THEORY OF MACHINES LAB**
Course Code: ES TT 391	**Semester: 3rd**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: hrs./week	**Continuous Internal Assessment:**
Tutorial: Nil	**External Assessment: 60**
Practical: 3 hr./week	**Distribution of marks: 40**
Credit Points: 1.5	

Course Outcomes:	
1	
2	
3	
4	
5	

Pre-Requisite:	
1	
2	
3	

Practical:	
	1) Intellectual skills-
	2) Motor skill-

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

Laboratory Experiment:	
1	Introduction to various textile machinery, motion and mechanism.
2	Study and understood the friction drive mechanism and derive relevant calculation.
3	Study and understood the 4-bar link crank and crank-arm drive mechanism.
4	Study and understood the belt drive and rope drive mechanism and derives the relevant calculation.
5	Study and understood the compound spur gear drive mechanism and derive relevant calculation.
6	Study and understood the bevel gear drive mechanism and derive relevant calculation.
7	Study and understood the warm and warm-wheel mechanism and derive relevant calculation.
8	Study and understood the Ratchet and pawl drive mechanism and derive relevant calculation.
9	Study and understood the epicyclic gear drive mechanism and derive relevant calculation.
10	Study and understood the disc cam drive mechanism and derive relevant calculation.
11	Study and understood the grove cam drive mechanism and derive relevant calculation.
12	Study and understood the stepper pulley drive mechanism and derive relevant calculation.

Text and reference books:

Special Remarks (If any):

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)
BS BIO 301   Biology for Engineers

Name of the Course:	BIOLOGY FOR ENGINEERS
Course Code: BS- 301	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	**Examination Scheme**
Theory: hrs./week	Mid Semester Exam.: 50 Marks
Tutorial: Nil	Assignment: 40 Marks
	Quiz: 10 Marks
Practical: hr./week	Attendance: 5 Marks
Credit Points: 3	End Semester Exam.: 70 Marks

Objective:	
1	To introduce modern biology with an emphasis on evolution of biology as a multidisciplinary field. 2. To make students.
2	To make students aware of application of engineering principles in biology and engineering robust solution inspired by biological examples.

Pre-Requisite:	
1	None

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	Units	Objective Questions (MCQ only with one correct answer)		Subjective Questions			
		No. of questions to be set	Total marks	No. of questions to be set	To answer`	Marks per question	Total marks
A							
B							
C							

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**
- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs/Unit	Marks/Unit
1	Darwinian evolution, molecular perspective and classification, Phylogenetic trees, study of inter- and intra -species relationships.	3	
2	Cellular structure and function, cellular assembly and central dogma of molecular Biology	6	
3	Organismal physiology-Energy and energetic constraints	3	
4	3 D structure and function of large biological molecules.	3	
5	Techniques in bio physics and bio chemistry	3	
6	Immunology- Self vs Non-self, pathogens, human immune system, antigen-antibody reactions.	6	
7	Infectious disease Biology and vaccines.	4	
8	Cancer biology, gene regulation, aging, apoptosis and stem cell.	6	
9	Environmental bio-safety, bioresources, biodiversity.	2	
10	Drug design	2	
11	Engineering design inspired by examples in biology	2	

Text and reference books:
1. Essential of Genetics, Miko, I & LeJeune, L, Cambridge, MA, NPG Education, 2009.
2. Essential of Cell Biology, O'Connor, C.M % Adam, J,U, Cambridge, MA, NPG Education, 2010.
3. Molecular Biology of the Gene, Warson JD, Baker, TA, Bell SP, Gann A, Levin M, Losick R, Pearson Education, 2004.

Course Outcome:
1. Learners will be able to define, describe and list different theories and function of different Biological structure and processes.
2. Learners will be able to explain different principles of biology
3. Learners will be able to develop the concept of vaccines and human immune system,
4. Learners will be able to correlate engineering design with examples of biology.

Special Remarks (If any):

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)
PC TT 301 Textile Fibre

Name of the Course:	TEXTILE FIBRES
Course Code: PC TT 301	**Semester: 3rd**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: hrs./week	Mid Semester Exam.: 50 Marks
Tutorial: Nil	Assignment: 40 Marks
	Quiz: 10 Marks
Practical: hr./week	Attendance: 5 Marks
Credit Points: 3	End Semester Exam.: 70 Marks

Objective:	
1	
2	
3	

Pre-Requisite:	
1	
2	
3	

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	Units	Objective Questions (MCQ only with one correct answer)		Subjective Questions			
		No. of questions to be set	Total marks	No. of questions to be set	To answer`	Marks per question	Total marks
A							
B							
C							

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

> - Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.
> - Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Unit	Content	Hrs/Unit	Marks/Unit
1	**General concept :** Classification of textile fibres, difference between natural and synthetic fibres according to their composition and properties, longitudinal and cross sectional views of different textile fibres and their impact on physiomechanical properties like tenacity, elongation, initial modulus, yield point, toughness, elastic recovery and moisture regain.		
2	**Fibre forming polymers and characterization:** Essential and desirable characteristics of fibre forming polymers, chemical structure and bonding of natural and synthetic fibres, macro and micro structure of cellulosic, protein and synthetic fibres, orientation and crystallinity, glass transition temperature and its significance, measurement of crystallinity by XRD, thermal characterization by DSC, TGA and DTA, structural characterization by FTIR and NMR, morphological characterization by SEM and AFM.		
3	**Natural fibres:** Classification, grading, structure and properties of natural fibres like vegetable (bast, leaf and seed fibres), animal fibres (wool and silk) and mineral fibres (glass, asbestos and metallic fibres), cotton, jute, flax, hemp, silk and wool: concept of varieties, grading, distinctive properties and end uses.		
4	**Regenerated fibres:** Classification, regenerated fibres: acetate, viscose and diverse form of viscose, cuprammonium, alginate, lyocell--- production , properties and uses.		
5	**Synthetic fibres:** Classification, Principles of polycondensation and production with reference to polyester, polyamides and polyurethanes, principles of poly addition and production with reference to acrylics, polyolefins, polyvinyl chlorides and aramid fibres including chemical properties and end uses. Principles of melt spinning, dry spinning and wet spinning, viscosity of melts and solution, rheology of melt spinning, LOY, Moy and FOY, equipments and features of manmade fibre production, concept of quenchingoperation and finish application.		
6	**Fibre forms and characteristics:** Continuous and staple fibre, heat setting and drawing,concept of micro denier and smart fibre production		

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

Text and reference books:

(i) Textile Science----- E. P. G. Gohl and I. D. Vilensky
(ii) Text book of Polymer science--- F. W. Billmeyer
(iii) Manufactured Fibre Technology--- V. B. Gupta and V. K. Kothari
(iv) Manmade Fibre Science and Technology---- H. F. Mark, S. M. Atlas and E. Cernia
(v) Fibre Chemistry – M. Lewin and E. M. Peare

Course Outcome: The students will be acquainted with the basics as well as the in-depth knowledge of fibre/filament production, properties and end uses which will not only help them to enrich themselves with the industrial requirements but also fit them with the industrial need as a whole.

Special Remarks (If any):

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)
<u>**PC TT 391 Textile Fibre Lab**</u>

Name of the Course:	TEXTILE FIBRE LAB
Course Code: PC TT 391	**Semester: III**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: hrs./week	**Continuous Internal Assessment:**
Tutorial: Nil	**External Assessment: 60**
Practical: 3 hr./week	**Distribution of marks: 40**
Credit Points:1.5	

Course Outcomes:	
1	Students learn to identify the physical and morphological, and solubility test, characteristics of common textile fibres blend analysis.
2	Students learn to measure the essential physical parameters of textile fibre and prepare report with statistical parameters and analyse the results.
3	Students learn longitudinal and cross-sectional features of textile fibres by microscopical observation ,burning behavior, chemical behavior with standard solvents ,chemicals
4	Students learn identifying unknown fibres and blend analysis
5	students learn fibre length characteristics by Baer and digital fibrograph methods
6	Student learn methods of determining fibre fineness by air flow technique other yarns
7	Students learn determing maturity cotton fibres by causticare method
8	Students learn determining denier of known filament and synthetic fibre by measuring diameter under microscope, crimps per cm of synthetic,wool fibre
9	Students learn stress-strain curve for textile fibres and analysis of the curve for different strength parameters
10	Students learn method of reporting the experimental data with statistical parameters
Pre-Requisite:	
1	Elements of statistics
2	General physics for measurement
3	General chemistry about common solvents
4	TT of Textile fibres
Practical: 9 number of experiments	
	1) Intellectual skills- 55 % (average)
	2) Motor skill- 45% (average)

Laboratory Experiment:	
1	Identification of textile fibres Identification of common textile fibres like cotton, wool, silk, jute, flax, ramie,viscose, acetate, nylon, polyester, acrylic, polypropylene, glass, by longitudinal and cross sectional views. .
	Identification of textile fibres by burning test
	Identification of common textile fibre by solubility test
	Methods to identify blend of common textile fibre by solubility test
2	Preparation of Baer sorter diagram and determination of Effective length (b) Mean length (c) Dispersion percentage (d) Short fibre percentage

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

3	Determination of 2.5% span length, 50% span length and uniformity ratio of a given cotton using fibro graph. Construction of the fibrogram.
4	Determination of micronaire value of given cotton sample by Airflow method.
5	Determination of maturity ratio of given cotton sample by causticaire method
6	Determination of Denier of filament/synthetic fibre by measuring diameter and known density.
7	Determination of crimp per cm of textile fibre.
8	Determination of bundle strength of cotton fibre by stelometer
9	Determination of stress strain curve of single textile fibres in Instron and analysis of the curve for determining strength parameters
10	Determination of regain of textile fibres by drying oven technique

Text and reference books:

1. ASTM Standard testing books 2011
2. Textile testing by J.E.Booth
3. Identification of textile fibres by Textile Institute

Special Remarks (If any): Nil

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

PC TT 302 Yarn Formation I

Name of the Course:	YARN FORMATION I
Course Code: PC-TT 302	**Semester: 3rd**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester Exam.: 50 Marks
Tutorial: Nil	Assignment: 40 Marks
	Quiz: 10 Marks
Practical: hr./week	Attendance: 5 Marks
Credit Points: 3	End Semester Exam.: 70 Marks

Objective:	
1	To introduce the raw materials, intermediate forms and end products of textiles and to explain the relationships between them.
2	To illustrate the requirements of fibre properties for conversion of fibres into yarns and its process flow
3	To explain in details the principles, mechanisms and technology involved in different preliminary and preparatory processes (viz. Ginning, baling, Blowroom, Carding and Draw Frame) to form parallel and even fibrous assembly in yarn manufacturing along with respective machineries.

Pre-Requisite: Nil

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	Units	Objective Questions (MCQ only with one correct answer)		Subjective Questions			
		No. of questions to be set	Total marks	No. of questions to be set	To answer`	Marks per question	Total marks
A							
B							

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

C								

•   **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**   •   **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

. Units	Coarse Content	Contact Hrs
1.	Introduction to the terms 'Textiles', 'Fibres', 'Filaments', 'Yarns' and 'Fabrics'; Understanding various properties of fibres and assessing the essential and desirable properties of fibres required for staple yarn preparation; Basic operations involved in yarn production – a brief conception. Process flowchart for carded and combed yarn manufacturing. Yarn numbering systems and their conversion; A brief idea about Yarn classifications.	6
2.	Impurities in cotton fibres and their removal during pre-baling operation; Concept of Ginning; Types of Ginning Machines and their suitability on different varieties of cotton; Performance of ginning on yarn quality, Objectives of baling for yarn preparation.	2
3.	Basics of Opening, cleaning, mixing and blending and their sequential implementation in yarn preparatory stage; Objectives of blowroom; Basic operations in blowrooms; Sequence of opening and cleaning machineries in conventional and modern blowroom and their brief comparative study; Working principles of automatic bale opener, coarse cleaner, mixing machines, intensive openers, dust removal, smoke and metal detectors. Classification of opening devices. Elements of grid as cleaning components. Processing of natural and synthetic fibres in blowroom, Process Performance of blowroom machines for such as Cleaning efficiency, Degree of Opening etc.; Production calculation, and fiber waste in blowroom.	10
4.	Objectives and functions of carding machine; Mechanism of feeding into a card; Principles of actions in different zones of carding and Concept of card clothing; Overview of various types of designs of carding machines; General Elements of a carding machine along with their maintenances and settings; Process performance of carding viz. cleaning efficiency, wastes, nep formation, sliver unevenness etc. Transfer efficiency of card- a brief idea; Draft and production calculations of card; Modifications needed in carding for manmade and blended yarns preparation. Modern developments in carding machines.	12
5	Objectives and tasks of drawframe machine. Principles of equalizing (doubling) and drafting processes; A idea of drafting theory; Evolution of drafting arrangements; Zone-wise study of a draw frame machines (machine components, maintenance and settings etc.) viz. creel section, drafting zone, dust removal region, material condensing and delivery sections; Process performance of Draw frame viz. U%, Imperfection etc. Draft and Production calculations of draw frame machines. Modifications needed in draw frame for manmade and blended yarns preparation. Developments in Modern draw frame machines.	10
6	Mass variations of fibrous assembly and their monitoring and control; Basic principle of auto-levelers; Classifications of Auto-leveller; Purpose and mechanisms of auto-levellers used in carding and Draw frame machines; Recent trends including concepts of Integrated monitoring and auto-levelling system.	2
		42

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

<u>**Course Outcome:**</u>

At the end of the semester under this course, students will be able to
1.   Understand the properties of spinnable fibres, basic operations involved in staple yarn spinning and sequential processes for carded and combed yarns manufacturing.
2.   Understand the objectives, tasks, principles, and technology behind each processes viz. Ginning, bailing, Blow room, Carding and Drawing.
3.   Understand the various process and machine parameters, requirements of maintenance and settings of machineries involved in Blowroom, Card, and Draw frame in order to apply it actual condition in textile spinning industry.

<u>**Text and reference books:**</u>
1. 'The Technology of Short Staple Spinning' by W. Klein. *The Textile Institute Publication, Manual of Cotton Spinning, Short Staple Spinning Series;*
2. 'A Practical Guide to Opening & Carding, W. Klein. *The Textile Institute Publication, Manual of Cotton Spinning, Short Staple Spinning Series;*
3. A Practical Guide to Combing & Drawing by W. Klein, *The Textile Institute Publication, Manual of Cotton Spinning, Short Staple Spinning Series;*
4. 'The characteristics of Raw Cotton' by P. Lord. *The Textile Institute Publication, Manual of Cotton Spinning, vol. II, Part-I;*
5. 'Opening & Cleaning' by C. Shirley, *The Textile Institute Publication, Manual of Cotton Spinning, vol. II, Part-II;*
6. 'The Principle of Roller Drafting & The Irregularity of Drafted Materials' by G. A. R. Foster,
7. 'Spun Yarn Technology' by Eric Oxtoby,
8. 'Fundamentals of spun yarn technology' by Carl A. Lawrence;
9. 'Cotton Ginning' – Textile Progress, *The Textile Institute Publication;*
10 'Spun Yarn Technology' (Vol-1 & Vol-2) by A Venkatasubramani;
11. Blow room and Carding' – Training Programme conducted by NCUTE, IIT, Delhi.
12. Essential Calculations of Practical Cotton Spinning' by T.K. Pattabhiraman

<u>Special Remarks (If any):</u>
Demonstration of machine may be needed

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

PC TT 392   Yarn Formation Lab I

Name of the Course:	Yarn Formation Lab I
Course Code: PC TT 392	Semester: 3rd
Duration: 6 months	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: hrs./week	Continuous Internal Assessment:
Tutorial: Nil	External Assessment: 60
Practical: 3 hr./week	Distribution of marks: 40
Credit Points:1.5	
Course Outcomes:	
1	
2	
3	
Pre-Requisite:	
1	PC TT 302 Yarn Formation I
2	
Practical: 14 number of experiments	
	1) Intellectual skills- 55 % (average)
	2) Motor skill- 45% (average)

Laboratory Experiment: (At least 10 experiments should be conducted)	
1	Study of different types of tools and gadgets used in yarn formation Laboratory set up viz. various types of spanners, Calipers, Hammers (Nylon, Brass & Iron hammers), Gauges (leaf gauge & filler gauge), Screw driver, Torque wrench, Pliers (Cir. clip Pliers - outer & inner), Pullers, Oiling and greasing equipment, Digital Tachometers etc.
2	Study of different types of drives viz. Belt drives - Flat and V, Open and Cross, Timer belts; Gear Drives –Spur (Simple and compound carrier), Helical, Bevel etc.; Chain and sprocket wheel drive; Worm and worm wheel drive;. Importance of safety gear; as well as calculations based on them regarding Simple speed, energy consumption (Slippage), cross checking the calculated speed by using Tachometer.
3	Study of different types of bearings used on spinning machines and their lubrication. Application of each types of bearing is demonstrated on machines.
4	Introduction to the knowhow of spinning process, sequence, machineries (carded/ combed) used in yarn manufacturing (short and long staple system) including explanation of objects of each machine and their feed as well as delivery materials. A mill visit (if accessible) may be conducted in this regard.
5	Demonstration of processes related to opening, cleaning, mixing, blending, carding, doubling and drafting, consolidation mechanism during yarn spinning preparatory stage (upto draw frame stage). Evaluation of hank of respective output materials from different machines.
6	Preparation of a flowchart of conventional and modern Blow room line along with machine positioning. Mill visits (if accessible) may be conducted to knowhow the differences of

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

	blowroom line between modern and conventional one.
7	Study of Different machines in Blow room operation viz. Bale opener, course and fine cleaning machines, Mixer, De-dusting machines etc.
8	Determination of trash content of cotton fibres and Calculate the cleaning efficiency.
9	Study and sketch the working mechanism of a card zone wise (viz. Feeding, stripping, carding, transfer, web collection and delivery, waste collection) with respect to flow of material and their dimensions.
10	Determination of different drafts, production and their respective constants of a carding machine
11	Different Settings and maintenance of a carding machines
12	Study and sketch the working mechanism with respect to flow of material along with dimension zone-wise of a draw frame machine.
13	Determination of individual and total draft, tension draft and calculation of productions of draw frame machines
14	Study of Auto-levellers used on Card and Draw frame machines

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)
PC TT 303   Textile Testing I

Name of the Course:		TEXTILE TESTING I				
Course Code: PC TT 303		Semester: III				
Duration: 6 months		Maximum Marks: 100				
Teaching Scheme		Examination Scheme				
Theory: 2 hrs./week		Mid Semester Exam.: 50 Marks				
Tutorial: Nil		Assignment: 40 Marks				
		Quiz: 10 Marks				
Practical: nil hr./week		Attendance: 5 Marks				
Credit Points:2		End Semester Exam.: 70 Marks				
Objective:						
1	To learn principles of testing of essential physical parameters of textile fibres like fibre length, fibre fineness, maturity of cotton fibre ,tensile strength ,Moisture properties of textile fibres,advanced methods of measuring fibre parameters					
2	To learn principles of testing yarn count,its different system,their conversion, twist characteristics,methods of measuring twist ,yarn hariness,yarn crimp rigidity,relation between diameter and yarn count,relation between twist and count.					
3	To learn yarn evenness, its representation,limiting irregularity ,yarn imperfection yarn periodic faults with spectrogram analysis,eveness relation with spinning machine,parameters influencing yarn evenness, different methods of measurement of yarn evenness.					
4	To learn tensile strength of yarn ,principles of different tensile testing instruments,different parameters of tensile strength from the testing parameters influencing tensile strength of yarn					
Pre-Requisite:						
1	General physics					
2	General chemistry					
3	Mathematics I and Mathematics II					
End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.						

Groups	Units	Objective Questions (MCQ only with one correct answer)		Subjective Questions			
		No. of questions to be set	Total marks	No. of questions to be set	To answer`	Marks per question	Total marks
A	1 to 3	10	10				
B	1 to 3			6	3	5	15
C	1 to 3			6	3	15	45

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

Unit	Content	Hrs/Unit	Marks/Unit
1.Data Analysis & Review of statistical techniques	Selection of samples for testing, random and biased samples, review of statistical techniques	2	8
2.Fibre Testing	Measurement of fibre length: length and its variability measurement, cumulative frequency diagram, fibre length distribution, wt. distribution curve, methods of measurement and associated parameters:Length biased and numerical biased sample;Concept of span lengthPrinciple of measuring span length by digital fibro graph, fibre fineness: technical significance, various parameters of measurement, gravimetric, optical, air flow and vibroscopic method; determination of maturity of cotton: significance, maturity ratio, maturity coefficient,degree of thickening, methods of measurement- air flow, dye method, polarising light method and NaOH method; crimp : significance, methods of determination; foreign matter content of fibres: significance, methods of determination; fibre quality index,cotton grading Wool fibre measurement Hauter and Barbe,Method of fibre length measurement by capacitance method, Principles of Almeter of measuring wool fibre length . Principles of OFDA Wool fibre diameter light scattering methods,wool quality. moisture in fibres: relative and absolute humidity, standard atmosphere and testing atmosphere, effect of moisture on fibres, moisture content and regain , moisture estimation methods; tensile testing of fibres: comparative stress-strain diagrams of different fibres, tensile testing of single fibre, bundle strength testing, principles of operation of CRL, CRT , CRE and accelerated rate of loading type of tensile testers; Basic principles of HVI and AFIS testing and its measured parameters .Application of testing parameters.	20	46
3.Yarn testing	Yarn dimensions and numbering: linear density, yarn numbering systems, determination of yarn count,conversion from one system to another, folded yarn ,measurement of yarn diameter; measurement of twist: twist, diameter and count relation, twist factor, optimum twist, effect of twist on fabric properties, methods of twist measurement; yarn strength: the concept of yarn rupture, types of tests- single thread, lea and ballistic test, types of testers and their principles of working (pendulum, spring, inclined plane, strain gauge etc.), types of	18	46

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

	testing (CRT,CRL,CRE and ARL), the effect of gauge length (the weak link theory etc.), automation in tensile testers; evenness testing: idea of the theory of random assemblies of fibres, theoretical best evenness possible, the V(L) and B(L) curves, periodic variations(drafting wave, machine imperfections), evenness testing of laps, slivers, rovings and yarns, Spectrogram, analysis of periodic variations in mass per unit length. Yarn appearance and grading, Uster Classimat; hairiness of yarn: methods of testing and implications for further processing; grading of yarn, special testing of interlaced and textured yarns. Application of the testing parameters.		
		40hrs	100

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

Course Outcome:
Students learn different sampling techniques used for testing textile materials.

Students learn the testing methods for measuring essential physical parameters of common textile fibres and textile yarns

Students learn testing methods essential parameters of fibre length, fibre fineness, strength, maturity. Advanced methods used in industry

Students learn basic principles producing yarn evenness, measuring principles and analysis of different parameters obtained from the instruments

Special Remarks (If any): Nil

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

PC TT 393   Textile Testing Lab I

Name of the Course:		TEXTILE TESTING LAB I
Course Code: PC TT 394		Semester: III
Duration: 6 months		Maximum Marks: 100
Teaching Scheme		Examination Scheme
Theory: 2 hrs./week		Continuous Internal Assessment:
Tutorial: Nil		External Assessment: 60
Practical: 3 hr./week		Distribution of marks: 40
Credit Points:1.5		
Course Outcomes:		
1	Students learn methods to determine count of sliver,roving,yarn and their conversion to other system	
2	Students learn methods to determine twist direction twist per unit length of single and ply yarn	
3	students learn determining strength parameters CSP,RKM,breaking elongation of yarn	
4	Student learn contraction of spun anf filament yarn	
5	Students learn principle of different tensile instruments like CRT,CRE,CRL by testing textile yarn	
6	Students learn determining yarn evenness by cutting and weighing method and its importance in production process ,also yarn grading by visual method	
7	Students learn stress-strain curve for textile yarns and analysis of the curve for different strength parameters	
8	Students learn yarn hariness.	
9	Students learn method of reporting the experimental data with statistical parameters	
Pre-Requisite:		
1	Elements of statistics	
2	General physics for measurement	
Practical: 10 number of experiments		
		1) **Intellectual skills- 60 % (average)**
		2) **Motor skill- 40% (average**

Laboratory Experiment:	
1	Determination of linear density and CV of sliver, roving
2	Determination of count of yarn indirect and direct method by simple wrap reel and weighing balance and their conversion in different system
3	Determination twist characteristics of yarn and its twist factor/twist multiplier,for single and plied yarn by twist untwist method.
4	Determination of twist contraction the spun and filament yarn
5	Determination lea strength and CSP of the spun yarn and compare with standard CSP.
6	Determination single yarn strength under CRT and CRE machine and Conversion of the

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

	same RKM and elongation.
7	Study of effect of gauge length on yarn strength.
8	Study of V (L) and B (L) curve by cutting and weighing Method and its interpretation about yarn evenness.
9	Study of yarn unevenness of yarn by visual method.
10	Determination of hairiness of yarn by microscopical methods

Text and reference books:

1. ASTM Standard testing books 2011
2. Textile testing by J.E.Booth
3. Indian Standard Institution for testing Textile fibres, yarns and Fabrics

Special Remarks (If any): Nil

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)
<u>**HM 301   Economics for Engineers**</u>

Name of the Course:	ECONOMICS FOR ENGINEERS
Course Code: HM 301	**Semester: 3rd**
Duration: 6 months	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3 hrs./week	Mid Semester Exam.: 50 Marks
Tutorial: Nil	Assignment: 40 Marks
	Quiz: 10 Marks
Practical: hr./week	Attendance: 5 Marks
Credit Points: 3	End Semester Exam.: 70 Marks

Objective:	
1	
2	
3	

Pre-Requisite: No-prerequisite

1	
2	
3	

End Semester Examinations Scheme. Maximum Marks – 70. Time allotted – 3 hrs.

Groups	Units	Objective Questions (MCQ only with one correct answer)	Subjective Questions

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

		No. of questions to be set	Total marks	No. of questions to be set	To answer`	Marks per question	Total marks
A							
B							
C							

- **Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.**
- **Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.**

Unit	Content	Hrs/Unit	Marks/Unit
1	Economic Decisions Making – 1. Overview, Problems, Role, Decision making process. 2. Engineering Costs & Estimation – Fixed, Variable, Marginal & Average Costs, Sunk Costs, Opportunity Costs, Recurring And Nonrecurring Costs, Incremental Costs, Cash Costs vs Book Costs, Life-Cycle Costs; Types Of Estimate, Estimating Models - PerUnit Model, Segmenting Model, Cost Indexes, Power-Sizing Model, Improvement & Learning Curve, Benefits.	9	
2	3. Cash Flow, Interest and Equivalence: Cash Flow – Diagrams, Categories & Computation, Time Value of Money, Debt repayment,Nominal & Effective Interest. 4. Cash Flow & Rate Of Return Analysis – Calculations, Treatment of Salvage Value, Annual Cash Flow Analysis, Analysis Periods; Internal Rate Of Return, Calculating Rate of Return, Incremental Analysis; Best Alternative Choosing An Analysis Method, Future Worth Analysis, Benefit-Cost Ratio Analysis, Sensitivity And Breakeven Analysis. Economic Analysis In The Public Sector -Quantifying And Valuing Benefits & drawbacks.	9	

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in Textile Technology (TT)
(Applicable from the academic session 2018-2019)

| 3 | 5. Inflation And Price Change – Definition, Effects, Causes, Price Change with Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis, Cash Flows that inflate at different Rates.
6. Present Worth Analysis: End-Of-Year Convention, Viewpoint Of Economic Analysis Studies, Borrowed Money Viewpoint, Effect Of Inflation & Deflation, Taxes, Economic Criteria, Applying Present Worth Techniques, Multiple Alternatives.
7. Uncertainty In Future Events - Estimates and Their Use in Economic Analysis, Range Of Estimates, Probability, Joint Probability Distributions, Expected Value, Economic Decision Trees, Risk, Risk vs Return, | 9 | |
| 4 | 8. Depreciation - Basic Aspects, Deterioration & Obsolescence, Depreciation And Expenses, Types Of Property, DepreciationCalculation Fundamentals, Depreciation And Capital Allowance Methods, Straight-Line Depreciation Declining BalanceDepreciation, Common Elements Of Tax Regulations For Depreciation And Capital Allowances.
9. Replacement Analysis - Replacement Analysis Decision Map, Minimum Cost Life of a New Asset, Marginal Cost, Minimum CostLife Problems.
10. Accounting – Function, Balance Sheet, Income Statement, Financial Ratios Capital Transactions, Cost Accounting, Direct andIndirect Costs, Indirect Cost Allocation. | 9 | |

Text books /References

1. Premvir Kapoor, Sociology and Ecnonomics for Engineers, Khanna Publishing House, New Delhi (AICTE)

2. James L.Riggs,David D. Bedworth, Sabah U. Randhawa : Economics for Engineers 4e , Tata McGraw-Hill

Donald Newnan, Ted Eschembach, Jerome Lavelle : Engineering Economics Analysis, OUP
3. John A. White, Kenneth E.Case,DavidB.Pratt : Principle of Engineering Economic Analysis, John Wiley

4. Sullivan and Wicks: Engineering Economy, Pearson

5. R.PaneerSeelvan: Engineering Economics, PHI 6. Michael R Lindeburg : Engineering Economics Analysis, Professional Pub