Maharashtra State Board Of Technical Education, Mumbai
Teaching And Examination Scheme For Post S.S.C. Diploma Courses

Program Name : Diploma in Textile Manufacturers

Program Code : TX

Duration of Program : 6 Semesters | **With Effect From Academic Year: 2017 - 18**

Semester : Second | **Duration : 16 Weeks**

S. N.	Course Title	Course Abbreviation	Course Code	Teaching Scheme			Credit (L+T+P)	Examination Scheme																Grand Total
									Theory							Practical								
				L	T	P		Exam Duration in Hrs.	ESE		PA		Total		ESE		PA		Total				
									Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks			
1	Elements of Electrical & Electronics Engineering	EOE	22239	4	-	2	6	3	70	28	30*	00	100	40	25@	10	25	10	50	20			150
2	Fundamentals of Mechanical Engineering	FME	22240	4	-	2	6	3	70	28	30*	00	100	40	25@	10	25	10	50	20			150
3	Mixing and Blow Room	MBR	22245	4	-	2	6	3	70	28	30*	00	100	40	25#	10	25	10	50	20			150
4	Yarn Preparation for Weaving	YPW	22246	4	-	2	6	3	70	28	30*	00	100	40	25#	10	25	10	50	20			150
5	Fiber Testing	FIT	22247	4	-	2	6	3	70	28	30*	00	100	40	25@	10	25	10	50	20			150
6	Business Communication Using Computers	BCC	22009	-	-	2	2	--	--	--	--	--	--	--	35@^	14	15~	06	50	20			50
7	Textile Mathematics	TMS	22017	1	-	2	3	--	--	--	--	--	--	--	25@	10	25~	10	50	20			50
	Total			21	-	14	35	--	350	--	150	--	500	--	185	--	165	--	350	--			850

Student Contact Hours Per Week: **35 Hrs.** Medium of Instruction: **English**

**Theory and practical periods of 60 minutes each.** Total Marks : **850**

Abbreviations: ESE- End Semester Exam, PA- Progressive Assessment, L - Lectures, T - Tutorial, P - Practical

@ Internal Assessment, # External Assessment, *# On Line Examination, ^ Computer Based Assessment

* Under the theory PA, Out of 30 marks, 10 marks are for micro-project assessment (5 marks each for Physics and Chemistry) to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the cognitive domain LOs required for the attainment of the COs.

~ For the courses having ONLY Practical Examination, the PA marks Practical Part - with 60% weightage and Micro-Project Part with 40% weightage

> **If Candidate not securing minimum marks for passing in the "PA" part of practical of any course of any semester then the candidate shall be declared as "Detained" for that semester.**
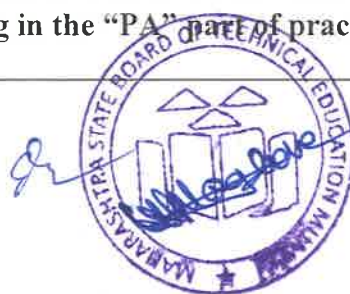
MSBTE Final Copy dt. 30.10.2017

Program Name	: Diploma in Textile Engineering Program Group
Program Code	: TX / TC
Semester	: Second
Course Title	: Elements of Electrical and Electronics Engineering (TC,TX)
Course Code	: 22239

1. RATIONALE

Electrical and electronics appliances, equipment are the most essential inputs of any textile industry. Various textile machines and other services like air conditioning, ventilation, water supply, lighting, etc. are powered by electrical energy. Further, the diploma engineer must have knowledge of different types of motors, their working, billing of electrical energy and the safety measures while working in textile industry. Along with this, textile machine manufacturers have introduced many electronic devices, to indicate, measure and control various units of textile processes. This course is developed in the way by which fundamental information will help the diploma engineers to apply the basic concepts and principles of electrical and electronic engineering in various engineering applications to solve broad based problems in textile industry and maintain textile processing plants.

2. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Use basic principles of electrical and electronics engineering to maintain textile processing plants.**

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

- a. Estimate the energy consumption to solve energy bill problems.
- b. Identify transformers and motors used in textile industry.
- c. Use electrical meters and lamps in textile industry.
- d. Select different types of electronic components and semiconductor devices for textile industry applications.
- e. Use sensors and actuators in textile industries.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme				Examination Scheme											
			Credit (L+T+P)	Theory						Practical					
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
4	-	2	6	3	70	28	30*	00	100	40	25@	10	25	10	50	20

(*): Under the theory PA; Out of 30 marks, 10 marks is for micro-project assessment to facilitate attainment of COs and the remaining 20 marks for tests and assignments given by the teacher.

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit, ESE - End Semester Examination; PA - Progressive Assessment.

5. COURSE MAP (with sample COs, Learning Outcomes i.e. LOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.
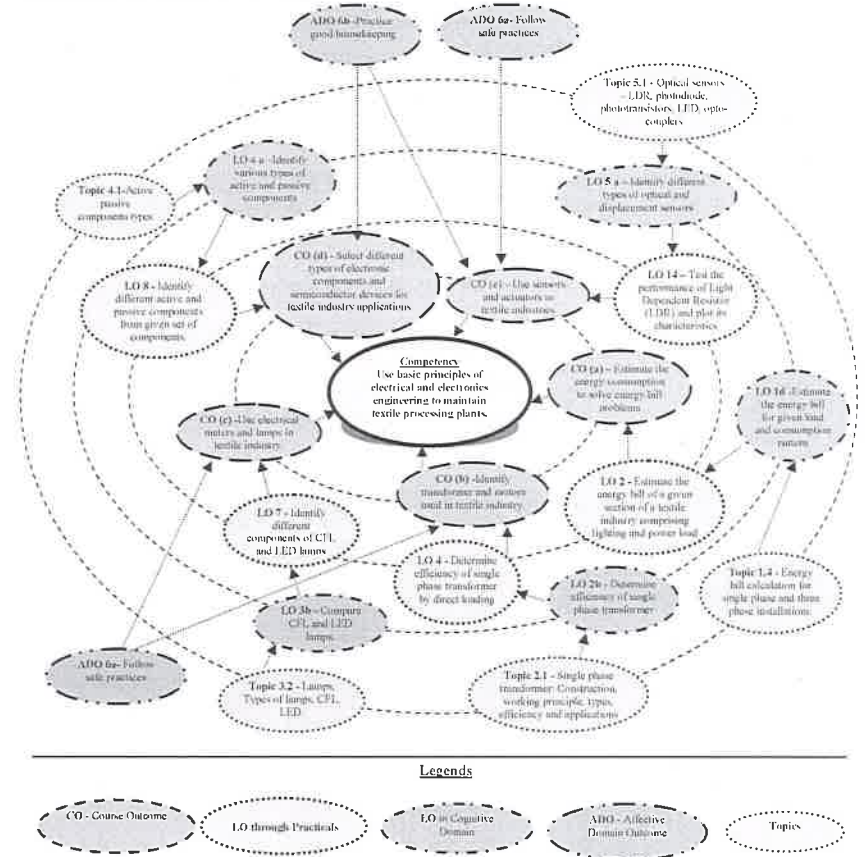

Figure 1 - Course Map

6. SUGGESTED PRACTICALS/ EXERCISES

The practicals/exercises/tutorials in this section are psychomotor domain LOs (i.e. sub-components of the COs) are to be developed and assessed in the student to lead to the attainment of the competency.

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
Electrical			
1	Find currents and voltages in a given circuit using Kirchhoff's laws.	I	02
2	Estimate the energy bill of a given section of a textile industry comprising lighting and power load.	I	02
3	Determine power factor of given series Resistor-Inductor (R-L) circuit and Resistor-Capacitor (R-C) circuit.	I	02
4	Determine efficiency of single phase transformer by direct loading.	II	02
5	Determine efficiency of three phase induction motor by direct loading.	II	02
6	Prepare line diagram of three-phase wiring for a given section/department of a textile industry comprising of motors.	III	02
7	Identify different components of Compact Fluorescent Lamp (CFL) and Light Emitting Diode (LED) lamps.	III	02
Electronics			
8	Identify different active and passive components from given set of components.	IV	02
9	Calculate values of resistors using color code chart and verify that using multimeter.	IV	02
10	Evaluate V-I characteristics of forward and reverse bias of diode.	IV	02
11	Verify input and output voltage waveforms of full wave rectifier.	IV	02
12	Measure temperature of water sample using Resistance Temperature Detector (RTD).	V	02
13	Measure the temperature of a given liquid using thermistor.	V	02
14	Test the performance of Light Dependent Resistor (LDR) and plot its characteristics.	V	02
15	Measure displacement using Linear Variable Differential Transducer/ Transformer (LVDT).	V	02
	Total		30

Note:
  i. Given in above table is suggestive list of practical exercises. Teachers can design other similar exercises.
  ii. To attain the Cos and competency, above listed Learning Outcomes (LOs) need to be undertaken the 'Applying Level' of Bloom's 'Cognitive Domain Taxonomy'.
Assessment of the 'Process' and 'Product' related skills in the laboratory/workshop/field work should be done as per suggested sample below:

S. No.	Performance Indicators	Weightage in %
1	Preparation of experimental set up	20
2	Setting and operation	20
3	Safety measures	10
4	Observations and Recording	10
5	Interpretation of result and Conclusion	20
6	Answer to sample questions	10
7	Submission of report in time	10

Total	100

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:
  a. Follow safety practices.
  b. Practice good housekeeping.
  c. Demonstrate working as a leader/a team member.
  d. Maintain tools and equipment.
  e. Follow ethical Practices.

The development of the attitude related LOs of Krathwohl's 'Affective Domain Taxonomy', the achievement level may reach:
  • 'Valuing Level' in 1st year
  • 'Organising Level' in 2nd year and
  • 'Characterising Level' in 3rd year.

7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Exp. No.
1	Dimmerstat 1 kVA,0-260 Volt AC	1,2
2	Resistance -290 ohm, 100 ohm	1,2
3	Digital multimeter : 3 1/2 digit display, 9999 counts digital multimeter measures: V_{ac}, V_{dc} (1000V max) , A_{dc}, A_{ac}(10 amp max) , (0 – 200 Hz) , resistance (0 - 100 MΩ) , capacitance and temperature	1,2,4,6, 8,9,10
4	Wattmeter 1A - 1 no., wattmeter 5A - 2 Nos	2,4,5
5	Three phase induction motor, 3 HP, 440V AC	5
6	Single phase transformer 1 kVA, 0-260V AC	4
7	Ammeter 0-3-10-30 A AC/DC	1,2,4
8	Voltmeter 0-150-300V AC/DC	1,2,4
9	Different types of LED and CFL lamp	7
10	Tachometer for speed measurement 0-3000 rpm	4
11	Resisters, capacitors, inductors, diodes, transistors of different values/ types	8,9
12	Diode characteristics kit, milliammeter 0-5-10-50 milliamp, micro ammeter, 0-50-500-1000 micro-amp, 32 V d. c. power supply, and connecting cords	10
13	Full wave rectifier kit, CRO, probe, connecting cords	11
14	RTD experiment kit, RTD pt-100	12
15	Thermistor experiment kit, connecting cords	13
16	LDR experiment kit, connecting cords	14
17	LVDT experiment kit, connecting cords	15

8. UNDERPINNING THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop LOs in cognitive domain for achieving the COs to attain the identified competency.

| Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Electrical		
Unit – I Fundamentals of Electrical Circuits	1a. Explain electrical quantities and their units. 1b. Inter-relate different electro-magnetic laws. 1c. Determine power factor in a given series R-L and Series R-C circuit. 1d. Estimate the energy bill for given load and consumption pattern.	1.1 Current, voltage, emf, power, energy, and its unit 1.2 Kirchhoff's laws: voltage and current, electromagnetic induction, Lenz law, Fleming's Right Hand/ Left Hand Rules 1.3 Series R-L, R-C circuits and their phasor diagram, types of power, power factor and their improvement method by capacitor 1.4 Energy bill calculation for single phase and three phase installations
Unit – II Electrical Machines	2a. Describe the construction of single phase transformer. 2b. Determine efficiency of single phase transformer. 2c. Describe the construction of servomotor and their applications. 2d. Describe single and three phase induction motors, and their applications. 2e. Determine efficiency of three phase Induction motor 2f. Select electrical machine for given applications.	2.1 Single phase transformer: construction, working principle, types, efficiency and applications 2.2 Servomotor: construction, working principle, application, types - single phase and three phase 2.3 Induction motors: construction, working principle, types, efficiency and applications 2.4 Electrical machine for textile industry
Unit – III Electrical meters and lighting system.	3a. Use various types of meters for given applications. 3b. Compare CFL and LED lamps based on construction and use. 3c. Describe methods of energy saving. 3d. Explain solar energy system.	3.1 Analog and digital meters for measuring AC/DC electrical quantities 3.2 Lamps- types, CFL, LED 3.3 Line diagram of 3 phase wiring circuit 3.4 Methods of energy saving in textile industry 3.5 Solar energy application in textile industry
Electronics		
Unit-IV Electronic components and Semiconductor Devices	4a. Identify various types of active and passive components. 4b. Classify passive components 4c. Classify materials. 4d. Compare the given semiconductors. 4e. Explain working principle of P-N junction diode. 4f. Explain working principle of	4.1 Active and passive components 4.2 Resistors-types of resistors, colour coding 4.3 Capacitor and inductor – symbol, properties and classification 4.4 Classification of material - conductors, semiconductors and insulators 4.5 Semiconductor – intrinsic, extrinsic, P and N type 4.6 P-N junction diode – unbiased,

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	half wave and full wave rectifier. 4g. Explain the working principle of transistor as switch.	forward and reverse bias, V- I characteristics of diode, application 4.7 Half wave and full wave rectifiers- working principle 4.8 Transistor – construction, types – PNP and NPN, working, operating regions – active, cut-off, saturation 4.9 Application of amplifier, transistor as switch
Unit-V Sensors and Actuators	5a. Identify different types of optical and displacement sensors. 5b. Identify force and weight measurement sensors. 5c. Identify different types of temperature and pressure sensors. 5d. Identify different types of actuators. 5e. Use suitable sensors and actuators for given situation. 5f. Explain the working of LVDT. 5g. Explain steps to measure the temperature of given liquid using thermocouple.	5.1 Optical sensors – LDR, photo diode, phototransistor, LED, opto-couplers 5.2 Displacement sensors – LVDT, capacitive sensor 5.3 Force and weight measurement – strain gauge, humidity sensors 5.4 Temperature sensors – RTD, thermistor, thermocouples 5.5 Pressure sensors – bourdon tubes, bellows 5.6 Actuators – relays, contactors, solenoids, electric and pneumatic 5.7 Applications – blow room, card auto leveller, yarn evenness testing, sizing, and automatic weft straightening

Note: To attain the COs and competency, above listed Learning Outcomes(LOs) need to be undertaken to achive the ' Application Level 'of Bloom's 'Cognitive Domain Taxonomy'.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
Electrical						
I	Fundamentals of Electrical Circuits	10	02	03	05	10
II	Electrical Machines	12	02	05	07	14
III	Electrical meters and lighting system.	10	02	03	05	10
Electronics						
IV	Electronic Components and Semiconductor Devices	14	04	05	07	16
V	Sensors and Actuators	18	05	07	08	20
	Total	64	15	23	32	70

Legends: R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)
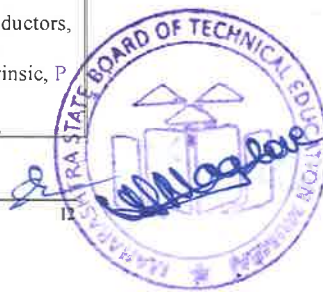
Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of LOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

a. Prepare a table of type of electrical machines and relevant industrial application.
b. Prepare presentation showing different types of motors, transformers, and lamps used in textile industries.
c. Collect leaflets and specifications of different types of sensors, actuators used in textile industries.
d. Collect leaflets and specifications of different types of active and passive components used in textile industries.
e. Prepare question bank referring old MSBTE question papers.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a. Massive open online courses *(MOOCs)* may be usd to teach various topics/subtopics.
b. *'L' in item No. 4* does not mean the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
c. *About 15-20% of the topics/subtopics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the LOs/COs through classroom presentations (see implement guideline for details).
d. In respect of item 10 above, teachers need to ensure to create opportunities and provisions for such *co-curricular activities.*
e. Guide student(s) in undertaking micro-projects.
f. Assign unit wise tutorials to group of 4 to 5 students for solving problems unit wise.
g. Assign micro projects to group of 4 to 5 students and let them prepare and present the project through PPT. Group shall submit a report which is limited to 5 pages.
h. Use of video, animation films to explain concepts, facts and applications related to electrical and electronics engineering.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practicals, cognitive domain and affective domain LOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than 16 (sixteen) student engagement hours during the course.

In the first two semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

a. **Energy bill:** Visit various textile industry/department and estimate their energy bills.
b. **3 phase circuit diagram:** Prepare a 3 phase circuit diagram incorporating machines and lighting loads, on banner/chart for a textile industry and estimate energy consumption per day.
c. **Electrical transformer:** Visit textile industry/department, collect information and prepare presentation incorporating the specifications of transformers used in textiles industry.
d. **Electrical servomotors:** Visit textile industry/department, collect information and prepare presentation on specifications and rating of servomotors used in various textiles industry.
e. **Electrical induction motors:** Visit textile industry/department and collect information and prepare presentation on specifications and rating of Induction motors used in various textiles industry.
f. **Electrical lamps:** Visit textile industry/department and collect information and prepare presentation on specifications and rating of different types of lamps used in various textiles industry.
g. **Solar energy:** Collect technical specifications for different solar panels used in textile industry and prepare a chart/ presentation.
h. **Resistor color codes:** Prepare resistor color code charts. Use the chart to calculate values of different resistors. Collect information of variable resistors, rheostats used in laboratory.
i. **Semiconductor devices**: Prepare presentation on active/passive components, semiconductor devices used in different textile units viz. spinning, weaving, sizing, dying, and testing. Collect different active semiconductor devices, list their applications and specifications.
j. **Transducers:** Prepare presentation incorporating animation displaying different transducers used in textile industry.
k. **Sensors:** Prepare presentation incorporating detailed specifications of temperature sensors, pressure sensors, optical sensors, strain gauges used in different processing machines.
l. **Actuators:** Prepare presentation incorporating detailed information of actuators – relays, contactors, solenoids, electric and pneumatic used in different processing units.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Electrical Engineering Fundamentals	Del, Toro Vincent	Prentice Hall, India, 2015 ISBN: 9789332551763
2	Basic Electrical Engineering	Kothari, D.P.	McGraw-Hill Education, India, 2009 ISBN: 9780070146112
3	A text-book of electrical engineering	Rajput, R.K.	Laxmi Publications, New Delhi, 2009 ISBN: 9789380386348
4	Electric Machinery Fundamentals	Chapman,	McGraw-Hill Education, USA,

S. No.	Title of Book	Author	Publication
		Stephen J.	2010 ISBN: 97800710705222010
5	Electrical Machinery	Bimbhra, P.S.	Khanna Publishers, New Delhi, 2014 ISBN: 9788174091734
6	Basic Electrical Engineering	Bakshi, U.A. Bakshi, V.U.	Technical Publications, New Delhi, 2008 ISBN: 9788184314885
7	Principles of electronics	Mehta, V.K., Mehta, Rohit	S. Chand New Delhi, 2005 ISBN: 9788121924504
8	Basic Electronics (solid state)	Theraja, B. L.	S. Chand New Delhi, 2006 ISBN: 9788121925556
9	Electronics and Electrical Measurements and Instrumentation	Sawhaney, A. K.	Dhanpat Rai & Co. New Delhi, 2014 ISBN: 9788177001006
10	A Course in Electronics and Electrical Measurements and Instrumentation	Gupta. J. B.	S K Kataria and Sons, India, 2013 ISBN: 9788188458936
11	Sensors and Actuators: Control System Instrumentation	De Silva, Clarence W.	CRC Press; Taylor & Francis, Boco Roton, 2007 ISBN: 9781420044836
12	Electronic controls in Textile Machines	Joshi, Hiren; Joshi, Gauri.	NCUTE training program, New Delhi, 2003

14. SOFTWARE/LEARNING WEBSITES

a. https://en.wikipedia.org/wiki/E-textiles
b. http://eartheasy.com/live_energyeff_lighting.htm
c. http://www.sengpielaudio.com/calculator-ohm.htm
d. http://freevideolectures.com/Course/2335/Basic-Electrical-Technology
e. http://www.electrical4u.com/electric-lamp-types-of-electric-lamp/
f. http://www.electrical4u.com/induction-motor-types-of-induction-motor/
g. http://www.electricaltechnology.org/2012/03/lets-try-to-understand-calculation-of.html
h. https://www.circuitspecialists.com/blog/differences-between-analog-and-digital-panel-meters/
i. http://www.electronicsandyou.com/blog/active-and-passive-electronic-components.html
j. https://www.ethz.ch/flexible-electronics
k. https://learn.sparkfun.com/tutorials/transistors
l. www.ee.buffalo.edu/faculty/paololiu/566/sensors.ppt
m. http://www.zapmeta.com.my/src?q=electronic+sensors&sc=s
n. www.zapmeta.co.in/Electronic+sensors
o. http://www.electronics-tutorials.ws/io/io_3.html
p. http://www.engineersgarage.com/articles/pressure-sensors-types-working
q. https://ielm.ust.hk/dfaculty/ajay/courses/alp/ieem110/lecs/actuators/actuators.html

15. PO-COMPETENCY-CO MAPPING

	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Textile Processing	PSO 2 Maintenance and quality control
Competency: Use basic principles of electrical and electronics engineering to maintain textile processing plants	3	1	2	1	1	1	1	1	1	2	1	1
a. Estimate the energy consumption to solve energy bill problems	3	1	2	1	1	0	2	1	1	2	1	1
b. Identify transformer and motors used in textile industry	3	1	2	1	1	0	1	1	1	2	1	1
c. Use electrical meters and lamps in textile industry	3	1	2	1	1	0	1	1	1	2	1	1
d. Select different types of electronic components and semiconductor devices for textile industry applications	3	2	2	1	1	1	1	1	1	2	1	1
e. Use sensors and actuators in textile industries	3	2	2	1	1	1	1	1	1	2	1	1

Programme Outcomes

Semester II

Competency and COs

Elements of Electrical & Electronics Engineering (Course Code: ....)
Mark '3' for high, '2' for medium, '1' for low in correlation for competency,CO,PO,PSO or '0' for no correlation

Program Name	: Diploma in Textile Engineering Program Group
Program Code	: TX / TC
Semester	: Second
Course Title	: Fundamentals of Mechanical Engineering (TC,TX)
Course Code	: 22240

1. RATIONALE

Textile industry uses mechanical equipment and machines, like transmission systems steam boilers, air compressors, fluid pumps, material handling equipment, etc. for its working and in various processes. The prime responsibility of a textile technician working on the shop floor is to ensure smooth and continuous functioning of all the machines and equipment for quality production. This requires him to operate and maintain the textile equipment and machines, which have mechanical systems, like gears, shafts, bearings, couplings, etc. Such abilities and competencies can only be developed with the use of basic knowledge of force, work, energy, materials used for making the machines, principles of motion, their transformation, and the methods of maintenance. This course is developed in the way by which fundamental information will help the diploma engineers to apply the basic concepts and principles of mechanical engineering in various textile production plants to solve broad based problems.

2. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Use basic principles of mechanical engineering to maintain textile manufacturing plants.**

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

- a. Apply principles of force, work, and energy to textile machines.
- b. Apply principles of kinetics and kinematics for textile machine applications.
- c. Identify different mechanisms in textile machines.
- d. Estimate the values of mechanical properties of materials.
- e. Use appropriate lubricants in textile machines.
- f. Select relevant transmission drives for textile machines.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme													
					Theory						Practical						
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total		
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
4	-	2	6	3	70	28	30*	00	100	40	25@	10	25	10	50	20	

(*): Under the theory PA; Out of 30 marks, 10 marks is for micro-project assessment to facilitate attainment of COs and the remaining 20 marks for tests and assignments given by the teacher.

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit, ESE - End Semester Examination; PA - Progressive Assessment.

5. COURSE MAP (with sample COs, Learning Outcomes i.e. LOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.
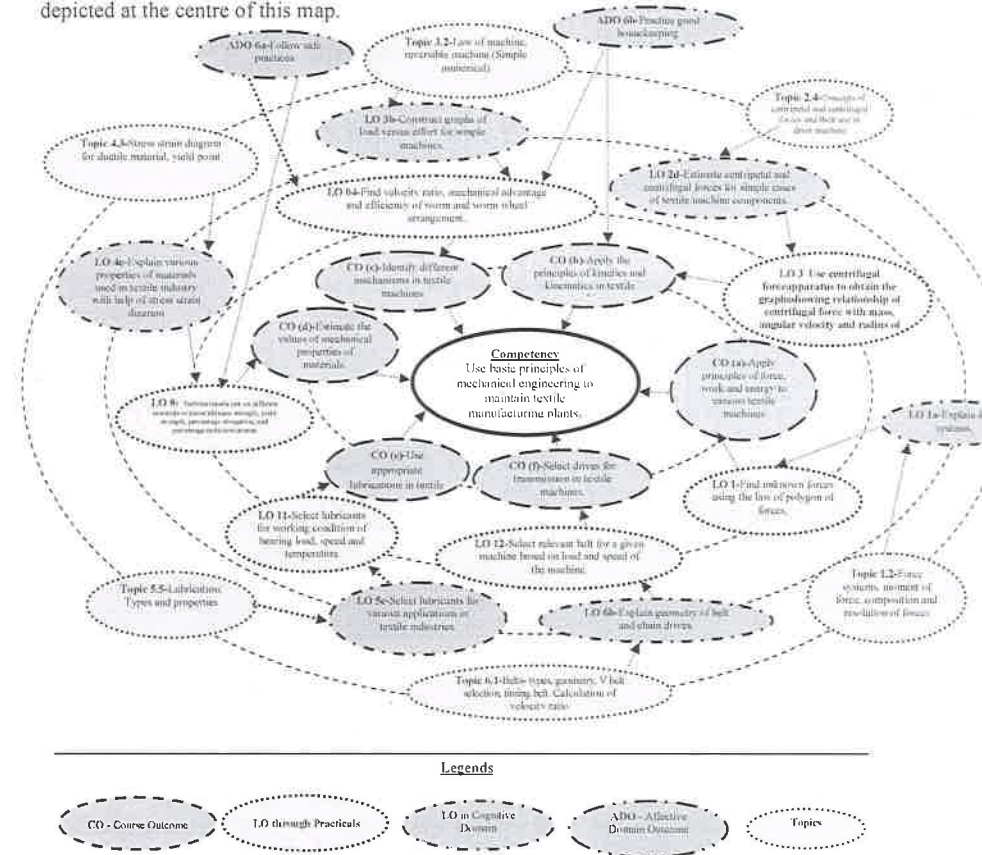

Figure 1 - Course Map

6. SUGGESTED PRACTICALS/ EXERCISES

The practicals/exercises/tutorials in this section are psychomotor domain LOs (i.e. sub-components of the COs) are to be developed and assessed in the student to lead to the attainment of the competency.

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
1	Use the Universal Force Table to find out resultant of forces.	I	02
2	Use moment of force apparatus to verify law of moments.	I	02
3	Use centrifugal force apparatus to obtain the graphs showing relationship of centrifugal force with mass, angular velocity and radius of rotation.	II	03
4	Use worm and worm wheel arrangement to find velocity ratio, mechanical advantage, and efficiency.	III	02
5	Use table mounted single purchase crab and double purchase crab to find velocity ratio, mechanical advantage, and efficiency.	III	03
6	Use '2D-working model software'/similar software and related mechanism to calculate displacement, velocities and acceleration of different links.	III	04
7	Use relevant arrangement to determine strain and stress in the given spring.	IV	02
8	Use UTM to conduct tensile test on different materials to determine the ultimate strength, yield strength, percentage elongation, and percentage reduction in area.	IV	04
9	**Use tensile testing machine to obtain the graph of stress versus strain of given textile material .**	IV	02
10	Use different combinations of surfaces of metal, wood, glass to determine coefficient of friction among them.	V	02
11	Use relevant **charts** to select lubricants for working condition of bearing load, speed, and temperature.	V	02
12	Use relevant **charts** to select relevant V belt for a given machine based on load and speed of the machine.	VI	02
13	Use relevant **charts** to select relevant chain for a given machine based on load and speed of the machine	VI	02
	Total		32

Note:
i. Given in above tables is suggestive list of practical exercises. Teachers can design other similar exercises.
ii. To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Applying Level' of Bloom's 'Cognitive Domain Taxonomy'.
Assessment of the 'Process' and 'Product' related skills in the laboratory/workshop/field work should be done as per suggested sample below:

S. No.	Performance Indicators	Weightage in %
1	Preparation of experimental set up	20
2	Setting and operation	20
3	Safety measures	10
4	Observations and Recording	10
5	Interpretation of result and Conclusion	20
6	Answer to sample questions	10

7	Submission of report in time	10
	Total	100

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:
   a. Follow safety practices.
   b. Practice good housekeeping.
   c. Demonstrate working as a leader/a team member.
   d. Maintain tools and equipment.
   e. Follow ethical Practices.

The development of the attitude related LOs of Krathwohl's 'Affective Domain Taxonomy', the achievement level may reach:
   • 'Valuing Level' in 1st year
   • 'Organising Level' in 2nd year and
   • 'Characterising Level' in 3rd year

7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Exp. No.
1	Universal Force Table (Consists of a circular 40 cm dia. Aluminum disc, graduated into 360 degrees.) with all accessories.	1, 2
2	Five Steel plates of unknown weight.	1, 2
3	Weights 50gm, 100gm, 200gm, 500gm, 1000gm (three pieces of each).	1, 2, 4,5,7
4	**Centrifugal force apparatus.**	**3**
5	Differential axle and wheel (wall mounted unit with the wheel of 40 cm diameter and axles are insteps of 20 cm and 10 cm reducing diameter	4, 5,
6	Worm and worm wheel (wall mounted unit with threaded spindle, load drum, effort wheel; With necessary slotted weights, hanger and thread).	4
7	Simple screw Jack (Table mounted metallic body , screw with a pitch of 5 mm carrying a double flanged turn table of 20 cm diameter.	4, 5
8	Single Purchase Crab winch (Table mounted heavy cast iron body. The effort wheel is of C.I. material of 25 cm diameter mounted on a shaft of about 40mm dia. On the same shaft a geared wheel of 15 cm diameter.	5
9	Double Purchase Crab winch (Having assembly same as above but with double set of gearing arrangement)	5
10	Wooden or Acrylic working models of various popular mechanisms	4, 5, 6
11	Latest licensed networking version of '2D-working model software'/similar planar mechanism simulation software.	4, 5, 6
12	1 meter and half meter steel rules.	1 to 9
13	Helical springs (Close and open coil) of different sizes and stand.	7
14	Universal Testing Machine 5 Ton capacity.	8
15	Friction apparatus for motion along horizontal and inclined plane (base to	

S. No.	Equipment Name with Broad Specifications	Exp. No.
	which a sector with graduated arc and vertical scale is provided. The plane may be clamped at any angle up to 45 degrees pan. Two weight boxes (each of 5 gm. 10 gm. 2-20 gm. 2-50 gm. 2-100 gm. weight).	10, 11
16	Mass hanger and pointer for friction apparatus.	7, 8, 9
17	Glass strip, Wooden surface, Metallic surface for friction apparatus.	10, 2
18	Working model of different drives such as gear drive, belt drive, etc.	12, 13
19	Actual belts, chains, gears and bearings commonly used in textile industries.	12, 13
20	Tensile tester capacity up to 500kg ,speed up to 100mm/min.	9
21	Lubricant selection charts	11
22	Industrial belt selection charts	12
23	Rating charts for chain	13
24	Moment of force apparatus	2

Note: To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy'.

8. UNDERPINNING THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop LOs in cognitive domain for achieving the COs to attain the identified competency.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Force, Work and Energy,	1a. Explain force systems. 1b. Construct polygon of forces. 1c. Apply principles of work in various textile machines. 1d. Identify various application of potential energy and kinetic energy in textile machines.	1.1 Force, principle of transmissibility of force 1.2 Force systems, moment of force, composition and resolution of forces 1.3 Equilibrium and resultant of forces 1.4 Work –definition, work of force, work of couple moment 1.5 Energy-potential energy, gravitational potential energy, elastic potential energy, kinetic energy 1.6 Work energy theorem
Unit– II Kinetics and Kinematics	2a. Evaluate weight of given substance related to textile industry from its mass. 2b. Differentiate between linear and angular motion. 2c. Calculate linear and angular velocities and accelerations for simple cases of textile machine components. 2d. Estimate centripetal and centrifugal forces for simple cases of textile machine components	2.1 Kinetics – Mass, weight, inertia, momentum, impulse 2.2 Newton's laws of motion 2.3 Kinematics – linear & angular motion 2.4 Concepts of centripetal and centrifugal forces and their use in dryer machine
Unit– III Machines and Mechanisms	3a. Determine efficiency of simple machines. 3b. Construct graphs of load versus effort for simple machines. 3c. Develop simple mechanisms for textile processes using software. 3d. Calculate velocity and acceleration of simple mechanisms for textile processes using planar mechanism simulation software.	3.1 Machines - definition, mechanical advantage, velocity ratio, efficiency (simple numerical) 3.2 Law of machine, reversible machine (simple numerical) 3.3 Simple machines: wheel and axle, simple screw jack, worm & worm wheel, single and double purchase crab 3.4 Planar Mechanisms- slider crank mechanism and four bar chain mechanism 3.5 Inversions of mechanism 3.6 Use of simulation software
Unit-IV Mechanical properties of materials.	4a. Identify stresses in various components of machines. 4b. Estimate stresses in various components of textile machines under simple loading. 4c. Explain various properties of materials used in textile industry with help of stress strain diagram. 4d. Calculate factor of safety in given situation through simple numerical. 4e. Classify different materials as Isotropic, homogeneous and orthotropic material.	4.1 Simple stresses & strains – stress, strain, types of stresses, (simple numerical) 4.2 Hooke's law, elastic limit, Modulus of elasticity, modulus of rigidity, ultimate stress, working stress (simple numerical), tenacity 4.3 Stress strain diagram for ductile material, yield point 4.4 Factor of safety (simple numerical) 4.5 Material: Isotropic, homogeneous, and orthotropic material, their applications
Unit –V Friction and lubrication.	5a. Evaluate coefficient of friction. 5b. Select bearings for various applications in textile industries. 5c. Select lubricants for various applications in textile industries.	5.1 Concept of friction, types of friction, factors affecting friction, coefficient of friction (simple numerical) 5.2 Types of bearings: journal bearing, ball bearing and roller bearing, uses of bearings in textile industry 5.3 Bearing specifications and system of code and description 5.4 Selection of bearings, criteria of selection 5.5 Lubrication: Types and properties
Unit-VI Transmission	6a. Select the proper drives for different applications in textile industries. 6b. Explain geometry of belt and chain drives.	6.1 Belts- types, geometry, V belt, selection, timing belt. Calculation of velocity ratio 6.2 Chains: Types, geometry, roller chain sprocket. Velocity ratio

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	6c. Explain type and terminologies gears. 6d. Compare different gear trains. 6e. Calculate velocity ratio in all above cases.	6.3 Cams: types of cams, types of followers, follower positions, follower shape and motion 6.4 Gears: types and applications 6.5 Spur gear terminologies, involute tooth profile 6.6 Gear in mesh: Interference, undercutting, backlash, calculation of velocity ratio 6.7 Gear trains: simple, compound, reverted, and epicyclic

Note: To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy'.

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Force ,Work and Energy	08	02	02	02	06
II	Kinetics and Kinematics	08	02	04	04	10
III	Machines and Mechanisms	08	02	04	06	12
IV	Mechanical properties of materials	13	04	04	08	16
V	Friction and lubrication	13	03	04	06	13
VI	Transmission	14	03	04	06	13
	Total	64	16	22	32	70

Legends: R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)
Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of LOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.

9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

a. Undertake survey of lubricants used in textile machineries.
b. Give seminar on any relevant topic.
c. Library survey regarding engineering material used in textile machineries.
d. Prepare power point presentation or animation for showing different types of transmission drives used in textile machines.
e. Undertake a survey of different machines and mechanisms used in textile plant.
f. Prepare question bank referring old MSBTE question papers.

10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a. Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
b. 'L' in item No. 4 does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
c. About 15-20% of the topics/sub-topics which is relatively simpler or descriptive in nature is to be given to the students for self-directed learning and assess the development of the LOs/COs through classroom presentations (see implementation guideline for details).
d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
e. Guide student(s) in undertaking micro-projects.
f. Assign micro projects to group of 4 to 5 students and let them prepare and present the project through PPT. Group shall submit a report which is limited to 5 pages.
g. Demonstrate estimation of kinematic data of various mechanisms used in Textile industry through 2D Working Model/similar software.
h. Use of video, animation films to explain concepts, facts and applications related to construction and working of different transmission drives.
i. Use real components to teach the concepts related to belts, chains, bearings, gears, V-pulley, timers, pulleys and others.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practicals, cognitive domain and affective domain LOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than 16 (sixteen) student engagement hours during the course.

In the first two semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

a. **Energy:** Enlist the applications of centrifugal and centripetal forces in various spinning and weaving machines.
b. **Mass and Weight:** Calculate mass and weight of fine yarn, medium yarn and coarser yarn of same length and different material.
c. **Machines:** Prepare graphs of load versus effort to demonstrate efficiency of textile machines.
d. **Mechanisms:** Prepare models for combination of different linkages to form different mechanisms.
e. **Materials:** Prepare chart indicating mechanical properties of different materials used in textile plant.
f. **Bearings:** Collect bearings according to the specifications and their uses in textile machines.

g. **Lubricants**: Prepare charts indicating lubricant, specification and their use in textile plant.

h. **Belts**: Select relevant belt for different textile machines using industrial v belt chart.

i. **Gears:** Prepare chart displaying specification and use of different gears.

j. **Gear trains:** Prepare model of gear train useful for textile plant machines.

12. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	Textile mechanics volume I	Slatar, K.	The textile institute , Manchester, 1977, ISBN 10: 0900739274
2.	Machine and Mechanisms	Myszka, David H.	Pearson education, New York., 2011, ISBN 13: 978-0-13-215780-3
3.	Theory of machines and Mechanisms.	Shigley, Joseph E. Uicker, J.J.Jr. Pennock,G.R.	Oxford University Press, New York, 2011, ISBN 13: 9780195371239
4.	Theory of machines and Mechanisms.	Rattan, S.S.	Tata McGraw-Hill Education, New Delhi,2009 ISBN 13: 9780070144774
5.	Strength of Materials: Elementary theory and problems	Timoshenko, S.	CBS Publishers, New Delhi 2004,ISBN 13:9788123910307
6.	Strength of Materials	Rajput, R.K.	S. Chand Limited, 2006 ISBN 13: 9788121925945
7.	Engineering Mechanics	Bhavikatti,S.S. Rajashekharappa,K.G.	New Age International, New Delhi,2015,ISBN 13:9788122437980
8.	A Text Book of Applied Mechanics	Rajput,R.K.	Laxmi Publications,New Delhi,1988, ISBN 13:9788170082088
9.	Engineering Mechanics Statics and dynamics	Shames,I.H.	Pearson Education India, 2005 ISBN 13: 9788177581232

13. SOFTWARE/LEARNING WEBSITES

a. http://www.physicsclassroom.com/mmedia/kinema

b. http://fearofphysics.com/Friction/frintro.html

c. www.sciencejoywagon.com/physicszone

d. www.science.howstuffworks.com

e. https://phet.colorado.edu/en/simulation/forces-and-motion-basics

f. https://phet.colorado.edu/en/simulation/friction

g. http://www.nptel.ac.in/courses/112102015/22

h. http://hperphysics.phy-astr.gsu.edu/hbase/hph.html

i. http://www.mechanicalhero.com/2011/12/mechanical-drives.html

j. http://physics.stackexchange.com/questions/27897/difference-b-w-kinetics-kinematics-w-concrete-example

k. http://www.mecheng.iisc.ernet.in/~bobji/funtri/assign/Lubricants.htm

l. http://onlinelibrary.wiley.com/subject/code/000080

m. http://nptel.ac.in/courses/116102012/

14. PO-COMPETENCY-CO MAPPING

	Programme Outcomes											
Semester II Competency and COs	PO 1 Basic knowledge	PO 2 Discipline knowledge	PO 3 Experiments and practice	PO 4 Engineering Tools	PO 5 The engineer and society	PO 6 Environment and sustainability	PO 7 Ethics	PO 8 Individual and team work:	PO 9 Communication	PO 10 Life-long learning	PSO 1 Textile Processing	PSO 2 Maintenance and quality control
	Fundamentals of Mechanical Engineering (Textile Group Specific) (Course Code: ....) Mark '3' for high, '2' for medium, '1' for low in correlation for competency.CO,PO,PSO or '0' for no correlation											
Competency: Use basic principles of mechanical engineering to maintain textile manufacturing plants	3	1	2	3	1	1	1	2	2	3	3	3
a. Apply principles of force, work and energy to various textile machines	3	1	2	1	2	1	1	2	2	3	2	1
b. Apply principles of kinetics and kinematics in textile machines.	3	2	3	2	1	1	1	2	2	2	3	2
c. Identify different mechanisms in textile machines.	3	2	3	2	2	1	1	2	2	2	3	2
d. Estimate the values of mechanical properties of materials.	2	2	3	1	2	2	2	2	2	2	3	2
e. Use appropriate lubricants in textile machines.	3	1	2	1	1	2	2	1	1	2	2	3
f. Select drives for transmission in textile machines.	3	2	3	3	2	1	1	2	1	3	2	3

Program Name   : **Diploma in Textile Manufacturer**

Program Code   : **TX**

Semester   : **Second**

Course Title   : **Mixing and Blow Room**

Course Code   : **22245**

1. RATIONALE

Cotton accounts for almost 50% of the worldwide consumption of textile fibres. To convert cotton into yarn, knowledge of fibre characteristics, ginning, baling, opening and cleaning is required to produce high quality yarns. For optimum opening of fiber gives good cleaning of natural textile fiber, if improper cleaning happens its effect on yarn quality. if impurities like seed, sand and leaf particles presents it deteriorates the quality of woven and processed fabrics. By using proper parameters like speed, settings and good condition of wire points of opening and cleaning machines increases opening and cleaning textile fiber. This course describes the basic facts, concepts & principles of opening and cleaning of natural fibers.

2. COMPETENCY

- Apply principles of opening and cleaning for textile raw material.

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

- a. Segregate the different types of textile fibres.
- b. Use cotton pickers, ginning and baling machines to convert agricultural product to cotton bale.
- c. Use mechanical principles of opening and cleaning of cotton raw material.
- d. Apply the fibre mixing principles to optimize mixing quality.
- e. Use cleaning quality measures to remove impurities in cotton.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme												
				Theory							Practical					
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
4	-	2	6	3	70	28	30*	00	100	40	25#	10	25	10	50	20

(*): Under the theory PA; Out of 30 marks.10 marks is for micro-project assessment to facilitate attainment of COs and the remaining 20 marks for tests and assignments given by the teacher.

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **ESE** -End Semester Examination; **PA** - Progressive Assessment

5. COURSE MAP (with sample COs, Learning Outcomes i.e.LOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.

Figure 1 - Course Map

6. SUGGESTED PRACTICALS/EXERCISES

The practicals/exercises/tutorials in this section are psychomotor domain LOs (i.e. sub-components of the COs) are to be developed and assessed in the student to lead to the attainment of the competency.

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
1	Use bare sorter instrument to identify the staple length of given	I	02

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
	textile fiber.		
2	Use ginning machine to identify the principle of preopening for given fiber.	II	02
3	Use Mixing machine to identify the principle of fiber mixing for given textile fiber.	II	02
4	Use all spinning machines to identify the correct material flow sequence to produce the yarn.	III	02
5	Use opener machine to identify the principle of tuft opening for given bale cotton.	IV	02
6	Use fine cleaner machine to identify the principle of fine cleaning in the machine.	IV	04
7	Use dust extractor machine to identify principle of removing micro dust from textile fiber.	IV	04
8	Use weighing machine to determine hank of lap by weighing grains per yard for given lap.	IV	02
9	Use trash analyzer machine to estimate the trash percentage in given cotton fiber.	IV	02
10	Use gearing arrangement of ginning machine to estimate the ginning roller speed.	IV	02
11	Use gearing arrangement of cleaner machine to estimate the speed of beater.	IV	02
12	Use gearing arrangement of fine cleaner machine to estimate the revaluation per min of cleaning roller.	IV	02
13	Use gearing arrangement of bale opener to estimate the opening roller speed.	V	02
14	Select most suitable material transport system to transport the material from opening machine to cleaning machine.	V	02
	Total		**32**

Note :

i. Given in above tables is suggestive list of practical exercises. Teachers can design other similar exercises.

ii. To attain the COs and competency, above listed learning Outcomes (LOs) need to be undertaken to achieve the 'applying level 'of Bloom's 'Cognitive Domain Taxonomy'. Assessment of the 'Process' and 'Product' related skills in the laboratory/workshop/field work should be done as per suggested sample below:

S. No.	Performance Indicators	Weightage in %
1	Preparation of experimental set up	20
2	Setting and operation	20
3	Safety measures	10
4	Observations and Recording	10
5	Interpretation of result and Conclusion	20
6	Answer to sample questions	10
7	Submission of report in time	10
	Total	**100**

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:

a. Follow safety practices.
b. Practice good housekeeping.
c. Demonstrate working as a leader/a team member.
d. Maintain tools and equipment.
e. Follow ethical Practices.

The development of the attitude related LOs of Krathwohl's 'Affective Domain Taxonomy', the achievement level may reach:

- 'Valuing Level' in 1st year
- 'Organising Level' in 2nd year and
- 'Characterising Level' in 3rd year.

7.   MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Exp. S. No.
1	Bare sorter machine with 12 combs	1
2	Double roller ginning machine (roller diameter 10 inch ,leather covered rollers)	2,3,10
3	Bale opener with stripper speed of 745R.P.M.	4,3,5,13
4	Clenomat machine with 250mm beater diameter,1250 R.P.M	4,6,11
5	De-Dusting with production rate of 600 Kg/hr	7,14
6	Steel ruler with 36 inch length and weighing pan with range of 500gm min-5kg max, digital tachometer	8

8.   UNDERPINNING THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop LOs in cognitive domain for achieving the COs to attain the identified competency.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit- I Raw material characteristics	1a. Explain relaxation of given bale material before processing. 1b. Describe the characteristics required for a typical textile fibre. 1c. Classify different types of fibers. 1d. Describe the salient features of the given fibre with their applications. 1e. Segregate the given type of textile fiber with justification.	1.1 Conditioning of raw materials 1.2 Textile fibres, generic names and definitions of man-made fibre. 1.3 Physical properties of fibres.
Unit –II Cotton varieties, Ginning and baling	2a. Identify the given cotton variety and areas of cultivation in India. 2b. Explain method of picking and ginning process for given type of cotton fiber. 2c. Describe the characteristics of given type of fibre bale. 2d. Describe the process of finding the bale density.	2.1 Cotton verities and areas of cultivation. 2.2 Cotton picking – hand and machine picking. 2.3 Cotton ginning machines – single roller, double roller and saw gins, - faults in ginning process. 2.4 Cotton pressing and baling, bale dimensions and density.
Unit –III Yarn classification And process flow chart	3a. Describe the properties of the given type of yarn. 3b. Describe objects, functions, and machine sequence for given carded/combed yarn manufacture.	3.1 Classification of yarns. 3.2 Flow chart for conversion of cotton fibers to carded and combed yarns. Object, input, and output of each process.
Unit –IV Blow room	4a. Describe the working of a typical feeding device with sketches. 4b. Describe the working of an opener for given type of cotton fibre. 4c. Describe the working of a mixer for given type of cotton fibre mixing. 4d. Explain various cleaner machine parameters to achieve desirable cleaning effect for given type of fibre. 4e. Describe the function of the	4.1 Feeding devices 4.2 Opening – Type of opening and degree of opening, intensity of opening, Opening devices and opening operations 4.3 Cleaning – mechanical cleaning, Grid and mote knives. Elements of grid, adjustments of grid bars, Interaction of feed assembly, opening element and grid, air flow cleaning, Cleaning efficiency and resistance to cleaning, factors influencing opening and cleaning. 4.4 Machine zones Machines in opening zone: Conventional bale openers and

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	given type of systems in the blow room.	hopper feeders, and Automatic bale openers 4.5 Coarse cleaners: Basics, Step cleaner, Axi flow cleaner, mono cylinder cleaner 4.6 Mixing/blending machines: Basics, manual mixing, and automatic mixing machines 4.7 Cleaning: Basics, Intensive cleaning: Basics, ERM cleaner, Cleanomat Dedusting machines: Basics, Dedustex , Separation of foreign fibre and metals: Securomat.
Unit -V Lap formation and Blow room lines	5a. Explain conventional process of lap making. 5b. Describe material transportation in blow room. 5c. Explain lap regulating mechanisms to produce uniform laps. 5d. Describe collection of waste produced during processing and its disposal. 5e. Select machine sequence for given fibre mixings. 5f. Calculate blow room production for the given condition.	5.1 Scutcher: Feed section, Cleaner with feed regulator, cages, Calendaring, lap building mechanism, lap linear density and weights of lap for various materials 5.2 Transport of material: conveyor belts, lattices and spiked lattices, pneumatic transport – basic principle, separation of air and material. 5.3 Control of material flow: a) Stop-go operation- swing doors, optical sensors b) Continuous operation. – feed regulation by electronic Feed commander 5.4 Waste disposal 5.5 Sequence of modern Blow room lines for different mixings. Calculations related to blow room production

Note: To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy'.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Raw material Characteristics	08	2	2	4	08
II	Cotton varieties, Ginning and baling	06	2	2	4	08
III	Yarn classification And process flow chart	14	2	2	4	08
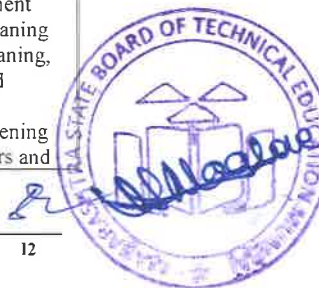
Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
IV	Bow room	28	06	12	16	34
V	Lap formation & Blow room lines	08	02	04	06	12
	Total	64	14	22	34	70

Legends: R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)
Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of LOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course:
   a. Prepare journals based on practical's performed in laboratory.
   b. Measure fibre bale specification.
   c. Give seminar on any relevant topic.
   d. Library survey regarding Modern features of blow room machines use in different industries.
   e. Prepare power point presentation for showing various principles of opening and cleaning.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:
   a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics
   b. *'L' in item No. 4* does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
   c. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the LOs/COs through classroom presentations (see implementation guideline for details).
   d. With respect to item No. 10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*
   a. Guide student(s) in undertaking micro-projects.
   b. Use Flash/Animations to explain the principle of opening and cleaning
   c. Give micro projects to students

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practicals, cognitive domain and affective domain LOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than *16 (sixteen) student engagement hours* during the course.

In the first two semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:
   a. Collect different types of fibres and prepare a card board indicating physical properties of each fiber
   b. Prepare geographical map on card sheet and mention variety of fiber produced on respective geographical areas.
   c. Prepare chart for showing life cycle of cotton plant.
   d. Prepare booklet by sticking various photographs of cotton picking practices in India.
   e. Prepare card sheet by collecting different types of yarns. Prepare booklet indicating flow chart for carded and combed yarn manufacture.
   f. Collect photographs and specification of various opening and cleaning machines and Prepare booklet.
   g. Collect line sketches of all modern machines and prepare card sheet showing sequence of all modern machine in line.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	The Technology of short staple spinning	Klein, W.	The Textile Institute,Manchenstar,1986 ISBN: 1 87081298 8
2	Spinning	Lord, P.R	Woodhead Publications,india,1970 ISBN: 1 85573 9771
3	Spinning of Manmade and Blends on cotton spinning	Salhotra, K.R	The Textile Association Of India,Ahmedabad,2016 ISBN:1 89328 00 X
4	Spun Yarn Technology	Eric, Oxtoby	Butterworth's(Publishers) Limited, 1983, ISBN:0-408-01464-4

14. SOFTWARE/LEARNING WEBSITES

1. www.nptl.comhttp://www.textileschool.com/articles/109/blow-room-functions
2. www.textilelearner.blogspot.in/2011/07/basic-operations-in-blowroom_485.html
3. www.textilelearner.blogspot.in/2011/03/blowroom-objects-of-blow-room-basic_2485.html
4. www.rieter.com/cz/rikipedia/articles/rotor-spinning/applications-engineering/preparation-of-raw-material/the-processing-stages/blowroom/
5. www.youtube.com/watch?v=IDGmXssFa6s
6. www.en.wikipedia.org/wiki/Cotton_gin
7. www.gluedideas.com/Encyclopedia-Britannica-Volume-6-Part-2-Colebrooke-Damascius/Cotton-Ginning-Machinery.html
8. www.textilelearner.blogspot.in/2011/08/what-is-ginning-cotton-ginning-types-of_8829.html
9. www.textilefashionstudy.com/what-is-textile-fiber-classifications-of-textile-fiber/

Program Name   : **Diploma in Textile Manufacturer**

Program Code   : **TX**

Semester   : **Second**

Course Title   : **Yarn Preparation for Weaving**

Course Code   : **22246**

1.   RATIONALE

Diploma engineers have to deal with different winding machines and techniques to produce various types of yarns. The study of basic concepts and principles of winding of warp, different supply and delivery packages, different yarn clearers will help them to produce good winding packages efficiently and economically.

2.   COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Apply principles of winding to prepare suitable package for weaving.**

3.   COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

a. Develop process sequence for manufacturing woven fabrics.

b. Apply the principles of yarn numbering system to estimate linear density of yarn.

c. Apply the principles of classimat to decide the objectionable faults in yarns.

d. Use winding machine to convert small packages to large packages.

e. Choose the knotting/splicing to join broken yarns during yarn winding.

f. Estimate winding parameters to produce the different packages.

4.   TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme												
				Theory						Practical						
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
4	-	2	6	3	70	28	30*	00	100	40	25#	10	25	10	50	20

(*): Under the theory PA; Out of 30 marks, 10 marks is for micro-project assessment to facilitate attainment of COs and the remaining 20 marks for tests and assignments given by the teacher.

*Legends: **L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit, **ESE** - End Semester Examination; **PA** - Progressive Assessment/*

5.   COURSE MAP (with sample COs, Learning Outcomes i.e. LOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the

course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.
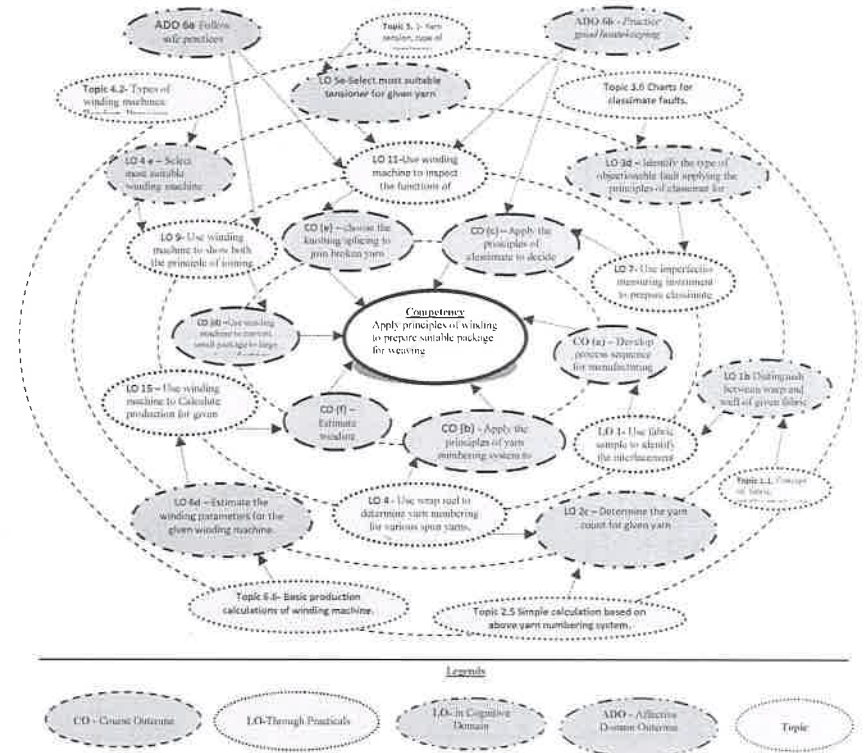

Figure 1 - Course Map

6.   SUGGESTED PRACTICALS/ EXERCISES

The practicals/exercises/tutorials in this section are psychomotor domain LOs (i.e. sub-components of the COs) are to be developed and assessed in the student to lead to the attainment of the competency.

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
1	Use fabric sample to : (i) Identify the interlacement of warp and weft. (ii) Identify and Mark warp and weft direction.	I	02

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
2	Use power looms to: (i) Trace the passage of warp. (ii) Use the concept of interlacement.	I	02
3	Use weft insertion looms to identify interlacement of warp and weft yarn	I	02
4	Use wrap reel to determine yarn numbering for various spun yarns.	II	02
5	Use direct wrap reel to determine direct numbering system of manmade yarns.	II	02
6	Use wrap reel to estimate and compare the direct, indirect numbering system for given yarn.	II	02
7	Use yarn imperfection measuring instrument to prepare classimate chart.	III	02
8	Use classimate chart to identify the various sizes of yarn faults.	III	02
9	Use winding machine to show both the principle of joining the yarn and conversion of smaller to bigger package.	IV	02
10	Use winding machines to identify the difference between principles of winding.	IV	02
11	Use winding machine to inspect the functions of clearer, splicer, and tensioner.	V	02
12	Insert different types of knots using yarn.	V	02
13	Use yarn strength measurement instrument to estimate strength of splicing/knotting for given yarn.	V	02
14	After watching the video, record the working parameters of modern winding machine.	VI	02
15	Use winding machine to i) Calculate production for given yarn. ii) Estimate the efficiency for given numbering system.	VI	02
16	Use different defective packages to identify the problem in given machine and take corrective remedial action.	VI	02
		Total	32

Note:
i.   *Given in above tables is suggestive list of practical exercises. Teachers can design other similar exercises.*
ii.   *To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Applying Level' of Bloom's 'Cognitive Domain taxonomy'.*
     Assessment of the 'Process' and 'Product' related skills in the laboratory/workshop/field work should be done as per suggested sample below:

S. No.	Performance Indicators	Weightage in %
1	Preparation of experimental set up	20
2	Setting and operation	20
3	Safety measures	10
4	Observations and Recording	10
5	Interpretation of result and Conclusion	20
6	Answer to sample questions	10
7	Submission of report in time	10
	Total	100

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:
a. Follow safety practices.
b. Practice good housekeeping.
c. Demonstrate working as a leader/a team member.
d. Maintain tools and equipment.
e. Follow ethical Practices.

The development of the attitude related LOs of Krathwohl's 'Affective Domain Taxonomy', the achievement level may reach:
- 'Valuing Level' in 1st year
- 'Organising Level' in 2nd year and
- 'Characterising Level' in 3rd year.

7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED
The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Exp. No.
1	Reflex type 1 inch counting glass ,plain weave fabric sample with 50 EPI X 20 PPI and 70 EPI X 50 PPI.	1
2	Plain power loom reed width of 60 inch/48inch and attached with lose reed, tappet shedding mechanism.	2,3
3	Wrap reel and Weighing balance with weight range of Min 0.2gm to Max. 500g.	4,5,6
4	Cone Winding machine (Model 338 RM, count range 2 to 100 Ne, yarn traverse 3 to 6 inch)	9,10,11, 15
5	Classimat instrument with Uster quantum 2	7,8
6	Ring yarn with count range 5, 10, 15 Ne and Manmade yarns with 150D, 300D.	1,3,8
7	Defective packages	16

8. UNDERPINNING THEORY COMPONENTS
The following topics/subtopics should be taught and assessed in order to develop LOs in cognitive domain for achieving the COs to attain the identified competency.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Elements of fabric	1a. Explain functions of preparatory process to produce given fabric 1b. Distinguish between warp and weft of given fabric. 1c. Classify different types of loom. 1d. Describe the process sequence for the given fabric.	1.1 Concept of fabric, interlacement, warp and weft. 1.2 Flow chart of conversion of Yarn to fabric 1.3 Objectives of various preparatory processes in weaving 1.4 Types of looms used for weaving

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	1e. Select most suitable loom for producing the given fabric. 1f. Develop process flow for conversion of yarn to fabric.	fabric - hand-loom, non-automatic loom, automatic loom, shuttle less looms(projectile, rapier, air jet, water jet loom)
Unit– II Yarn numbering system	2a. Explain yarn numbering system for given yarn. 2b. Distinguish between direct and indirect system of yarn numbering. 2c. Determine the yarn count for given yarn. 2d. Estimate linear density of the given yarn based on the given numbering system. 2e. Select most suitable yarn numbering system for given yarn.	2.1 Yarn specification-Linear density 2.2 Practical difficulties in measuring the yarn diameter 2.3 Direct-Tex. Denier 2.4 Indirect numbering system-Number English ,Metric, woolen, worsted, linen, French 2.5 Simple Calculations based on above yarn numbering system.
Unit– III Objects of winding	3a. Describe the functions of warp winding. 3b. Identify the category of given type of yarn feed and delivery package with justification. 3c. Describe the significance of objectionable faults 3d. Identify the type of objectionable fault applying the principles of classimat for given yarn.	3.1 Warp yarn winding. 3.2 Different types of yarn Feed and delivery packages. 3.3 Objects of warp yarn winding 3.4 Different types yarn faults in ring spun yarn. 3.5 Significance of objectionable faults 3.6 Chart for classimat faults: classimat II and V.
Unit-IV Winding machines	4a. Describe the process of cleaning and joining of yarn. 4b. Describe the working principle of the given type of winding machine. 4c. Distinguish the salient features of precision and random winding 4d. Describe the procedure of developing the end package by proper build. 4e. Select most suitable winding machine for producing end packages for given yarn.	4.1 Passage of yarn through warp winding machine. 4.2 Types of winding machines: Random, Precision, hybrid winding. 4.3 Winding machines: drum and precision.
Unit-V Tensioner,cl earere	5a. Select most suitable tensioner for given yarn. 5b. Distinguish the salient features of the given two types of clearer. 5c. Distinguish the salient features of	5.1 Yarn tension, type of tensioner: Multiplicative. Disc, Additive, Gate. Expression of tension, amount of tension. 5.2 Methods of yarn traversing.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	splicing and knotting mechanism. 5d. Describe the type of jointing required for the given type of yarn with justification 5e. Select most suitable yarn joining method for given yarn.	5.3 Types of yarn clearer: mechanical-Fixed, swinging and electronic 5.4 Method of joining the yarn-splice and knot, knotting and splicing. 5.5 Principle of splicing. 5.6 Types of knots. 5.7 Unwinding accelerator (Balloon breaker) to control yarn tension.
Unit –VI Production Calculations	6a. Describe the technique to minimize the number of package defects. 6b. Describe the plan for the number of machines for working in the given situation. 6c. Estimate winding parameters for given yarn count. 6d. Estimate the winding parameters for the given winding machine. 6e. Identify the different type of package defects for given type of machine.	6.1 Types of package: parallel. cross. 6.2 End uses of winding packages. 6.3 Defects in winding packages. 6.4 Winding parameters - Travers length, traverse ratio, Winding speeds, coil angle, wind angle, scroll of drum. Gain. 6.5 Assessment of clearer performance: knot factor, clearing efficiency. 6.6 Basic Production calculations of winding machine.

Note: To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy'.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Elements of fabric	08	04	04	-	08
II	Yarn numbering system	10	04	04	04	12
III	Objects of winding	10	02	04	04	10
IV	Winding machine	12	04	04	04	12
V	Tensioner and clearer	12	02	04	06	12
VI	Production calculations	12	02	04	10	16
	Total	**64**	**18**	**24**	**28**	**70**

Legends: R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)
Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of LOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

a. Prepare journals based on practical performed in workshop.
b. Measure yarn numbering for set of yarns.
c. Give seminar on any relevant topic.
d. Library survey regarding winding parameters used for different materials.
e. Prepare power point presentation or animation for showing different sizes of yarns.
f. Prepare question bank referring old MSBTE question papers.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a. Assign unit wise assignments to group of 4 to 5 students for solving problems unit wise.
b. Assign micro projects to group of 4 to 5 students and let them prepare and present the project through PPT. Group shall submit a report which is limited to 5 pages.
c. Use of video, animation films to explain concepts, facts and applications related to yarn winding.
d. In respect of item 10 above, teachers need to ensure to create opportunities and provisions for such co-curricular activities.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practicals, cognitive domain and affective domain LOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than **16 (sixteen)** student engagement hours during the course.

In the first two semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

a. **Elements of fabric:** Each batch will collect ten woven fabric samples and mark warp weft direction.
b. **Elements of fabric:** Each batch will collect line sketch of flow chart of various fabrics and prepare booklet.
c. **Yarn Numbering system:** Each batch will collect twenty different samples of yarn and prepare booklet by labelleling yarn number in English and Tex system.
d. **Yarn Numbering system:** each batch will collect thirty yarn samples with different yarn size and prepare card sheet by rearranging these yarns in increasing order of their yarn count.
e. **Objectionable faults:** Each batch will collect different yarn faults and categories it according to classimat faults on black card board sheet
f. **Winding machines:** Each batch will collect photographs of different splicers and paste on card sheet with its specification.
g. **Winding machines:** Each batch will collect photographs of different clearers and paste on card sheet with its specification.

h. **Package defects:** Each batch will collect two defective packages and take photograph of various package defects and paste on card sheet.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Weaving: Conversion of Yarns to Fabric	Lord, P.R; Mahamed, M.H.	Woodhead Publication,USA, 1982 ISBN:9781855734838
2	Principle Of Weaving	Marks, R; Robbinson,A.T.S.	The Textile Institute,Manchester,1976 ISBN: 0-900739258
3	Weaving: Machines, Mechanisms, Management	Talukdar, M.K.; Ajgaonkar, D.B,; Sriramulu, P.K.	Mahajan Publisher Private Limited,Ahmedabad,1998. ISBN:81-85401-16-0
4	Modern Preparation and Weaving Technology	Ormerod, A.	Butterworth, (Publishers) Limited, 1983, ISBN: 9780408012126
5	Fundamentals of yarn winding	Karanne,M.K.	A woodhead publishing indiatitle, 2013,ISBN:9781782420682

14. SOFTWARE/LEARNING WEBSITES

1. http://nptel.ac.in/courses/116102005/48
2. http://nptel.ac.in/courses/116102005/49
3. http://www.textbooksonline.tn.nic.in/books/11/stdxi-voc-textiles-em.pdf
4. https://en.wikipedia.org/wiki/Textile_manufacturing
5. https://www.rieter.com/en/rikipedia/articles/ringspinning/cop_buildup/the_winding_process/
6. http://www.clothingstudy.com/yarn-numbering-system-yarn-count-direct-system-indirect-system/
7. https://en.wikipedia.org/wiki/Units_of_textile_measurement
8. https://www.uster.com/fileadmin/customer/Knowledge/Textile_Know_How/Yarn_clearing/UCQ_Analysis_of_yarns_be_a_sophisticated.pdf

Program Name : **Diploma in Textile Manufacturer**

Program Code : **TX**

Semester : **Second**

Course Title : **Fiber Testing**

Course Code : **22247**

1.   RATIONALE

This subject intends to equip students with the concepts, principles and methods of testing of various textile materials (fibres), which are helpful in selection of raw materials, process control and quality assurance. The process improvement is also an important aspect, which requires lot of experimentation. This processes results in number of observations, which are to be analyzed and interpreted and used for best results. Therefore, students are also equipped with the methods to analyse the testing results statistically.

2.   COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Apply principles of fibre testing in selection of raw materials, process control and quality assurance.**

3.   COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

a. Use basic principles of fibre testing.
b. Evaluate fibre sample based on moisture relationship.
c. Select fibre sample based on fibre length.
d. Select fibre sample based on fibre fineness.
e. Select fibre sample based on fibre maturity and neps.
f. Analyse trash and grade the cotton.

4.   TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme												
				Theory						Practical						
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
4	-	2	6	3	70	28	30*	00	100	40	25@	10	25	10	50	20

(*): Under the theory PA; Out of 30 marks, 10 marks is for micro-project assessment to facilitate attainment of COs and the remaining 20 marks for tests and assignments given by the teacher.
**Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit,
ESE - End Semester Examination; PA - Progressive Assessment.**

5.   COURSE MAP (with sample COs, Learning Outcomes i.e. LOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.
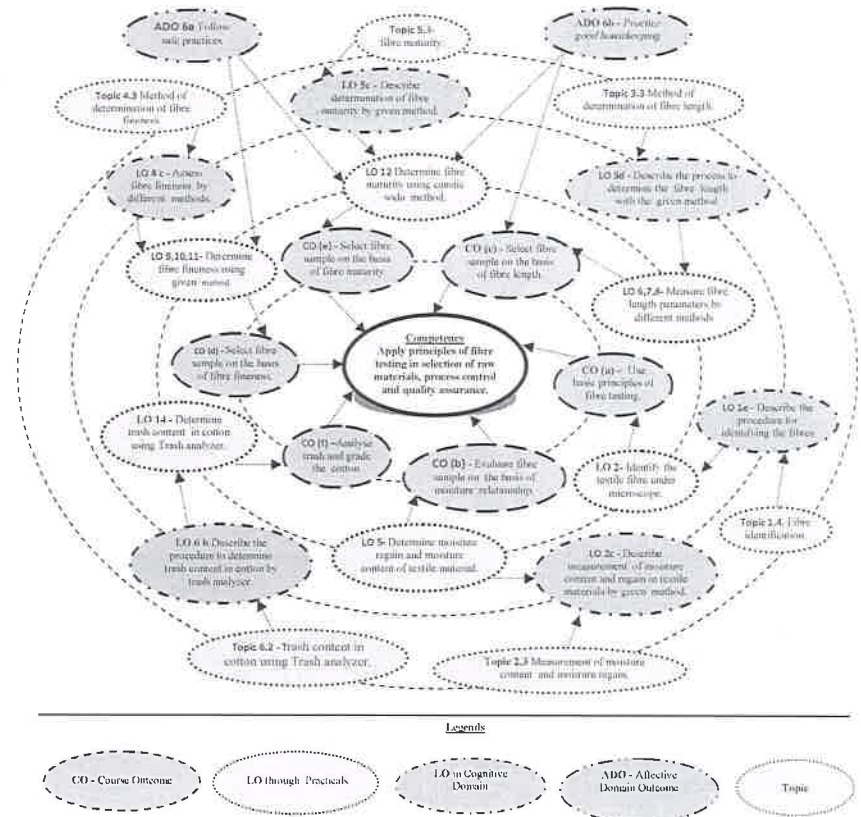

Figure 1 - Course Map

6.   SUGGESTED PRACTICALS/ EXERCISES

The practicals/exercises/tutorials in this section are psychomotor domain LOs (i.e. sub-components of the COs) are to be developed and assessed in the student to lead to the attainment of the competency

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
1	Perform fibre sampling by zoning method (BS 2545-1965) and record the result.	I	02
2	Identify the textile fibre using microscope.	I	02
3	Identify the textile fibre by using burning test.	I	02

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
4	Identify the textile fibre by using solubility test.	I	04
5	Determine moisture regain and moisture content of textile material by oven dry and electrical resistance (moisture meter) method.	II	04
6	Measure fibre length parameters using oil plate method to draw fibre distribution curve.	III	02
7	Measure fibre length parameters using comb sorter (IS: 233 Part-I to VI 1978).	III	02
8	Determine fibre length parameters using digital fibro graph.	III	02
9	Determine fibre fineness using cut and weight (gravimetric) method.	IV	02
10	Determine fibre fineness using Air flow principle (ASTM D-1448-97, BS3181:1968	IV	02
11	Measure fibre diameter using optical (microscopic) method.	IV	02
12	Determine fibre maturity using caustic soda method(IS 236-1968, ASTM-D-1442-93, BS-3085-1968).	V	02
13	Measure fibre Neps in Card web by Shirley Template.	V	02
14	Determine trash content in cotton using Trash analyzer. (ASTM D-2812-95).	VI	02
	Total		**32**

Note:

i. Given in above tables is suggestive list of practical exercises. Teachers can design other similar exercises.

ii. To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Applying Level' of Bloom's 'Cognitive Domain Taxonomy'. Assessment of the 'Process' and 'Product' related skills in the laboratory/workshop/field work should be done as per suggested sample below:

S. No.	Performance Indicators	Weightage in %
1	Preparation of experimental set up	20
2	Setting and operation	20
3	Safety measures	10
4	Observations and Recording	10
5	Interpretation of result and Conclusion	20
6	Answer to sample questions	10
7	Submission of report in time	10
	Total	**100**

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:

    a. Follow safety practices.
    b. Practice good housekeeping.
    c. Demonstrate working as a leader/a team member.
    d. Maintain tools and equipment.
    e. Follow ethical Practices.

The development of the attitude related LOs of Krathwohl's 'Affective Domain Taxonomy', the achievement level may reach:

- 'Valuing Level' in 1st year
- 'Organising Level' in 2nd year and
- 'Characterising Level' in 3rd year.

7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments. as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Exp. No.
1	Electronic balance, with the scale range of 0.001g to 500g. Pan size 100 mm; response time 3-5 sec.; power requirement 90-250 V, 10 watt	1,5,9,10, 14
2	Microscope, with magnification ranges 5x to 100 x.	2,11,12
3	Electric oven inner size 18''x18''x18''; temperature range 100 to 250^0 C. with the capacity of 40lt, moisture tester.	05
4	Oil or greese, glass plate. Needle, forcep.	06
5	Comb sortor instrument	07
6	Digital fibro graph instrument	08
7	Shirley template.	13
8	Fibre fineness tester based on airflow principle	10
9	Trash analyzer.	14
10	Moisture meter, with scale range 1% to 26%	05

8. UNDERPINNING THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop LOs in cognitive domain for achieving the COs to attain the identified competency.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – 1 Basics of fibre Testing	1a. Summarize objectives of textile testing. 1b. Justify the necessity of sampling. 1c. Select sampling method for testing of given fibre. 1d. Distinguish the salient features of the given two fibre sampling methods. 1e. Describe the procedure for identifying the fibres in the given textile material.	1.1 Textile testing. 1.2 Types of samples for testing: random sample, biased sample, numerical sample, length biased sample. factors governing sampling methods. 1.3 Sampling methods: Bulk zoning. core sampling for wool, fibre sampling from sliver, roving and yarn: random draw method, cut square method. 1.4 Fibre identification: burning, solubility, swelling, microscopic appearance for cotton, wool, silk. flax, viscose and polyester, nylon, acrylic, polypropylene.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit-II Moisture Relations in Textiles	2a. Describe method of measuring ambient conditions in atmosphere. 2b. Describe measurement of moisture content and regain in textile materials by given method. 2c. Explain the effects of moisture on properties of given fibre. 2d. Explain the effects of relative humidity on efficiency of given process. 2e. Describe the procedure to evaluate the given fibre sample based on moisture relationship.	2.1 Humidity, absolute and relative humidity, moisture content, moisture regain. 2.2 Measurement of atmospheric conditions: wet and dry bulb hygrometer. 2.3 Measurement of moisture content and moisture regain: oven dry and electrical resistance method. 2.4 Effects of moisture regain on fibre properties. 2.5 Effect of humidity on processing of material.
Unit– III Fibre Length	3a. Describe technical significance of fibre length in yarn manufacturing. 3b. Select the fibre length parameters for setting the given process. 3c. Explain the consequences of length parameters for the given process. 3d. Discuss the process to select the given fibre based on the fibre length. 3e. Describe determination of fibre length by given method.	3.1 Fibre length: Technical significance of fibre length. 3.2 Staple length of cotton, Length-frequency diagrams, effective length, mean length, upper quartile length, span length, uniformity ratio, uniformity index. 3.3 Method of determination of fibre length- Hand stapling, Oil Plate method, comb sorter, digital fibro graph.
Unit-IV Fibre Fineness	4a. Describe technical significance of fibre Fineness in yarn manufacturing 4b. Differentiate between the given two measures of fibre fineness. 4c. Describe the working of air-flow principle based instrument. 4d. Discuss the process to select the given fibre based on the fibre fineness. 4e. Describe determination of fibre fineness by given method.	4.1 Fibre fineness: Technical significance of fibre Fineness 4.2 Measures of fibre fineness: micronaire. denier and decitex. 4.3 Method of determination of fibre fineness: microscopic, cut and weight (Gravimetric), air-flow principle and air-flow principle based instruments.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –V Fibre Maturity And Neps in Cotton	5a. Describe Technical significance of fibre maturity in yarn manufacturing. 5b. Identify the different factors affecting maturity of cotton. 5c. Describe determination of fibre maturity by given method. 5d. Discuss the process to select the given fibre based fibre maturity and neps.	5.1 Cotton fibre maturity: technical significance 5.2 Factors affecting maturity of cotton 5.3 Method to determine fibre maturity: - caustic soda method, causticaire method, differential dyeing. 5.4 Neps: definition, measurement of fibre neps(template method).
Unit-VI Trash Content and Grading of cotton	6a. Differentiate the different types of trash in cotton. 6b. Describe the procedure to determine trash content in cotton by trash analyzer. 6c. Justify the significance of cottons grading. 6d. Describe cotton grading in given country.	6.1 Trash: concept, significance and classification of trash 6.2 Determination of trash content in cotton using Trash analyzer. 6.3 Cotton grading: American, Egyptian and Indian cotton grading

Note: To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy'.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Basics of fibre Testing	12	02	04	04	10
II	Moisture Relations in Textiles	08	02	02	02	06
III	Fibre Length	14	02	06	08	16
IV	Fibre Fineness	12	02	06	08	16
V	Fibre Maturity and Neps in Cotton	12	02	06	08	16
VI	Trash Content and Grading of cotton	06	02	02	02	06
	Total	64	12	26	32	70

Legends: R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)
Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of LOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

a. Market survey of different fibres or materials made from them and compares them based on their properties, application and price.
b. Library survey regarding textile fibres used in different industries.
c. Prepare table for different varieties of cotton fibre and their properties.
d. Prepare question bank referring old MSBTE question papers.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
b. *'L' in item No. 4* does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes
c. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the LOs/COs through classroom presentations (see implementation guideline for details).
d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
e. Guide student(s) in undertaking micro-projects.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practicals, cognitive domain and affective domain LOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than *16 (sixteen) student engagement hours* during the course.

In the first four semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

a. **Fibre identification:** Each batch will prepare chart for microscopic appearance of different fibres also collect photo graphs from internet.
b. **Fibre identification:** Each batch will prepare a chart for solubility test and burning test of different fibres.

c. **Fibre length:** prepare chart of fibre of different length group's with units and paste on black card board paper. Also collect samples of different varieties of cotton and paste them with their name.
d. **Fibre length, fineness, maturity:** Each batch will prepare chart for
   i. Fibre length ratings based on span length and draw comb sorter diagram with analysis and fibro graph diagram.

   ii. Fibre fineness rating.
   iii. Maturity co-efficient rating.
e. **Fibre length, Fibre fineness:** Each batch will write ASTM standard and procedure for measurement of fibre length, fibre fineness.
f. **Fibre maturity:** Each batch will write ASTM standard and procedure for measurement of fibre maturity and draw stages in development of cell wall.

g. **Fibre maturity:** Collect images and data on morphological structure of cotton and prepare power point presentation.

h. **Trash Content:** Each batch will write ASTM standard and procedure for measurement of trash content. Collect samples of cotton with different percentage of trash contents from industry.
i. **Trash Content:** Each batch will prepare chart for classification of trash. Also collect samples showing each type of trash content.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Physical Properties of Textile Fibres'	Morton, W.E; Hearle, J.W.	Wood head publishing 2008. ISBN 978-1-84569-220-9.
2	Hand book of Textile Testing-part-1: Testing and grading of textile fibres.	--	SP 15-1:Published 1989 Bureau of Indian Standards(BIS)
3	Textile Testing Physical, Chemical and Microscopical	Skinkle, John H.	Chemical Publishing Co Inc (1940) ASIN: B001OMN6VS
4	Principles of Textile Testing	Booth, J. E.	CBS publishers and distributors private ltd. 1996.New Delhi India. ISBN 10:81-239-O515-7. ISBN 13:9788123905150
5	Testing & Quality Management	Kothari, V.K.	IAFL, New Delhi 1999 ISBN 819010330X, 9788190103305
6	Hand book of Textile Testing & Quality Control	Grover,E.B; Hamby, D.C.	Textile Book Publishers, 1960 - Technology and Engineering the University of Michigan
7	Physical Testing of Textiles	Saville, B.P.	Wood head publishing limited -2002 Cambridge England. ISBN :1 85573 367 6 CRC press ISBN: 0-8493-0568-3.
8	Methods of Tests, Fibre, Yarn & Fabric	--	CIRCOT, Mumbai
9	A Practical Guide to Textile Testing	Amutha,K.	Wood head Publishing New Delhi India.2016. ISBN:978-93-85059-07-0

14. SOFTWARE/LEARNING WEBSITES

1. https://www.uster.com/en/knowledge/textile-know-how/fibre-testing/
2. http://nptel.ac.in/courses/116102029/11

3. http://nptel.ac.in/courses/116102029/14
4. http://nptel.ac.in/courses/116102029/16
5. https://www.scribd.com/doc/15569730/Fibre-Testing
6. https://www.scribd.com/doc/97265301/Fiber-Maturity
7. https://www.scribd.com/document/67254369/Cotton-Specification
8. http://textilelearner.blogspot.in
9. http://www.slideshare.net/tahmidurrahman52/identification-of-textile-fibres
10. http://www.rieter.com/en/rikipedia/articles/technology-ofshort-staple-spinning/raw-material-as-a-factor-influencing-spinning

Program Name: **All Branches of Diploma in Engineering and Technology.**

Program Code: **CE/CR/CS/CH/PS/CM/CO/IF/CW/DE/EJ/EN/EQ/ET/EX/IE/MU/EE/**

EP/EU/IS/IC/AE /FG/ME/PG/PT/DC/TX/TC

Semester   : **Second**

Course Title : **Business Communication Using Computers**   .

Course Code : 22009

1. RATIONALE

Communication is the key factor for smooth and efficient functioning of any industry or business activity. Effective business communication is the lifeblood of any organization and is required to maintain quality and progress. The efficacy of business communication skills are essential for engineering professionals for instructing, guiding and motivating subordinates to achieve desired goals at work place. It is very crucial for an entrepreneur to run organization successfully by communicating effectively and skillfully with employees, customers and investors. Thus this course has been designed to enhance the skills to '*Communicate effectively and skillfully at workplace.*'

2. COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences

- **Communicate effectively and skillfully at workplace.**

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following *industry oriented* COs associated with the above-mentioned competency:

  a. Communicate effectively by avoiding barriers in various formal and informal situations.

  b. Communicate skillfully using non-verbal methods of communication.

  c. Give presentations by using audio- visual aids.

  d. Write reports using correct guidelines.

  e. Compose e-mail and formal business letters.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme											
				Theory						Practical					
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
--	--	2	2	--	--	--	--	--	--	--	35@^	14	15~	06	50	20

(~^{1}): For only practical courses, the PA (15 marks) has two components under practical marks i.e. the assessment of practical has a weightage of 60% (i.e 09 marks) and micro-project assessment has a weightage of 40% (i.e 06 marks). This is designed to facilitate attainment of COs holistically, as there is no theory ESE.
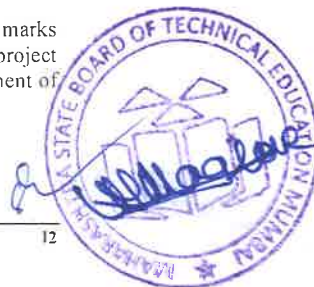
Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit. ESE - End Semester Examination; PA - Progressive Assessment.

5. COURSE MAP (with sample COs, PrOs, UOs, ADOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.
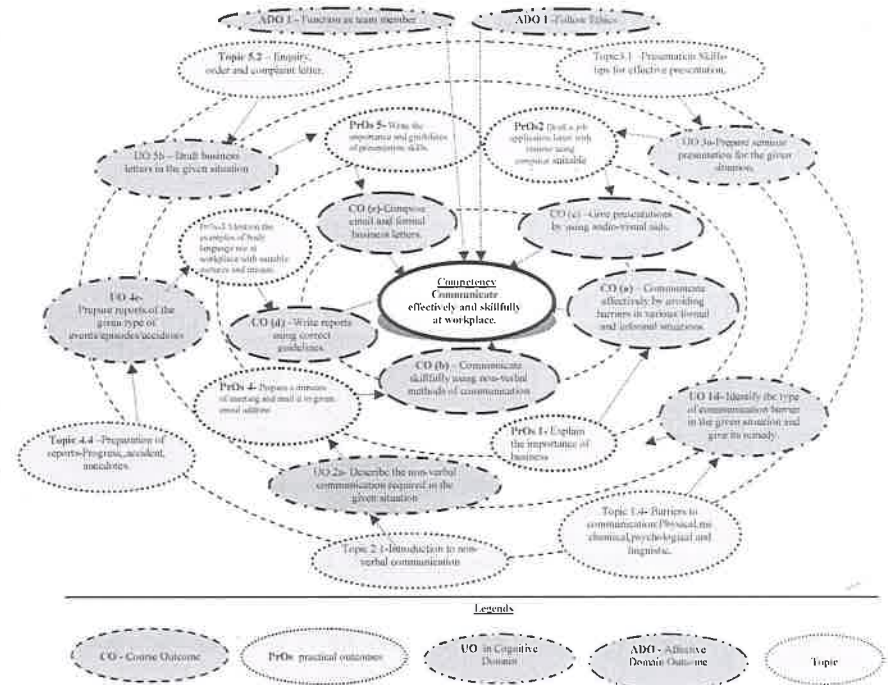

Figure 1 - Course Map

6. SUGGESTED PRACTICALS ACTIVITIES / EXERCISES (Integrate the theory in the laboratory when conducting practical)

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Explain the importance of business communication for an organization using case study	1	2*

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
2	Draft a job application letter with resume using computer.	V	2*
3	Mention the examples of body language use at workplace with suitable pictures and images.	II	2*
4	Prepare a minutes of meeting and mail it to given email address	VI	2
5	Write the importance and guidelines of presentation skills.	III	2*
6	Draft a detailed Progress Report.	IV	2*
7	Organize a debate on types of communication.	1 & III	2
8	Summarize an industry report using techniques of summarizing.	IV	2
9	Draft a complaint letter on given topic.	V	2
10	Design PowerPoint presentation on any technical topic.	III	2*
11	Explain the eight principles of effective communication.	I	2*
12	Explain various non-verbal codes with examples.	II	2
13	Explain the importance of personal appearance stating tips of grooming for a professional.	II	2*
14	Draft a memo on given topic.	V	2
15	Present any Two barriers to communication using case study.	I	2*
16	Present a technical paper using IEEE format.	III	2*
			32

Note

i. A suggestive list of practical LOs is given in the above table, more such practical LOs can be added to attain the COs and competency. A judicial mix of minimum 12 or more practical LOs/tutorials need to be performed, out of which, the practicals marked as '' are compulsory, so that the student reaches the 'Precision Level' of Dave's 'Psychomotor Domain Taxonomy' as generally required by the industry. The size of batch for the practical should not exceed more than 21 students strictly for the maximum attainment of COs and PrOs.*

ii. Hence, the 'Process' and 'Product' related skills associated with each LO of the laboratory/workshop/field work are to be assessed according to a suggested sample given below:

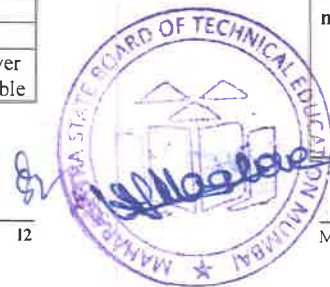## 7.   MAJOR EQUIPMENTS / INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Exp. S.No.
1	LCD Projector	All
2	Smart Board with networking	All
3	Language lab with internet	All
4	Printer	Wherever Applicable

8.   UNDERPINNING THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop UOs in cognitive domain for achieving the COs to attain the identified competency:

Unit	Unit Outcomes (UOs) (in cognitive domain)		Topics and Sub-topics
	Writing Skills	**Speaking Skills**	
Unit – I Introduction to Business Communication	1a. Describe the importance of the business communication in the given situation. 1b. Identify the missing element in the given communication process. 1c. Identify the type of communication in the given situation. 1d. Identify the type of communication barrier in the given situation and its remedy.	1e. Use different types of verbal and non–verbal communication for the given situation.	1.1 Introduction to Communication- Elements, Importance, Functions. 1.2 Types (meaning and importance) –Verbal (Oral-Written), Formal, Informal, Vertical, Horizontal and Diagonal communication. 1.3 Principles of effective communication. 1.4 Barriers to communication - Physical, mechanical, psychological and linguistic. 1.5 Business communication: Meaning, characteristics and importance.
Unit– II Non-Verbal Communication	2a. Describe the non-verbal communication required in the given situation. 2b. Describe personal appearance required in the given communication situation. 2c. Describe the given facial expressions.	2d. Use relevant facial expressions in the given situation. 2e. Answer questions after listening to presentations.	2.1 Introduction to Non-Verbal communication (Meaning and importance) 2.2 Body Language: Aspects of body language: gestures, eye contact, posture, facial expressions, personal appearance (dressing and grooming) vocalics. 2.3 Body language - positive and negative body language
Unit– III Presentation skills	3a. Prepare seminar presentation for the given situation. 3b. Prepare debate points 'for' and 'against' the given topic. 3c. Prepare the points for computer presentation	3d. Make seminar presentation 3e. Participate in debate speaking 'for' or 'against' the given topic. 3f. Make effective	3.1 Presentation skills- tips for effective presentation. 3.2 Guidelines for developing power point presentation. 3.3 Presenting Technical papers.

Unit	Unit Outcomes (UOs) (in cognitive domain)		Topics and Sub-topics
	Writing Skills	Speaking Skills	
	for the given topic.	computer presentations	
Unit– IV Office Drafting	4a. Draft the given notice using the relevant format. 4b. Draft the given memorandum using the relevant format. 4c. Prepare agenda for the given type of meetings. 4d. Prepare minutes of the given type of meetings. 4e. Prepare reports of the given type of events/episodes/ accidents	4f. Read the agenda of the given meeting. 4g. Read the report of the given event. 4h. Initiate telephone calls for given situation. 4i. Answer official phone calls for given situation.	4.1. Office drafting: Formats and Guidelines. 4.2. Formulating notices and memoranda. 4.3. Preparation of agenda and writing minutes of meetings. 4.4. Preparation of reports- progress reports, Accident reports, case study. 4.5. Summarizing techniques.
Unit-V Business Correspon dence	5a. Respond to given job advertisements by writing your CV/ Resume. 5b. Draft business letters in the given situations. 5c. Draft complaint letters for the given situations. 5d. Compose E- mails with relevant for the given situation.		5.1 Business correspondence. 5.2 Enquiry, order and complaint letters. 5.3 E-mails- netiquettes. 5.4 Difference –Curriculum Vitae, Bio-data and Resume. 5.5 Job application and resume writing

Note: To attain the COs and competency, above listed Learning Outcomes (UOs) need to be undertaken to achieve the 'Application Level' of Blooms's 'Cognitive Domain Taxonomy' Theory related topic should be covered during practical hours using multimedia.

9. SUGGESTED SPECIFICATION TABLE FOR INTERNAL END SEMISTER EXAMINATION

Unit No.	Unit Title	Distribution of practical Marks			
		R Level	U Level	A Level	Total Marks
I	Introduction to Business Communication	02	02	01	05
II	Non-verbal Communication	02	01	02	05
III	Presentation Skills	02	01	02	05
IV	Office Drafting	02	04	04	10
V	Business Correspondence	02	04	04	10
	Total	10	12	13	35

Legends: R=Remember, U=Understand. A=Apply and above (Bloom's Revised taxonomy)
Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of PrOs and UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.

10. SUGGESTED GUIDELINES FOR ASSESSMENT TOOL TO CONDUCT INTERNAL END SEMETER EXAM (ESE).

Weightage (20 Marks) A	Weightage (15 Marks) B	Total
Assessment based on PrOs, practicals conducted during semester Based on computer and written skill. (Minimum four questions each five marks) Sample questions: Eg. I Draft an email to The manager regarding the shortage of raw material at production department. Note-submit the printout of mail. (Computer based) Eg. II Write job application with resume. (written)	Oral examination based on UOs Topics mentioned in syllabus. (Minimum five questions each two marks to be asked) Eg. I Explain the importance of communication in professional life. II. State any four guidelines of presentation skills.	(35 Marks) A+B Duration: 2 hours

SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

a. Collect good articles from newspapers and magazines and read them with correct intonation.
b. Listen to Business news on TV and radio.
c. Watch videos of effective presentations on television and open learning sources for presentation skills and body language.
d. Undertake micro-projects.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.

b. *'L' in item No. 4* does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.

c. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).

d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.

a. Arrange various communication activities using functional grammar.

b. Show video/animation films to develop listening skills and enhance vocabulary.

c. Use real life situations for explanation.

d. Prepare and give oral presentations.

e. Guide micro-projects in groups as well as individually.

12.   SUGGESTED TITLES OF MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of CrAs, UOs and ADOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than *16 (sixteen) student engagement* hours during the course.

In the first four semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

a. Study the personal appearance and grooming of employees visiting sales store, shopping mall in the vicinity.

b. Comparative study of Bio-data, Resume and Curriculum vitae.

c. A detailed study of guidelines required for presentation skills.

d. Summarize technical content using English newspaper, magazines or online resources.

e. Prepare a booklet on aspects of body language in pictorial form.

f. A detailed study of the importance, of technical paper of technical paper presentation.

g. Case study on the importance of Business communication in an organization.

h. Report on various formal/business activities.

i. Study of oral presentation of famous business leader.

j. Detailed study of business etiquettes observed in organization.

k. Summarize the business article with the help of English newspapers/magazines and other sources.

13.   SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Effective Communication Skills	M Ashraf Rizvi	Tata McGraw-Hill

S. No.	Title of Book	Author	Publication
2	Communication Skills	Sanjay Kumar and Pushp Lata	Oxford University Press
3	Personality Development and Soft Skills	Barun K. Mitra	Oxford University Press

14.   SOFTWARE/LEARNING WEBSITES

a. https://www.britishcouncil.in/english/learn-online

b. http://learnenglish.britishcouncil.org/en/content

c. http://www.talkenglish.com/

d. languagelabsystem.com

e. www.wordsworthelt.com

f. www.notesdesk.com

g. http://www.tutorialspoint.com

h. www.studylecturenotes.com

i. totalcommunicator.com

j. www.speaking-tips.com

Program Name	: **Diploma in Textile Manufacturer**
Program Code	: **TX**
Semester	: **Second**
Course Title	: **Textile Mathematics**
Course Code	: **22017**

1. RATIONALE

Practicing of units, conversions to other systems of measurements, mensuration, graphical interpretation, and basic mechanisms involved in conversion of fibres to fabrics is the basis of textile manufacturing problems. This course is intended to provide solutions to the day to day calculations related to textile operations.

2. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Apply principles of mathematics to solve textile industry related problems.**

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

a. Use suitable units of textile material to estimate output of various machines.
b. Utilize basic concept of mathematics to solve related textile problems.
c. Develop tabulated forms and graphs for given numerical data set to solve textile related problems.
d. Apply the principle of mechanics to solve related textile industry problems.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme												
				Theory						Practical						
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	-	2	3	--	--	--	--	--	--	--	25@	10	25~	10	50	20

(**) marks should be awarded on the basis of internal end semester theory exam of 50 marks based on the specification table given in S. No. 9.

*(~1): For the **practical only courses,** the PA has two components under practical marks i.e. the assessment of practicals (seen in section 6) has a weightage of 60% (i.e. 15 marks) and micro-project assessment (seen in section 12) has a weightage of 40% (i.e. 10 marks). This is designed to facilitate attainment of COs holistically, as there is no theory ESE.*

*Legends: **L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit, **ESE** - End Semester Examination; **PA** - Progressive Assessment.*

5. COURSE MAP (with sample COs, Learning Outcomes i.e. LOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.
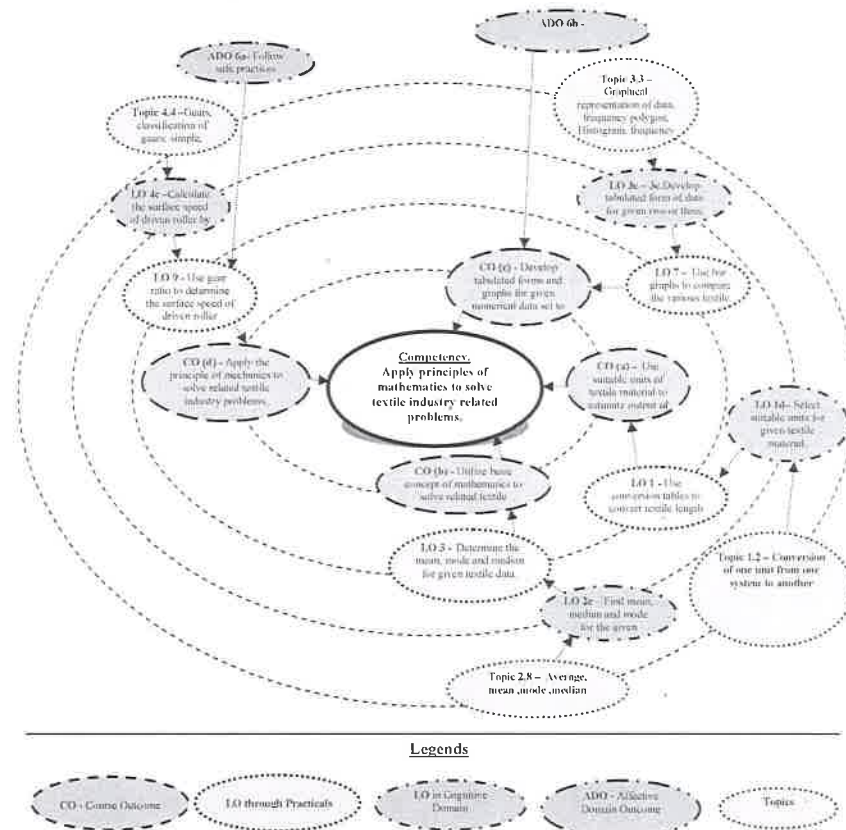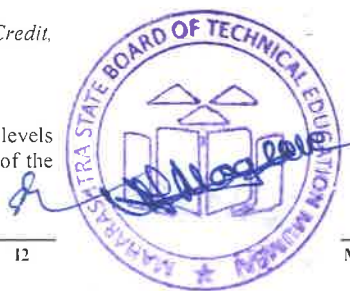

Figure 1 - Course Map

6. SUGGESTED PRACTICALS/ EXERCISES

The practicals/exercises/tutorials in this section are psychomotor domain LOs (i.e. sub-components of the COs) are to be developed and assessed in the student to lead to the attainment of the competency

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
1	Use conversion tables to convert textile length parameter from one system to another.	I	2
2	Use logarithm tables to convert the log values of textile material.	II	2
3	Determine the mean, mode and median for given textile data.	II	4
4	Determine the standard deviation and percentage means deviation for given textile material data.	II	2
5	Determine the coefficient of variation for given textile material.	II	2
6	Develop frequency polygon curve for given textile material.	III	2
7	Use bar graphs to compare the various textile values.	III	4
8	Use pie charts to express the textile values.	III	4
9	Use gear ratio to determine the surface speed of driven roller	IV	4
10	Use epicyclical gear train system to determine the speed of third roller	IV	4
11	Use timing belt to determine the surface speed of driven roller	IV	2
	Total		**32**

Note:

i. Given in above tables is suggestive list of practical exercises. Teachers can design other similar exercises.

ii. To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Applying Level' of Bloom's 'Cognitive Domain Taxonomy'.

Assessment of the 'Process' and 'Product' related skills in the laboratory/workshop/field work should be done as per suggested sample below:

S. No.	Performance Indicators	Weightage in %
1	Preparation of experimental set up	20
2	Setting and operation	20
3	Safety measures	10
4	Observations and Recording	10
5	Interpretation of result and Conclusion	20
6	Answer to sample questions	10
7	Submission of report in time	10
	Total	**100**

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:

a. Follow safety practices.
b. Practice good housekeeping.
c. Demonstrate working as a leader/a team member.
d. Maintain tools and equipment.
e. Follow ethical Practices.

The development of the attitude related LOs of Krathwohl's 'Affective Domain Taxonomy', the achievement level may reach:

- 'Valuing Level' in 1st year
- 'Organising Level' in 2nd year and
- 'Characterising Level' in 3rd year.

7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Exp. S. No.
1	HB Pencil with 4B	7
2	Graph paper	7
3	Scientific calculator fx 82	1,3
4	Logarithm tables	2

8. UNDERPINNING THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop LOs in cognitive domain for achieving the COs to attain the identified competency.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Textile Units	1a. Select suitable units for given textile material. 1b. Convert the one unit into another unit for given textile material. 1c. Use conversion tables to calculate the production of various machines.	1.1 Basic Units 1.2 Conversion of one unit from one system to another 1.3 Conversion tables.
Unit – II Applications of Mathematics in textile	2a. Estimate the area of given textile material. 2b. Calculate the volume for given textile material. 2c. Find mean, median and mode for the given numerical data. 2d. Evaluate the coefficient of variation for given textile material.	2.1 Accuracy and error 2.2 Approximate Values, Decimal Places and Significant figures 2.3 Use of logarithm 2.4 Powers and roots, symbols and Formulae 2.5 Area and Perimeter 2.6 Volume and surface area 2.7 Ratio, proportion, percentage 2.8 Average, mean ,mode ,median 2.9 Scatter Percentage mean deviation and standard deviation.
Unit – III Graphs	3a. Select the most suitable graph from given textile data. 3b. Plot the histogram graph for given numerical data. 3c. Develop tabulated form of data for given two or three variables data set. 3d. Plot bar graph for given numerical data.	3.1 Axes of reference, scales, Co-ordinates, plotting a Graph 3.2 Basics of graphs, interpretation of the Gradient of a Graph ,Graphs Showing Minimum and Maximum Values. 3.3 Graphical representation of data, frequency polygon, Histogram, frequency curves, Bar graph, line graph, pie charts.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		3.4 Data tables, various types of tables, method to prepare table for single or two variations.
Unit-IV Elements of Textile Mechanics	4a. Estimate the resulting speed of gear for given simple gear trains. 4b. Estimate the surface speed of driven roller using belt drive system. 4c. Calculate the surface speed of driven roller by using gear ratio. 4d. Calculate the velocity of shuttle.	4.1 Basic Kinematics - speed, velocity, acceleration 4.2 The Equations of motion 4.3 Frictional drives, Belt drives, Chain and sprocket drives 4.4 Gears, classification of gears: simple, compound and Epicyclical gears ,ratio of gear trains, PIV gears, Planetary gear, differential gear

Note: To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy'.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER(INTERNAL) DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Textile Units	08	01	02	03	06
2	Applications of Mathematics in textile	10	02	02	04	08
3	Graphs	08	01	02	03	06
4	Elements of Textile Mechanic	06	01	01	03	05
	Total	**32**	**05**	**07**	**13**	**25**

Legends: R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)
Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of LOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table. –

10. SUGGESTED STUDENT ACTIVITIES
Other than the classroom and laboratory learning, following are the suggested student-related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course:
a. Give seminar on application of mathematics in various areas of textile.
b. Give seminar on any relevant topic.
c. Library survey regarding various textile material units used for different application.
d. Prepare power point presentation for showing different types of graphs.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course Guide student(s) in undertaking micro-projects.

a. Massive open online courses *(MOOCs)* may be used to teach various topics/sub topics.
b. *'L' in item No. 4* does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
c. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for self-directed learning and assess the development of the LOs/COs through classroom presentations (see implementation guideline for details).
d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
e. Guide student(s) in undertaking micro-projects.

12. SUGGESTED MICRO-PROJECTS
Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practicals, cognitive domain and affective domain LOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than 16 (sixteen) student engagement hours during the course.

In the first two semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:
a. **Units:** Each batch will develop the chart of various units of textile material.
b. **Basic Mathematic application:** Each batch will develop the chart showing the formula of volumes, surface area.
c. **Basic Mathematic application:** Students will prepare charts showing application of slandered deviation.
d. **Graphs:** Students will prepare chart showing different graphs by using same textile data.
e. **Graphs:** Students will collect various data and arrange these data into different tables.
f. **Elements of textile Mechanics:** Students will prepare chart by collecting photographs of various applications of simple, compound gears in textile area.
g. **Elements of textile Mechanics:** Students will prepare chart of different diagrams showing applications of various belts.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Mechanics and calculations of textile machinery	N Gokarneshan	A Woodhead Publishing India ISBN: 9780857091048
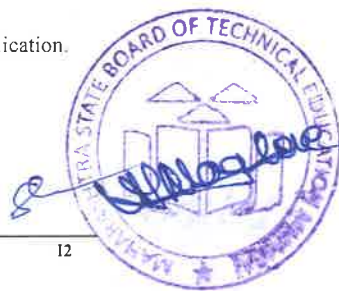
S. No.	Title of Book	Author	Publication
2	Statistics for textile engineers	J R Nagla	A Woodhead Publishing India ISBN: 9781782420675
3	Textile mathematics Vol I	Booth,J.E.	The textile institute, UK, 1975, ISBN:9780900739163
4	Textile Mathematics Vol III	Booth,J.E.	The textile institute,Manchester,1977, ISBN:090073924X

14. SOFTWARE/LEARNING WEBSITES

a. http://www.cleavebooks.co.uk/scol/ccdentex
b. http://www.unitconverters.net/length-converter.html
c. http://www.fibre2fashion.com/industry-article/3671/mathematical-application-in-textiles?page=1
d. http://textilesworldwide.blogspot.in/2008/10/mathematical-application-in-textiles.html
e. https://wikieducator.org/images/9/90/JSMath6_Part2.pdf
f. https://en.wikipedia.org/wiki/Frequency_distribution
g. https://www.scribd.com/document/276565765/Gears
h. http://auto.howstuffworks.com/gears3.htm