

Curriculum
of
Diploma Programme
in
Fashion & Clothing Technology



State Board of Technical Education (SBTE)
Bihar

Semester –IV Teaching & Learning Scheme

Course Codes	Course Titles	Teaching & Learning Scheme (Hours/Week)					
		Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+SL)	Total Hours (CI+LI+TW+SL)	Total Credits (C)
		L	T				
2451401	Fundamental of Electrical, Electronic & Mechanical Engg. (CACDDM, FCT, GT)	3	-	4	2	9	6
2451402	Knitted and Non -Woven Fabric & Construction	3	-	4	2	9	6
2451403	Dyes, Colours & Printing	3	-	4	2	9	6
2451404	Women's Wear Garment Construction	3	-	4	2	9	6
2451405	Surface Embellishment	3	-	4	2	9	6
Total		15	-	20	10	45	30

Note: Prefix will be added to Course Code if applicable (T for Theory Paper, P for Practical Paper and S for Term Work)

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)

Notional Hours: Hours of engagement by learners, other than the contact hours for ensuring learning.

TW: Term work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.)

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours)

Note:

TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning

Semester –IV Assessment Scheme

Course Codes	Course Titles	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
		Theory Assessment (TA)		Term Work & Self-Learning Assessment (TWA)		Lab Assessment (LA)		
		Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2451401	Fundamental of Electrical, Electronic & Mechanical Engg. (CACDDM, FCT, GT)	30	70	20	30	20	30	200
2451402	Knitted and Non -Woven Fabric & Construction	30	70	20	30	20	30	200
2451403	Dyes, Colours & Printing	30	70	20	30	20	30	200
2451404	Women's Wear Garment Construction	30	70	20	30	20	30	200
2451405	Surface Embellishment	30	70	20	30	20	30	200
Total		150	350	100	150	100	150	1000

Note: Prefix will be added to Course Code if applicable (T for Theory Paper, P for Practical Paper and S for Term Work)

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)

TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.

Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done internally (40%) as well as externally (60%). Assessment related to planning and execution of Term Work activities like assignment, micro project, seminar, and self-learning is to be done by internal faculty (Internal Assessment) whereas assessment of output/product/ presentation related to these activities will be carried out by external faculty/expert (External Assessment). However, criteria of internal as well as external assessment may vary as per the requirement of respective course. For valid and reliable assessment, the internal faculty should prepare checklist & rubrics for these activities.

- A) **Course Code** : 2451401(T2451401/P2451401/S2451401)
- B) **Course Title** : Fundamentals of Electrical, Electronics and Mechanical Engineering (CACDDM, FCT, GT)
- C) **Pre-requisite Course(s)** : Engineering Physics, Basic mathematics
- D) **Rationale** :

In the present scenario, the costume design industry is moving towards automation and electrically operated machines are used for the same. Therefore, it is very essential to know about the basic concepts, components and parameters of electricity, power and heat transmission and maintenance practices. This course is a fundamental course designed mainly to introduce the diploma students of Fashion design and Costume Design and Dress Making, the basic concepts & laws of electricity, basic electrical and electronic components, electromagnetic induction and electrical machines. Basics of power transmission, types of drives, law of gearing and maintenance practices applicable for textile industries are also essential for diploma engineers, so that students will be able to apply the same for solving the problems in their own discipline.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of following course outcomes by the learners. For this, the learners are expected to perform various activities related to three learning domains (Cognitive, Psychomotor and Affective) in classroom/laboratory/workshop/field/ industry.

After completion of the course, the students will be able to-

- CO-1. Determine various basic electric parameters in a given electrical system.
- CO-2. Apply the fundamental laws of DC, AC and magnetic circuits to a given electrical system.
- CO-3. Apply the principle of electromagnetic induction to a given equipment.
- CO-4. Use relevant power transmission systems and steam properties in a given situation.
- CO-5. Use suitable maintenance practices in various divisions of textile industries.

F) Suggested Course Articulation Matrix (CAM):

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)	
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2
CO-1	3	2	2	3	2	-	2		
CO-2	3	3	3	3	-	-	2		
CO-3	3	3	3	3	2	-	2		
CO-4	3	2	2	2	-	-	1		
CO-5	3	2	2	3	2	1	2		

Legend: High (3), Medium (2), Low (1) and No mapping (-)

- PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional

G) Teaching & Learning Scheme:

Course Code	Course Title	Scheme of Study (Hours/Week)					Total Credits (C)
		Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+ SL)	Total Hours (CI+LI+TW+SL)	
		L	T				
2451401	Fundamental of Electrical, Electronics and Mechanical Engineering	03	-	04	02	09	06

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)

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SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours)

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

H) Assessment Scheme:

Course Code	Course Title	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
		Theory Assessment (TA)		Term Work & Self-Learning Assessment (TWA)		Lab Assessment (LA)		
		Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2451401	Fundamental of Electrical, Electronics and Mechanical Engineering	30	70	20	30	20	30	200

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)

TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.)

Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities like assignment, micro project, seminar and self-learning is to be done by internal faculty (Internal Assessment) whereas assessment of output/product/presentation related to these activities will be carried out by external faculty/expert (External Assessment). However, criteria of internal as well as external assessment may vary as per the requirement of respective course. For valid and reliable assessment, the internal faculty should prepare checklist & rubrics for these activities.

Course Curriculum Detailing: This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (SW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP2020 related reforms like Green skills, Sustainability, Society connect, Multi-disciplinary aspects, Indian Knowledge System (IKS) and others need to be integrated appropriately.

I) Theory Session Outcomes (TSOs) and Units: T2451401

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p>TSO.1a Apply the concept of charge, voltage and current in the given electrical circuit</p> <p>TSO.1b Differentiate between AC and DC currents.</p> <p>TSO.1c Differentiate between practical and Ideal current/voltage source</p> <p>TSO.1d Calculate work, power, and energy for given circuit</p> <p>TSO.1e Calculate the equivalent resistance/Capacitance/ inductance in a given series and parallel electric circuit.</p> <p>TSO.1f Calculate the energy stored in a given resistor/capacitor /inductor.</p> <p>TSO.1g Describe the construction and working principle of the given semiconductor devices with application in textile industries</p>	<p>Unit-1.0 Basic Electrical & Electronic Components and Parameters</p> <p>1.1 Electric charge, flow of charges, Electric Current D.C and A.C, Concept of ideal and practical current sources</p> <p>1.2 Analogy of charge, potential /Voltage difference D.C and A.C, Induced emf/voltage, Terminal voltage, Concept of Ideal & Practical voltage sources</p> <p>1.3 Resistor -Properties, Effect of temperature on resistance, types of resistors and their applications.</p> <p>1.4 Capacitors – Properties, Expression for capacitance, Capacitive reactance, Energy stored in capacitor, Types of capacitors and their applications</p> <p>1.5 Inductors – Properties, Self and mutual inductance, inductive reactance, Energy stored in inductor, types of Inductors and their applications</p> <p>1.6 Semiconductor devices; Diode, pn junction diode, transistors, uncontrolled rectifiers.</p>	CO-1
<p>TSO.2a Apply Ohm's law and Kirchhoff's laws to determine current and voltage in a given circuit.</p> <p>TSO.2b Explain various AC fundamental parameters.</p> <p>TSO.2c Explain various terms related to magnetic circuits</p>	<p>Unit-2.0 D.C, A.C. and Magnetic Circuits</p> <p>DC Circuits</p> <p>2.1 Current, Voltage and Power in DC circuits</p> <p>2.2 Ohm's law, Kirchhoff's Current Law, Kirchhoff's Voltage law</p> <p>A.C Circuits</p> <p>2.3 Frequency, Time period, Amplitude, Angular Velocity, RMS Value, Average Value, Form factor, Peak factor,</p> <p>2.4 Current, Voltage, Power and Phase difference in AC circuits</p> <p>Magnetic circuits</p> <p>2.5 Magnetic flux, Magnetomotive force, Magnetic field strength, Permeability, Reluctance.</p>	CO-2
<p>TSO.3a Explain the phenomenon of induced e.m.f and current</p> <p>TSO.3b Explain Faraday's laws of electromagnetic induction</p> <p>TSO.3c Describe the construction and working of the given electrical machines used in garment manufacturing.</p>	<p>Unit-3.0 Electromagnetic Induction and electrical machines</p> <p>3.1 Concept of Electromagnetic induction</p> <p>3.2 Induced e.m.f- Statically (self and mutual) and dynamically induced emf,</p> <p>3.3 Faraday's Laws of electromagnetic Induction.</p> <p>3.4 Fleming's R.H. rule; direction of induced E.M.F, Fleming's L.H. rule</p>	CO-3

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	3.5 Transformer (single phase), DC Motor, Servo motor, Universal motor: Construction, working and applications,	
<p>TSO4a. Compare different types of drives</p> <p>TSO4b. Calculate the length of belt, velocity ratio for the given situation</p> <p>TSO4c. Identify different types of gear and gear train and their applications for the given situation</p> <p>TSO4d. Explain method of lubrication and law of gearing.</p> <p>TSO4e. Explain steam and their phases along with field applications.</p> <p>TSO4f. Calculate dryness fraction and degree of superheat</p> <p>TSO4g. Describe the criteria for selection of steam properties in the given situation.</p>	<p>Unit-4.0 Power Transmission & Steam Properties:</p> <p>4.1 Concept of Power transmission, Types of Drives – Belt, Rope, Gear drives & their comparison; Belt Drives - flat belt, V– belt & its applications; Angle of lap, Belt length. Slip and Creep; Determination of Velocity Ratio; Conditions for maximum power transmission in textile industries.</p> <p>4.2 Gear Drives – Spur gear terminology; Types of gears and gear trains, their selection for different applications related to textile industries; Train value & Velocity ratio for compound, reverted and suitable gear trains used in textiles and CDDM; Law of gearing; Methods of lubrication.</p> <p>4.3 Formation of steam, various phases like wet steam, dry saturated Steam, superheated steam; Types of steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, steam calorimeters.</p> <p>4.4 Dryness fraction, degree of superheat, sensible heat, Latent heat, calculation of enthalpy of wet, dry saturated & superheated steam using steam table.</p> <p>4.5 Selection of applicable steam properties used in various processes / operations related to textile & garment manufacturing.</p>	CO-4
<p>TSO.5a Explain the importance of maintenance in textile industries.</p> <p>TSO.5b Develop preventive maintenance plan for machineries/ equipment used in textile industries and CDDM.</p> <p>TSO.5c Explain the maintenance practices being used in garment manufacturing units.</p> <p>TSO.5d Enlist the common faults that may occur in modern / Hi-tech machines used in textile industries and also the remedies.</p> <p>TSO.5e Enumerate the safety measures while carrying out maintenance of automated textile systems / sub systems.</p>	<p>Unit-5.0 Maintenance Practices</p> <p>5.1 Concept of maintenance and its importance in textile industries and CDDM.</p> <p>5.2 Systems of maintenance; Types of maintenance- Preventive, break down, Planned, Corrective and Predictive maintenance.</p> <p>5.3 Maintenance schedule –machine wise, preventive maintenance program/plan for different divisions of textile industries.</p> <p>5.4 Maintenance Practices, maintenance tools and gauges; Lubrications, properties and their applications.</p> <p>5.5 Maintenance of modern / Hi-tech machines used in textile industries – Auto levelers, Feed systems, Protector motion, Sewing and Weaving machine etc.</p> <p>5.6 Overview of maintenance of Automated textile systems</p>	CO-5

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2451401

Practical/ Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSOs 1.1 Identify the Given different electrical and electronics components,	1.	Identification of electrical and electronics components	CO-1
LSOs 1.2 Plot the terminal voltage of a source starting from no load to different load (Current) conditions	2.	Terminal voltage of a source for different load conditions	CO-1
LSOs 1.3 Calculate the value of color-coded resistor and verify it by measuring the value of resistor using digital multimeter	3.	Value of color-coded resistor	CO-1
LSOs 1.4 Measure current and voltage in a branch of the given electric circuit	4.	Measurement of current and voltage	CO-1, CO-2
LSOs 2.1 Apply ohm's law to calculate voltage across each element in a given circuit	5.	Measurement of voltage across each element in a given linear circuit	CO-1, CO-2
LSOs 2.2 Determine currents in the given electric circuit using KCL and verify it by conducting experiment	6.	Measurement of currents in the given electric circuit.	CO-1, CO-2
LSOs 2.3 Determine voltages in the given electric circuit using KVL and verify it by conducting experiment	7.	Measurement of voltage in a given electric circuit	CO-1, CO-2
LSOs 3.1 Perform experiment to demonstrate statically and dynamically induced emf.	8.	Demonstrate statically and dynamically induced emf.	CO-3
LSOs 3.2 Perform experiment to demonstrate self and mutual inductance.	9.	Demonstrate self and mutual inductance.	CO-3
LSOs 3.3 Perform experiment to demonstrate Faraday's laws of electromagnetism	10.	Demonstrate Faraday's laws of electromagnetism	CO-3
LSOs 3.4 Perform experiment to demonstrate Flemings right hand and left hand rules	11.	Demonstrate Flemings right hand and left hand rules	CO-3
LSOs 3.5 Measure Voltage ratio and current ratio of a given single phase transformer	12.	Voltage ratio and current ratio of single phase transformer	CO-3
LSOs 3.6 Dismantle the given DC machine LSOs 3.7 Identify the different parts of the dismantled DC machine LSOs 3.8 Demonstrate the working of the DC machine using Virtual Lab/Simulator	13.	Demonstration of parts and working of a DC Motor	CO-3
LSOs 3.9 Dismantle the given Servomotor LSOs 3.10 Identify the different parts of the dismantled Servomotor LSOs 3.11 Demonstrate the working of the Servomotor using Virtual Lab/Simulator	14.	Demonstration of parts and working of a Servomotor.	CO-3
LSOs 3.12 Dismantle the given Universal motor LSOs 3.13 Identify the different parts of the dismantled Universal motor LSOs 3.14 Demonstrate the working of the Universal motor using Virtual Lab/Simulator	15.	Demonstration of parts and working of a Universal motor.	CO-3
LSOs 4.1 Identify different types of belts LSOs 4.2 Calculate the length of belt for different situation	16.	Calculate the length of belt of open and cross belt drive.	CO-4

Practical/ Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSOs 4.3 Observe the various types of gear and gear train and its uses in various situation LSOs 4.4 Modify roller speed of a given machine by changing gear ratio	17.	Study of various types of gears and gear trains.	CO-4
LSOs 4.5 Use of calorimeter	18	Find dryness fraction of steam by separating and throttling calorimeter.	CO-4
LSOs 5.1 Demonstrate bobbin winding and threading.	19.	Demonstration of bobbin winding and threading.	CO-5
LSOs 5.2 Demonstrate use of different types of sewing machine attachments.	20.	Demonstration of use of different types of sewing machine attachments.	CO-5
LSOs 5.3 Identify the faults of sewing machine and repair the same.	21.	Identification of the faults of sewing machine and repair the same.	CO-5
LSOs 5.4 Clean and lubricate the given machine by oiling it at various oiling points.	22.	Cleaning and lubricating the given garment manufacturing machine by oiling it at appropriate oiling points/places.	CO-5
LSOs 5.5 Development of maintenance plan of blow room / carding / speed frame / ring frame / loom etc.	23.	Preparation of a maintenance plan of given textile machinery.	CO-5

L) Suggested Term Work and Self-Learning: S2451401 Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. Assignments: Questions/Problems/Numerical/Exercises to be provided by the course teacher in line with the targeted COs.

- i. Prepare a report on types of resistors, their power ratings and relevant applications.
- ii. Collect the information regarding various types of inductors used in different domestic appliances.
- iii. Prepare a chart of different types of capacitors used with their applications.
- iv. Draw a well labeled diagram of hand operated sewing machine.
- v. Draw a well labeled diagram of treadle operated sewing machine.
- vi. Draw a well labeled diagram of electric motor operated sewing machine.
- vii. Draw a well labeled diagram of sewing machine showing its cleaning and oiling points
- viii. Prepare sketch of a gearing system used in any yarn spinning machine.

b. Micro Projects:

1. Demonstrate the working of resistor, Inductor and Capacitor through role play or using animation
2. Prepare a chart for commonly used capacitors used in different domestic appliances (name of appliances with type and ratings)
3. Search animations demonstrating Faraday's laws of electromagnetic induction and Lenz's law to understand the concepts of electromagnetic induction and develop a presentation
4. Prepare a report on the comparison of technical parameters of NPN and PNP transistor.
5. Build and test the transistor switch circuit.
6. Practice of sewing on different types of machines
7. Prepare a report on the use of Tailoring Tools & Time Saving Devices.
8. Identify the faults of given weaving machine and carry out relevant remedial procedure
9. Prepare a report on the comparison of various heating system used in textile industry.

c. Other Activities:

1. Seminar Topics:

- Types of resistors, Inductors and capacitors and their applications
- Basic laws governing DC and AC circuits
- Prepare a chart illustrating an example to differentiate between statically and dynamically induced emf.
- Applications based on principle of electromagnetic induction.
- New/Advanced Tailoring Tools and Time Saving Devices
- Sensors used in Textile industry.

2. Surveys:

- Carry out a market survey for availability of different types of resistors used for small projects.
- Carry out a survey a market for availability of different types of semiconductor diodes used for small projects.
- Carry out a market survey for availability of different types of sewing machines available in the market

3. Visits:

- Visit a nearby garment factory and prepare a report on the sewing machines and other equipment used to prepare the garments.
- Visit a nearby yarn/fabric manufacturing facility and prepare a report on machines used to prepare yarn/fabric.

d. Self-learning topics:

- Industrial/commercial applications of AC and DC supply
- Differentiate between AC and DC in terms of generation, waveforms, and power
- Applications of statically and dynamically induced emf
- Motors used in electrical sewing machine
- Different types of sewing machines and their components available in the market
- Maintenance plan of Textile machinery

M) Suggested Course Evaluation Matrix: The course teacher has to decide and use appropriate assessment strategy and its weightage in theory, laboratory and sessional work for ensuring CO attainment. The response/performance of each student in each of these designed activities is to be used to calculate **CO attainment**.

COs	Course Evaluation Matrix						
	Theory Assessment (TA)**		Term Work Assessment (TWA)			Lab Assessment (LA)#	
	Progressive Theory Assessment (PTA) Class/Mid Sem Test	End Theory Assessment (ETA)	Term Work & Self Learning Assessment			Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)
Assignments			Micro Projects	Other Activities*			
CO-1	20%	15%	30%	20%	30%	20%	20%
CO-2	20%	20%	10%	20%	20%	20%	20%
CO-3	10%	15%	-	-	15%	20%	20%
CO-4	25%	25%	20%	30%	20%	20%	20%
CO-5	25%	25%	40%	30%	15%	20%	20%
Total Marks	30	70	20	20	10	20	30
			50				

Legend:

*: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.

** : Mentioned under point- (N)

: Mentioned under point-(O)

Note:

- The percentage given are approximate
- In case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided in all those COs mapped with total experiments.
- For CO attainment calculation indirect assessment tools like course exit survey need to be used which comprises of questions related to achievement of each COs.

N) Suggested Specification Table for End Semester Theory Assessment: Specification table represents the reflection of sample representation of assessment of cognitive domain of full course.

Unit Title and Number	Total Classroom Instruction (CI) Hours	Relevant COs Number(s)	Total Marks	ETA (Marks)		
				Remember (R)	Understanding (U)	Application & above (A)
Unit-.1.0 Basic Electrical parameters and concepts	8	CO-1	12	4	4	4
Unit-.2.0 Fundamentals of DC, AC and Magnetic circuits	10	CO-2	14	4	6	4
Unit-.3.0 Electromagnetic induction and electrical machines	10	CO-3	12	4	4	4
Unit-.4.0 Power Transmission & Steam Properties	10	CO-4	16	4	6	6
Unit-.5.0 Maintenance Practices	14	CO-5	16	4	6	6
Total Marks	48		70	20	26	24

Note: Similar table can also be used to design class/mid-term/ internal question paper for progressive assessment.

O) Suggested Assessment Table for Laboratory (Practical):

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
1.	Identification of electrical and electronics components.	CO-1	50	40	10
2.	Terminal voltage of a source for different load conditions	CO-1	50	40	10
3.	Value of color-coded resistor	CO-1	50	40	10
4.	Measurement of current and voltage	CO-1, CO-2	50	40	10
5.	Measurement of voltage across each element in a given linear circuit	CO-1, CO-2	50	40	10
6.	Measurement of currents in the given electric circuit.	CO-1, CO-2	50	40	10
7.	Measurement of voltage in a given electric circuit	CO-1, CO-2	50	40	10
8.	Demonstrate statically and dynamically induced emf.	CO-3	50	40	10
9.	Demonstrate self and mutual inductance.	CO-3	50	40	10
10.	Demonstrate Faraday's laws of electromagnetism	CO-3	50	40	10

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
11.	Demonstrate Flemings right hand and left hand rules	CO-3	50	40	10
12.	Voltage ratio and current ratio of single phase transformer	CO-3	50	40	10
13.	Demonstration of parts and working of a DC Motor	CO-3	50	40	10
14.	Demonstration of parts and working of a Servomotor.	CO-3	50	40	10
15.	Demonstration of parts and working of a Universal motor.	CO-3	50	40	10
16.	Calculate the length of belt of open and cross belt drive.	CO-4	50	40	10
17.	Study of various types of gears and gear trains.	CO-4	50	40	10
18.	Find dryness fraction of steam by separating and throttling calorimeter.	CO-4	50	40	10
19.	Demonstration of bobbin winding and threading.	CO-5	50	40	10
20.	Demonstration of use of different types of sewing machine attachments.	CO-5	50	40	10
21.	Identification of the faults of sewing machine and repair the same.	CO-5	50	40	10
22.	Cleaning and lubricating the given garment manufacturing machine by oiling it at appropriate oiling points/places.	CO-5	50	40	10
23.	Preparation of a maintenance plan of given textile machinery.	CO-5	50	40	10

Legend:

PRA*: Process Assessment

PDA**: Product Assessment

Note: This table can be used for both end semester as well as progressive assessment of practical. Rubrics need to be prepared by the course teacher for each experiment/practical to assess the student performance.

- P) Suggested Instructional/Implementation Strategies:** Different Instructional/ Implementation Strategies may be appropriately selected, as per the requirement of the content/outcome. Some of them are Improved Lecture, Tutorial, Case Method, Group Discussion, Industrial visits, Industrial Training, Field Trips, Portfolio Based, Learning, Role Play, Live Demonstrations in Classrooms, Lab, Field Information and Communications Technology (ICT)Based Teaching Learning, Blended or flipped mode, Brainstorming, Expert Session, Video Clippings, Use of Open Educational Resources (OER), MOOCs etc.

Q) List of Major Laboratory Equipment, Tools and Software:

S. No.	Name of Equipment, Tools and Software	Broad Specifications	Relevant Experiment/ Practical Number
1.	Resistors, Capacitors, and Inductors	Different types and ratings	1,3
2.	Electronic components Connecting probes	PN Junction diode -NPN and PNP, BJT Connecting probes	1
3.	DC Source (Variable)	0-40/50 Volts	2
4.	AC Source (Variable)	0-40/50 Volts	2
5.	Load bank	Load bank in steps of 20 Watt	2
6.	Voltmeter	0-300 V, 0-75 V (MI & MC)	2,5,7
7.	Ammeter	0-5/10/40 A (MI), 0-4 A (MC)	2,4,6
8.	Multimeter	Digital Multimeter: 3 1/4 digit display, 9999 counts digital multimeter measures: V_{ac} , V_{dc} (1000V max), A_{dc} , A_{ac} (10 amp max), Resistance (0 - 100 M Ω), Capacitance and Temperature measurement	2,3,4, 5,7
9.	Demonstration kit for demonstrating statically and dynamically induced emf	Demonstration kit for demonstrating statically and dynamically induced emf for demonstration purpose	8
10.	Demonstration kit to demonstrate self and mutual inductance.	Demonstration kit to demonstrate self and mutual inductance.	9
11.	Demonstration kit for Faraday's laws of electromagnetic induction	Demonstration kit for Faraday's laws of electromagnetic induction for demonstration purpose	10
12.	Demonstration kit for Flemings right hand and left hand rules	Demonstration kit for Flemings right hand and left hand rules for demonstration purpose	11
13.	Rheostats	0-50 Ohms, 5 Amp; 0-300 Ohms, 4 amp	2
14.	Single phase transformer	Single phase transformer of low power rating for laboratory purpose	12
15.	DC Motor	DC Motor of small rating for laboratory experimentation purpose	13
16.	Servomotor	Servomotor of small rating for laboratory experimentation purpose	14
17.	Universal motor	Universal motor of small rating for laboratory experimentation purpose	15
18.	Belt Drive Apparatus with different belt arrangement / working model	Belt drive Apparatus with Standard specification or Working model of different belt arrangement	16
19.	Gear Train Apparatus/ working model	Gear Train Apparatus with different gears (spur, helical, bevel etc.) and gear train (simple, compound, reverted and epicyclic gear train) with Standard specification or Working model of different gears (spur, helical, bevel etc.)	17

S. No.	Name of Equipment, Tools and Software	Broad Specifications	Relevant Experiment/ Practical Number
		and gear train (simple, compound, reverted and epicyclic gear train)	
20.	Separating and throttling calorimeter	Standard specification	18
21.	Sewing Machine	Sewing Machine foot drive with cover	19,20,21
22.	Carding / speed frame / ring frame / loom	Available in the polytechnic of standard specifications	22,23
23.	Garment manufacturing machine	Available in the polytechnic of standard specifications	22,23

R) Suggested Learning Resources:

(a) Books:

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Basic Electrical Engineering	Mittle and Mittal	McGraw Education, New Delhi, 4015, ISBN: 978-0-07-0088574-5
2.	Fundamentals of Electrical Engineering	Saxena, S. B. Lai	Cambridge University Press, ISBN : 9781107464353
3.	Electrical Technology Vol- I	Theraja, B. L.	S. Chand Publications, New Delhi. 4015, ISBN: 9788141944405
4.	Basic Electrical and Electronics Engineering	Jegathesan, V.	Wiley India, New Delhi, 4015, ISBN : 97881436549513
5.	Basic Electronic Engineering	BaruV.;KaduskarR.;Gaikwad S.T.	Dream tech Press, New Delhi, 4015, ISBN: 9789350040146
6.	Cutting & Tailoring Course	Gayatri Verma	Asian Publishers Latest
7.	The Art of Sewing	Anna Jacob Thomas	USB Publishers & Distributors. 1993
8.	Theory of Machines	R. S. KHURMI J. K. GUPTA	S. CHAND; 14th edition,2020 ISBN-978-8121925242
9.	Dynamics of Machines	J. B. K. Das	Sapna Book House, 2008 ISBN-978-8128009112
10.	Thermodynamics an engineering approach	Yunus A. Cengel Michael A. Boles Mehmet Kanoglu	McGraw Hill Education india, 2019 ISBN: 9789353165741, 9353165741
11.	Basic and applied thermodynamics	P.K. Nag	McGraw Hill Education india, second edition; ISBN: 9780070151314, 9780070151314
12.	A text book of Thermal Engineering	R.S. Khurmi J.K. Gupta	S. Chand, ISBN: 9788121925730,9788121925730

(b) Online Educational Resources:

1. <https://nptel.ac.in/courses/108104139>
2. <https://archive.nptel.ac.in/courses/108/104/108104139/>
3. <https://archive.nptel.ac.in/courses/117/106/117106108/>
4. <https://alison.com/course/advanced-diploma-in-basic-electrical-circuits>
5. <https://archive.nptel.ac.in/courses/108/105/108105159/>
6. <https://www.youtube.com/watch?v=-BN1kQqHmyI>
7. <https://www.youtube.com/watch?v=c6IDFVZ9M8k>
8. Study on the Basics of Maintenance of Textile Machinery - Textile Learner

Note: Teachers are requested to check the creative commons license status/ financial implications of the suggested, online educational resources before use by the students.

(c) Others:

1. Electrical and Electronics engineering Handbook
2. Users' Guide
3. Manufacturers' Manual
4. Lab Manuals

- A) **Course Code** : 2451402(T2451402/P2451402/S2451402)
- B) **Course Title** : Knitted and Non -Woven Fabric & Construction
- C) **Pre- requisite Course(s)** : Fibre science and Textile, Applied Mathematics-D, Fabric Construction
- D) **Rationale** :

Knitting is an inter-meshing method of manufacturing the fabric. Its unique feature of loop structure in course and wale direction contributes outstanding elasticity and shape fitting properties in fabric, which expand the range of applications in garment manufacturing industry. This course is developed to enable the passout to use the basic principles of circular weft knitting, flat warp knitting, v- bed flat knitting and Non-woven technology in fabric production by considering the relevant industrial apparel design problems.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of following course outcomes by the learners. For this, the learners are expected to perform various activities related to three learning domains (Cognitive, Psychomotor and Affective) in classroom/ laboratory/ workshop/ field/ industry.

After completion of the course, the students will be able to-

- CO-1.** Select relevant knitted fabric for given application by considering its physical properties.
- CO-2.** Use circular knitting principles to develop relevant knitted fabric.
- CO-3.** Develop relevant design on point paper to reproduce given fabric.
- CO-4.** Conduct quality-check of knitted fabric using relevant testing procedure.
- CO-5.** Use warp knitting principle to develop ornamented warp knitted fabric.
- CO-6.** Use relevant nonwoven fabric to develop specified garments.

- F) **Suggested Course Articulation Matrix (CAM):**

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)	
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO- 1	PSO- 2
CO-1	3	-	3	2	1	-	1		
CO-2	3	2	3	2	1	-	-		
CO-3	3	3	3	3	1	-	-		
CO-4	3	3	3	3	1	-	-		
CO-5	3	3	3	3	1	-	3		
CO-6	3	3	3	3	1	-	3		

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional

G) Teaching & Learning Scheme:

Course Code	Course Title	Scheme of Study (Hours/Week)					
		Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+ SL)	Total Hours (CI+LI+TW+SL)	Total Credits (C)
		L	T				
2451402	Knitted and Non -Woven Fabric & Construction	03	-	04	02	09	06

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)

Notional Hours: Hours of engagement by learners, other than the contact hours for ensuring learning.

TW: Term Work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.)

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours)

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

H) Assessment Scheme:

Course Code	Course Title	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
		Theory Assessment (TA)		Term Work & Self-Learning Assessment (TWA)		Lab Assessment (LA)		
		Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2451402	Knitted and Non - Woven Fabric and Construction	30	70	20	30	20	30	200

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)

TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.)

Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities like assignment, micro project, seminar and self-learning is to be done by internal faculty (Internal Assessment) whereas assessment of output/product/ presentation related to these activities will be carried out by external faculty/expert (External Assessment). However, criteria of internal as well as external assessment may vary as per the requirement of respective course. For valid and reliable assessment, the internal faculty should prepare checklist & rubrics for these activities.

I) **Course Curriculum Detailing:** This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

J) **Theory Session Outcomes (TSOs) and Units: T2451402**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 1a.</i> Describe the fabric manufacturing method for given type of fabric</p> <p><i>TSO 1b.</i> Describe the principle of intermeshing of loops for given yarn.</p> <p><i>TSO 1c.</i> Enlist basic terms for given knitted fabric.</p> <p><i>TSO 1d.</i> Classify the knitting machines.</p> <p><i>TSO 1e.</i> Distinguish between knitted and woven fabrics.</p>	<p>Unit-1.0 Introduction of knitting Process</p> <p>1.1 Methods of fabric manufacture</p> <p>1.2 Principle of knitting of loops.</p> <p>1.3 Basic terms of fabric: Course, Wales, Stitch Length, Needle Loop, shinker loop, Face Loop, Back loop, Course Length.</p> <p>1.4 Classification: warp knitting & weft knitting</p> <p>1.5 Comparison of knitted and woven fabrics.</p> <p>1.6 Reasons for the growth of knitting industry</p>	CO1
<p><i>TSO 2a.</i> Draw the loop structure of specified knitted fabric.</p> <p><i>TSO 2b.</i> Classify the weft knitting machine.</p> <p><i>TSO 2c.</i> Illustrate the principle of single jersey machine.</p> <p><i>TSO 2d.</i> Develop the knitted fabric by using relevant technique.</p> <p><i>TSO 2e.</i> Develop the flat knitted fabric by using V bed.</p>	<p>Unit-2.0 Weft knitting Machines</p> <p>2.1. Classification of weft knitting machine.</p> <p>2.2. Rib machine: structure, principle of Single jersey machine-loop structure, Principle of intermeshing, functions of cylinder, cams, needles, types, sinker, cams, fabric spreader. features ,stripper</p> <p>2.3. intermeshing, arrangement of needles and tricks. Cylinder /dial cam. features</p> <p>2.4. Interlock machine: structure, principle, arrangement of needle and cylinder trick.cam arrangement. Features</p>	CO1, CO2
<p><i>TSO 3a.</i> Classify the weft knitted fabrics.</p> <p><i>TSO 3b.</i> Illustrate the loop structure for given type fabric.</p> <p><i>TSO 3c.</i> Compare between the single and double jersey for given situation.</p> <p><i>TSO 3d.</i> Describe the physical properties of given fabric.</p> <p><i>TSO 3e.</i> Compare the physical properties of given set of fabric.</p> <p><i>TSO 3f.</i> Illustrate relevant notation on paper for given design of fabric.</p> <p><i>TSO 3g.</i> Develop design, cam order, and needle order for given knitted fabric.</p>	<p>Unit-3.0 Knitted Fabrics</p> <p>2.1. Classification of weft knitted fabrics</p> <p>2.2. Loop structure of Single jersey/rib/interlock/purl fabric-structure, properties,</p> <p>2.3. Principle stitches: knit, tuck, miss, purl, Loop, diagram of tuck & float stitch, Effect of tuck & float stitch on fabric property.</p> <p>2.4. Representation of fabric on paper, method of presentation.</p> <p>2.5. Concept of design, cam order , needle order</p> <p>2.6. Ornamentation of single, rib, interlock and purl fabrics: La-coste, cross tuck, satin, jersey blister, thick fleece, milano rib, double pique, pique poplin, evermote, punto- di -roma, ottoman rib, texi pique.</p>	CO3
<p><i>TSO 4a.</i> Identify the fabric defect for given knitted fabric.</p>	<p>Unit-4.0 Quality and Production of Knitted Fabric</p>	CO4

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 4b.</i> Illustrate various causes for relevant fabric defect to given knitted fabric</p> <p><i>TSO 4c.</i> Calculate angle of spirality for given knitted fabric.</p> <p><i>TSO 4d.</i> Estimate the course length for given knitted fabric.</p> <p><i>TSO 4e.</i> Describe the procedure to evaluate various test parameters for given knitted fabric..</p>	<p>4.1. Weft knit fabric Defects: Causes and Remedies.</p> <p>4.2 Tests for weft knit Quality: Spirality, barre , course length , GSM,CPI and WPI, stitch length , yarn count, stretch memory</p> <p>4.3 Knitting machine production:</p> <p>4.4 Fabric parameter: Stitch length, tightness factor, GSM calculation.</p>	
<p><i>TSO 5a.</i> Draw the loop structure for given warp knitted fabric.</p> <p><i>TSO 5b.</i> Compare between basic principle of knitting methodology.</p> <p><i>TSO 5c.</i> Describe the functions of various elements for given warp knitting machine.</p> <p><i>TSO 5d.</i> Represent the given warp knitted fabric on paper by using lapping movement.</p> <p><i>TSO 5e.</i> Represent the given warp knitted fabric on paper by chain notation.</p> <p><i>TSO 5f.</i> Evaluate the lapping movement diagram for knitted fabric from given chain notation.</p> <p><i>TSO 5g.</i> Describe the various application of warp knitted fabric.</p>	<p>Unit-5.0 Warp Knitting Machines and Fabrics</p> <p>4.1. Warp knitting – General, Loop structure of warp knit fabric,</p> <p>4.2. Comparison between warp & weft knitting.</p> <p>4.3. Elements of warp knitting machine –needle bar, sinker bar, presser bar, latch wire, pattern drum, pattern wheel, and chain links.</p> <p>4.4. Warp knitting - Fabric structure, representation of fabric, chain notation, Single bar, two bar fabrics</p> <p>4.5. Applications of warp knit fabrics.</p>	CO5
<p><i>TSO 6a.</i> Describe the concept of nonwoven fabric.</p> <p><i>TSO 6b.</i> Classify the non woven fabric.</p> <p><i>TSO 6c.</i> Describe the needle punching process to produce non- woven fabric.</p>	<p>Unit-6.0 Non-Woven</p> <p>6.1 Non- woven: Concept, Classification, favorable Properties for Garment Productions.</p> <p>6.2 Manufacturing process of Nonwoven Fabrics.</p> <p>6.3 Dry Method, Bonding method and Needle Bonding methods of production, properties and uses</p>	CO6

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2451402

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<p><i>LSO 1.1.</i> Use Knitted Fabric.</p> <p><i>LSO 1.2.</i> Identify the basic terms of knitted fabrics.</p>	1.	Identify and draw the basic terms like face loop, back loop, technical face, technical back, and Top and bottom side of it.	CO1
<p><i>LSO 2.1.</i> Compare between woven and knitted fabric.</p>	2.	Evaluate for given similar GSM knitted fabric and woven fabric - a. Stretch, elastic recovery, strength of fabric b. Identify and draw the intermeshing and interlacement of thread.	CO1
<p><i>LSO 3.1.</i> Use single jersey machine to produce the knitted fabric.</p>	3.	Demonstrate operation of single jersey machine to a. Show the principle of intermeshing b. Identify and draw various elements. c. Show the flow process of yarn.	CO2
<p><i>LSO 4.1.</i> Compare between the single jersey and rib machine.</p>	4.	Demonstrate operation of rib machine to a. Show the principle of intermeshing b. Identify and draw the process of yarn	CO2

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<i>LSO 4.2.</i> Use the rib machine to produce the rib fabric.			
<i>LSO 5.1.</i> Use interlock machine to demonstrate production of the knitted fabric	5.	Use interlock knitting machine to set the needles, cylinder tricks and cylinder cams for given fabric.	CO3
<i>LSO 6.1.</i> Produce Flat knitted fabric out of given yarn.	6.	Demonstrate various elements of flat knitting machine to show the process flow of material.	CO4
<i>LSO 7.1.</i> Identify the single jersey fabric. <i>LSO 7.2.</i> Evaluate the various technical parameter of given fabric.	7.	Use single jersey fabric to calculate CPI, WPI, yarn count, tightness factor, GSM and yarn count by analyzing the given fabric	CO4
<i>LSO 8.1.</i> Identify the stripper fabric. <i>LSO 8.2.</i> Analyze the patterned knitted fabrics.	8.	Use striped single jersey fabric to calculate course wise colour repeat, Number of colored yarns, and decide the position of stripper	CO5
<i>LSO 9.1.</i> Identify the double jersey fabric. <i>LSO 9.2.</i> Evaluate the various technical parameter of given rib fabric. <i>LSO 9.3.</i> Reproduce the given type of rib fabric.	9.	Calculate CPI, WPI, yarn count, tightness factor, GSM and yarn count by analyzing the given rib fabric for producing double jersey fabric	CO5
<i>LSO 10.1.</i> Evaluate the various technical parameter of given interlock fabric. <i>LSO 10.2.</i> Reproduce the given type of interlock fabric	10.	Calculate CPI, WPI, yarn count, tightness factor, GSM and yarn count by analyzing the given Use interlock fabric to reproduce fabric.	CO5
<i>LSO 11.1.</i> Evaluate the dimensional stability of knitted fabric.	11.	Evaluate the dimensional stability in dry/wet condition for single jersey/rib/interlock	CO5
<i>LSO 12.1</i> Demonstrate use of warp knitting machine.	12	Demonstrate warp knitting machine to identify and draw the various elements of it.	CO5
<i>LSO 13.1</i> Describe the principle of nonwoven fabric.	13	Demonstrate needle punching machine to show the process flow of material	CO6

L) **Suggested Term Work and Self Learning: S2451402** Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. Assignments:

1. Draw the various structure of knitted fabric on drawing paper by using the coloured pens.
2. Collect various knitted fabric and categories into various types.
3. Draw the Needle order and cam order of various knitted fabric structure.
4. Collect various patterned fabric from market and identify the number of courses per repeat, C.P.I, W.P.I and stitch length.

b. Micro Projects:

- a. Prepare wire model of stitch by using metal wire of different colors for representing basic terminology of knitted fabric basic terms.
- b. Collect colored photographs of single jersey/rib/interlock machines basic elements and compare the all machine.
- d. Prepare wire of single jersey/rib/interlock/rib loop structure by using flexible colored wire to reflect difference in intermeshing principle among each other.
- e. Prepare booklet of showing various ornamented design and express cam order and relevant needle order for each designs.
- f. Prepare the informative table showing list of defects, their definition, photograph, remedies.
- g. Prepare booklet showing collection of warp knitting various elements photograph with specific function of the same.
- h. Collect the different sample of various non woven fabrics and stick on card sheet by captioning the relevant technology used to produce the same over the sample

c. Other Activities:

1. Seminar Topics:

- Commercially available single jersey machine.
- Application of warp knitted fabrics.
- Needle punching non woven machine and fabric.
- Design, Needle Order and Cam order of knitted fabric.
- Quality parameters of knitted fabric.

2. Visits: Visit nearby industry with knitting machine facilities. Prepare report of visit with special comments of number of knitting machine, type of fabric production, fabric costing, knitted fabric garment preparation.

3. Self-learning topics:

- Single Jersey machine components.
- Planning of stripper arrangement in knitting machine.
- Rachel Knitting machine.

M) Suggested Course Evaluation Matrix: The course teacher has to decide and use appropriate assessment strategy and its weight age in theory, laboratory and Term Work for ensuring CO attainment. The response/performance of each student in each of these designed activities is to be used to calculate **CO attainment**.

COs	Course Evaluation Matrix						
	Theory Assessment (TA)**		Term Work Assessment (TWA)			Lab Assessment (LA)#	
	Progressive Theory Assessment (PTA) Class/Mid Sem Test	End Theory Assessment (ETA)	Term Work & Self Learning Assessment			Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)
Assignments			Micro Projects	Other Activities*			
CO-1	10%	10%	10%	-	-	10%	10%
CO-2	10%	10%	10%	25%	-	10%	20%
CO-3	10%	10%	10%	25%	33%	15%	20%
CO-4	30%	30%	30%	25%	33%	15%	20%
CO-5	30%	30%	30%	25%	34%	40%	20%
CO-6	10 %	10 %	10 %	-	-	10%	10%
Total Marks	30	70	20	20	10	20	30
			50				

Legend:

*: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.

** : Mentioned under point- (N)

: Mentioned under point-(O)

Note:

- The percentage given are approximate
- In case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided in all those COs mapped with total experiments.
- For CO attainment calculation indirect assessment tools like course exit survey need to be used which comprises of questions related to achievement of each COs.

N) Suggested Specification Table for End Semester Theory Assessment: Specification table represents the reflection of sample representation of assessment of cognitive domain of full course.

Unit Title and Number	Total Classroom Instruction (CI) Hours	Relevant COs Number(s)	Total Marks	ETA (Marks)		
				Remember (R)	Understanding (U)	Application & above (A)
Unit-1.0 Introduction of Knitting Process	4	CO1	10	3	3	4
Unit-2.0 Weft Knitting Machines	10	CO1, CO2	12	3	4	5
Unit-3.0 Knitted Fabrics	8	CO3	12	5	2	5
Unit-4.0 Quality and Production of Knitted Fabric	10	CO1,CO2, CO4	14	3	4	7
Unit-5.0 Warp Knitting Machines and Fabrics	12	CO5	14	3	4	7
Unit-6.0 Non-Woven	4	CO6	08	3	2	3
Total	48	-	70	20	19	31

Note: Similar table can also be used to design class/mid-term/ internal question paper for progressive assessment.

O) Suggested Assessment Table for Laboratory (Practical):

S. No	Laboratory Practical Titles	Relevant COs Number (s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA * (%)	PDA ** (%)	
1.	Identify and draw the basic terms like face loop, back loop, technical face, technical back, and Top and bottom side of it.	CO1	30	60	10
2.	Evaluate for given similar GSM knitted fabric and woven fabric - a. Stretch, elastic recovery, strength of fabric b. Identify and draw the intermeshing and interlacement of thread.	CO1	40	50	10
3.	Demonstrate operation of single jersey machine to a. Show the principle of intermeshing b. Identify and draw various elements. c. Show the flow process of yarn.	CO2	30	60	10
4.	Demonstrate operation of rib machine to a. Show the principle of intermeshing b. Identify and draw the process of yarn	CO2	30	60	10
5.	Use interlock knitting machine to set the needles, cylinder tricks and cylinder cams for given fabric.	CO3	30	60	10
6.	Demonstrate various elements of flat knitting machine to show the process flow of material.	CO4	30	60	10
7.	Use single jersey fabric to calculate CPI, WPI, yarn count, tightness factor, GSM and yarn count by analyzing the given fabric	CO4	30	60	10
8.	Use striped single jersey fabric to calculate course wise colour repeat, Number of colored yarns, and decide the position of stripper	CO5	40	50	10
9.	Calculate CPI, WPI, yarn count, tightness factor, GSM and yarn count by analyzing the given rib fabric for producing double jersey fabric	CO5	40	50	10
10.	Calculate CPI, WPI, yarn count, tightness factor, GSM and yarn count by analyzing the given Use interlock fabric to reproduce fabric.	CO5	40	50	10
11.	Evaluate the dimensional stability in dry/wet condition for single jersey/rib/interlock	CO5	30	60	10

S. No	Laboratory Practical Titles	Relevant COs Number (s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA * (%)	PDA ** (%)	
12.	Demonstrate warp knitting machine to identify and draw the various elements of it.	CO5	30	60	10
13.	Demonstrate needle punching machine to show the process flow of material	CO6	30	60	10

Legend:

PRA*: Process Assessment

PDA**: Product Assessment

Note: This table can be used for both end semester as well as progressive assessment of practical. Rubrics need to be prepared by the course teacher for each experiment/practical to assess the student performance.

P) Suggested Instructional/Implementation Strategies: Different Instructional/ Implementation Strategies may be appropriately selected, as per the requirement of the content/outcome. Some of them are Improved Lecture, Tutorial, Case Method, Group Discussion, Industrial visits, Industrial Training, Field Trips, Portfolio Based, Learning, Role Play, Live Demonstrations in Classrooms, Lab, Field Information and Communications Technology (ICT)Based Teaching Learning, Blended or flipped mode, Brainstorming, Expert Session, Video Clippings, Use of Open Educational Resources (OER), MOOCs etc.

Q) List of Major Laboratory Equipment, Tools and Software:

S. No	Name of Equipment, Tools and Software	Broad Specifications	Relevant Experiment/Practical Number
1.	Single Jersey machine	Single jersey machine with 34 inch cylinder diameter, 24 E, 108 feeder	3
2.	Rib Machine	Rib machine with 30 inch cylinder diameter and 26E machine gauge, 96 feeder	4
3.	Interlock Machine	Interlock machine with 30 inch cylinder dia. And 26E machine gauge, 96 feeder	5
4.	GSM Cutter	10 inch knife GSM cutter	All
5.	Knitted fabric	Single jersey fabric, rib fabric, interlock knitted fabric.	7,8,9,10,11
6.	Flat Knitting machine	Flat knitting machine with 18E and V bed needle tricks arrangement	6
7.	Warp knitting machine	Warp knitting machine with single bar and pattern wheel	12

R) Suggested Learning Resources:**(a) Books:**

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Knitting Technology	D.J. Spencer	Woodhead Publishing Limited. ISBN: 9781855733336
2.	Fundamentals and advances in knitting technology	Sadan Chandra Roy	Wood head publication India limited, New Delhi 2012 ISBN: 9789380308166
3.	The Nonwovens	Gianni Tanchis	ITMA April 2008 publication

(b) Online Educational Resources:

1. <https://www.youtube.com/watch?v=3uw-nUvGrBY>
2. <https://www.nptel.ac.in/courses/116102008/>
3. <https://www.garmentsmerchandising.com/list-of-fabrics-used-in-knit-garments-manufacturing/>
4. <https://www2.ca.uky.edu/HES/fcs/FACTSHTS/CT-MMB-165.pdf>
5. <https://www.karlmayer.com/en/products/warp-knitting-machines/tricot-machines/tricot-machines-with-2-guide-bars/>
6. <https://www.nptel.ac.in/courses/116102014//>

Note: Teachers are requested to check the creative commons license status/ financial implications of the suggested, online educational resources before use by the students.

(c) Others:

1. NPTEL and MOCCS Lecture on weft knitting technology

- A) **Course Code** : 2451403(T2451403/P2451403/S2451403)
- B) **Course Title** : Dyes, Colours & Printing
- C) **Pre- requisite Course(s)** : Applied Chemistry-C (For textile and allied disciplines), Fibre Science and Textile
- D) **Rationale** :

Garmenting is the process in which fabric is converted in to garment. This fabric undergoes several decorative chemical processes using dyes such as dyeing and printing. Some chemical treatment is also carried out on garment additionally to increase the value of garment. Some garments possess their functional properties because of certain kind of chemical processing only. Hence the basic information of dyes, coloring matters, chemical processing is essential for student. Student should apply the knowledge of chemical processing to develop requisite properties in garment.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of following course outcomes by the learners. For this, the learners are expected to perform various activities related to three learning domains (Cognitive, Psychomotor and Affective) in classroom/ laboratory/ workshop/ field/ industry.

After completion of the course, the students will be able to-

CO-1 Prepare fabric for dyeing & printing with relevant pre-treatments effectively.

CO-2 Apply relevant dyes on natural fibers effectively.

CO-3 Apply relevant dyes on manmade fibers effectively.

CO-4 Apply relevant printing method on given fabric effectively.

CO-5 Apply relevant finishing technique on given fabric effectively.

- F) **Suggested Course Articulation Matrix (CAM):**

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)	
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO- 1	PSO- 2
CO-1	3	2	3	2	-	-	2		
CO-2	3	2	2	2	-	-	2		
CO-3	3	3	2	2	3	-	2		
CO-4	3	3	2	2	-	-	2		
CO-5	3	2	3	3	-	3	2		

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional

G) Teaching & Learning Scheme:

Course Code	Course Title	Scheme of Study (Hours/Week)					
		Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+ SL)	Total Hours (CI+LI+TW+SL)	Total Credits (C)
		L	T				
2451403	Dyes, Colours & Printing	03	-	04	02	09	06

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)

Notional Hours: Hours of engagement by learners, other than the contact hours for ensuring learning.

TW: Term Work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.)

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours)

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

H) Assessment Scheme:

Course Code	Course Title	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
		Theory Assessment (TA)		Term Work & Self-Learning Assessment (TWA)		Lab Assessment (LA)		
		Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2451403	Dyes, Colours & Printing	30	70	20	30	20	30	200

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)

TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.)

Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities like assignment, micro project, seminar and self-learning is to be done by internal faculty (Internal Assessment) whereas assessment of output/product/ presentation related to these activities will be carried out by external faculty/expert (External Assessment). However, criteria of internal as well as external assessment may vary as per the requirement of respective course. For valid and reliable assessment, the internal faculty should prepare checklist & rubrics for these activities.

I) Course Curriculum Detailing: This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

J) Theory Session Outcomes (TSOs) and Units: T2451403

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 1a.</i> Draw flow process chart for fabric pretreatment.</p> <p><i>TSO 1b.</i> List objectives of shearing and cropping m/c.</p> <p><i>TSO 1c.</i> Explain the process parameters for singeing.</p> <p><i>TSO 1d.</i> Describe with diagram the desizing process.</p> <p><i>TSO 1e.</i> Describe with diagram, scouring process.</p> <p><i>TSO 1f.</i> Compare hypochlorite bleaching with peroxide bleaching.</p> <p><i>TSO 1g.</i> List types of mercerization.</p>	<p>Unit-1.0 Mechanical and Chemical Pre-Treatment</p> <p>1.1 Introduction, flow chart & importance of pretreatments.</p> <p>1.2 Shearing and cropping- objective, process</p> <p>1.3 Singeing- objective, types, process</p> <p>1.4 Desizing- objective, acid and enzyme</p> <p>1.5 Scouring- objective, batch and continuous processes</p> <p>1.6 Bleaching- objective, hypochlorite and peroxide bleaching</p> <p>1.7 Mercerizing- objective, types, process</p>	CO1
<p><i>TSO 2a.</i> Classify coloring matter.</p> <p><i>TSO 2b.</i> Describe dyeing of cotton with reactive dye.</p> <p><i>TSO 2c.</i> Describe dyeing of wool with acid dye.</p> <p><i>TSO 2d.</i> Describe the procedure to dye silk fiber.</p> <p><i>TSO 2e.</i> Justify the use of mordant in natural dye application.</p>	<p>Unit-2.0 Dyeing of Natural Fiber</p> <p>2.1 Coloring matter-classification, properties of dyes and pigments, Definition of percentage shade, exhaustion, expression</p> <p>2.2 Dyeing of cotton with exhaust and padding with direct, Sulphur, vat and reactive dyes,</p> <p>2.3 Dyeing of wool with acid and basic dye</p> <p>2.4 Dyeing of silk with acid and basic dye</p> <p>2.5 Dyeing of cotton with natural dye</p>	CO2
<p><i>TSO 3a.</i> Explain dyeing of polyester with disperse dye.</p> <p><i>TSO 3b.</i> Compare different methods of polyester dyeing.</p> <p><i>TSO 3c.</i> List the dyes used for nylon dyeing.</p> <p><i>TSO 3d.</i> Explain process parameters of jigger dyeing.</p> <p><i>TSO 3e.</i> Describe the concepts of cross dyeing and reverse dyeing.</p>	<p>Unit-3.0 Dyeing of Manmade Fiber</p> <p>3.1 Dyeing of polyester with disperse dye.</p> <p>3.2 Methods of polyester dyeing- HTHP, carrier, thermo fixation.</p> <p>3.3 Dyeing of nylon with acid and basic dye.</p> <p>3.4 Machines used for dyeing- jigger, winch, jet dyeing.</p> <p>3.5 PC blend dyeing.</p>	CO3
<p><i>TSO 4a.</i> Describe the method of print paste formulation.</p> <p><i>TSO 4b.</i> Explain block printing method.</p> <p><i>TSO 4c.</i> Justify the use of discharging agent in printing.</p>	<p>Unit-4.0 Printing of Textiles</p> <p>4.1 Important print paste ingredients & their functions</p> <p>4.2 Tie and Dye, Batik and Block printing on cotton</p> <p>4.3 Direct, discharge and resist styles of printing</p>	CO4
<p><i>TSO 5a.</i> Describe the objectives of finishing of textiles.</p> <p><i>TSO 5b.</i> Explain mechanical finishing of cotton fabric.</p> <p><i>TSO 5c.</i> Describe the objectives of wool and polyester finishing.</p>	<p>Unit-5.0 Finishing of Textiles</p> <p>5.1 Classification and objectives of finishing processes</p> <p>5.2 Sanforising, compacting, sueding.</p> <p>5.3 Decatising of wool, heat setting of polyester.</p>	CO5

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 5d.</i> Give process parameters for stone wash of denim.	5.4 Denim finishing- enzyme wash, stone wash, acid wash.	
<i>TSO 5e.</i> Explain application process of softener finish on cotton.	5.5 Water repellent finish, softener, stiffener, soil release finish on cotton.	

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2451403

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<i>LSO 1.1.</i> Maintain process parameters for desizing.	1.	Desize given cotton fabric using enzyme to remove starch.	CO1
<i>LSO 2.1.</i> Maintain proper process parameters for scouring.	2.	Scour the given cotton fabric to remove hydrophobic impurities	CO1
<i>LSO 3.1.</i> Maintain proper process parameters for bleaching.	3.	Bleach given cotton fabric using hydrogen peroxide.	CO1
<i>LSO 4.1.</i> Maintain proper process parameters for cotton dyeing.	4.	Dye given cotton fabric sample using reactive dye.	CO2
<i>LSO 5.1.</i> Maintain proper process parameters for wool dyeing.	5.	Dye given wool fabric sample using acid dye	CO2
<i>LSO 6.1.</i> Maintain proper process parameters for cotton dyeing.	6.	Dye given cotton fabric with natural dye using mordant	CO2
<i>LSO 7.1.</i> Maintain proper process parameters for polyester dyeing	7.	Dye given polyester fabric with disperse dye by carrier method.	CO3
<i>LSO 8.1.</i> Maintain proper process parameters for polyester dyeing	8.	Dye given nylon fabric using basic dye.	CO3
<i>LSO 9.1.</i> Use wooden blocks to print on cotton fabric.	9.	Perform block printing on given cotton fabric	CO4
<i>LSO 10.1.</i> Maintain proper process parameters for cotton printing.	10.	Print given cotton fabric with reactive dye by direct style.	CO4
<i>LSO 11.1.</i> Maintain proper process parameters for cotton printing.	11.	Print given cotton fabric with reactive dye by discharge style.	CO4
<i>LSO 12.1</i> Use pad-dry-cure process	12.	Apply softener finish on given cotton fabric	CO5

L) **Suggested Term Work and Self Learning: S2451403** Some sample suggested assignments, micro project and other activities are mentioned here for reference.

- a. **Assignments:** Questions/Problems/Numerical/Exercises to be provided by the course teacher in line with the targeted COs.

b. Micro Projects:

- 1) **Sample collection:** Visit a local Industry. Collect the sample from grey to mercerization and observe the changes take places in each step.
- 2) **Shade checking:** Produce the different shade by using same colour and write the observation. Batch of students should prepare relative process parameter chart.
- 3) **Garment collection:** Collect the photographs of garment in which special printing effects are used. Classify them and write a brief about each category.
- 4) **pH in wet processing:** Prepare chart on chemicals used in textile preparatory processes with their pH. Choose combinations of various chemicals preparatory processes and check their effect and summarize it in the form of chart.
- 5) **Comparison:** Compare the results of chemical processing of cotton sample by all methods specified in curriculum and on varieties i.e. cotton, wool and silk.

c. Other Activities:

1. Seminar Topics:

- Commercially used chemicals in textile wet processing.
- Processing machinery used for textiles.
- Effluent treatment plant set-up for textile industry.
- Decorative and functional finishes on textiles.

2. Visits: Students should visit the chemical processing unit and observe the various steps in fabric processing. He will write observations and present a report.

3. Self-learning topics:

- Properties of chemicals.
- Processing of textile blends.
- Chemical calculations in recipe for textile processing.

M) Suggested Course Evaluation Matrix: The course teacher has to decide and use appropriate assessment strategy and its weightage in theory, laboratory and Term Work for ensuring CO attainment. The response/performance of each student in each of these designed activities is to be used to calculate **CO attainment**.

COs	Course Evaluation Matrix						
	Theory Assessment (TA)**		Term Work Assessment (TWA)			Lab Assessment (LA)#	
	Progressive Theory Assessment (PTA) Class/Mid Sem Test	End Theory Assessment (ETA)	Term Work & Self Learning Assessment			Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)
Assignments			Micro Projects	Other Activities*			
CO-1	20%	20%	15%	-	-	20%	20%
CO-2	20%	20%	30%	25%	25%	20%	20%
CO-3	20%	20%	30%	25%	25%	20%	20%
CO-4	20%	20%	10%	25%	25%	20%	20%
CO-5	20%	20%	15%	25%	25%	20%	20%
Total Marks	30	70	20	20	10	20	30
			50				

Legend:

*: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.

** : Mentioned under point- (N)

: Mentioned under point-(O)

Note:

- The percentage given are approximate
- In case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided in all those COs mapped with total experiments.
- For CO attainment calculation indirect assessment tools like course exit survey need to be used which comprises of questions related to achievement of each COs.

N) Suggested Specification Table for End Semester Theory Assessment: Specification table represents the reflection of sample representation of assessment of cognitive domain of full course.

Unit Title and Number	Total Classroom Instruction (CI) Hours	Relevant COs Number(s)	Total Marks	ETA (Marks)		
				Remember (R)	Understanding (U)	Application & above (A)
Unit-1.0 Mechanical and Chemical Pre-Treatment	8	CO1	14	4	4	6
Unit-2.0 Dyeing of Natural Fiber	10	CO2	14	4	3	7
Unit-3.0 Dyeing of Manmade Fiber	8	CO3	14	4	5	5
Unit-4.0 Printing of Textiles	10	CO4	14	4	4	6
Unit-5.0 Finishing of Textiles	12	CO5	14	4	3	7
Total	48	-	70	20	19	31

Note: Similar table can also be used to design class/mid-term/ internal question paper for progressive assessment.

O) Suggested Assessment Table for Laboratory (Practical):

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
1.	Desize given cotton fabric using enzyme to remove starch.	CO1	30	60	10
2.	Scour the given cotton fabric to remove hydrophobic impurities	CO1	40	50	10
3.	Bleach given cotton fabric using hydrogen peroxide.	CO1	30	60	10
4.	Dye given cotton fabric sample using reactive dye.	CO2	30	60	10
5.	Dye given wool fabric sample using acid dye	CO2	30	60	10
6.	Dye given cotton fabric with natural dye using mordant	CO2	30	60	10
7.	Dye given polyester fabric with disperse dye by carrier method.	CO3	30	60	10
8.	Dye given nylon fabric using basic dye.	CO3	40	50	10
9.	Perform block printing on given cotton fabric	CO4	40	50	10
10.	Print given cotton fabric with reactive dye by direct style.	CO4	40	50	10
11.	Print given cotton fabric with reactive dye by discharge style.	CO4	30	60	10
12.	Apply softener finish on given cotton fabric	CO5	30	60	10

Legend:

PRA*: Process Assessment

PDA**: Product Assessment

Note: This table can be used for both end semester as well as progressive assessment of practical. Rubrics need to be prepared by the course teacher for each experiment/practical to assess the student performance.

P) Suggested Instructional/Implementation Strategies: Different Instructional/ Implementation Strategies may be appropriately selected, as per the requirement of the content/outcome. Some of them are Improved Lecture, Tutorial, Case Method, Group Discussion, Industrial visits, Industrial Training, Field Trips, Portfolio Based, Learning, Role Play, Live Demonstrations in Classrooms, Lab, Field Information and Communications Technology (ICT)Based Teaching Learning, Blended or flipped mode, Brainstorming, Expert Session, Video Clippings, Use of Open Educational Resources (OER), MOOCs etc.

Q) List of Major Laboratory Equipment, Tools and Software:

S. No	Name of Equipment, Tools and Software	Broad Specifications	Relevant Experiment/Practical Number
1.	Glass Ware	Laboratory Glass Ware	all
2.	dye-pot	Water bath and dye-pot	1 to 8, 12
3.	Steamer	Lab Steamer	9,10,11
4.	Dyeing m/c	Rota dyeing machine	7
5.	Printing blocks	Wooden blocks	9
6.	Curing chamber	Lab Curing chamber	12
7.	Printing table	Wooden Printing table, screen and accessories	9,10,11

R) Suggested Learning Resources:**(a) Books:**

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Chemical Technology in the Pretreatment Processes of Textile	Karmakar, S. R.	Elsevier Science Publication, Netherlands 1999 ISBN:044450060X
2.	Technology of Bleaching and Mercerizing	Shenai, V. A.	Sevak Publication, Mumbai, 1996
3.	Chemical processing of textile	Dr.Koushik, C. V.; Antao Irwin Josico	NCUTE, 8th Floor, Main Building, IIT, Hauz Khas, New Delhi-110016
4.	Handbook of textile and industrial dyeing	M.Clark	Woodhade publishing Ltd camrich U.K. ISBN9781845696955
5.	Dyeing and Printing	Cockett S. R., Hilton K. A.	Leonard Hill Books Ltd. London, 1961 ISBN-13: 9781114785724 ISBN-10:1114785725

(b) Online Educational Resources:

- 1) <http://www.nptel.ac.in/courses/116102005/20>
- 2) http://textilelearner.blogspot.in/2011/03/cotton-desizing-process_255.html
- 3) http://shodhganga.inflibnet.ac.in/bitstream/10603/24222/9/09_chapter4.pdf
- 4) http://textilelearner.blogspot.in/2011/03/scouring-treatments-of-cotton-silk-wool_4142.html
- 5) <http://textilelearner.blogspot.in/2012/12/bleaching-of-cotton-fiberfabric-with.html>
- 6) <http://www.nptel.ac.in/courses/116102016/19>
- 7) <http://www.nptel.ac.in/courses/116102016/16>
- 8) <http://textilelearner.blogspot.in/2013/06/mercerization-process-of-cotton-fabric.html>
- 9) <http://textilelearner.blogspot.in/2013/07/pretreatment-process-of-silk.html>
- 10) <http://thesmarttime.com/pretreatment/scouring-of-wool.html>
- 11) <http://textilelearner.blogspot.in/2012/09/dyeing-of-cotton-with-direct-dyes.html>
- 12) <http://textilelearner.blogspot.in/2012/01/dyeing-of-cotton-fabric-with-reactive.html>
- 13) <http://textilelearner.blogspot.in/2012/01/vat-dyeing-process-textile-dyeing.html>
- 14) <http://textilelearner.blogspot.in/2012/01/printing-of-cotton-fabric-with-reactive.html>
- 15) <https://scanhttp.com/en/disperse-dyes/>
- 16) <https://en.wikipedia.org/wiki/Printing>

Note: Teachers are requested to check the creative commons license status/ financial implications of the suggested, online educational recourses before use by the students.

- A) **Course Code** : 2451404(T2451404/P2451404/S2451404)
 B) **Course Title** : Women's Wear Garment Construction.
 C) **Pre-requisite Course(s)** : i) Quality aspects of fabric and sewing thread
 ii) Fashion sketching
 D) **Rationale** :

The course molds students to be qualified for supervising women's wear designers available in the apparel-manufacturing sector. Keeping the diverse nature of challenges faced by the designers in the industry, the course aims to cover all aspects involved in the manufacturing sector. The course introduces students to the fundamentals governing aesthetic and design elements and the fundamentals of garment construction. It imparts extensive knowledge of raw materials including fabrics and trims and of machineries involved in the manufacturing of apparels. Students develop understanding of garment construction parameters which provide essential operational knowledge relating to future work profiles.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of following course outcomes by the learners. For this, the learners are expected to perform various activities related to three learning domains (Cognitive, Psychomotor and Affective) in classroom/laboratory/workshop/field/ industry.

After completion of the course, the students will be able to-

- CO-1** Classification of Women's Wear patterns and various construction techniques based on basics of body measurements.
CO-2 Applying spreading, marker planning and cutting in apparel production.
CO-3 Apply basic principles of different types of cutting machineries elaborating the parts and functions of machinery used in the apparel production.
CO-4 Classification of the different types of stitches, seams and seam finishes.
CO-5 Use various Sewing accessories and trims in garment along with fusing and pressing elements with packing styles.
CO-6 Select proper fabric using different parameters looking to the end use.

F) Suggested Course Articulation Matrix (CAM):

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)	
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2
CO-1	3	-	3	2	-	-	2		
CO-2	3	2	-	2	-	-	-		
CO-3	3	3	2	2	3	-	-		
CO-4	-	3	-	2	2	3	-		
CO-5	3	-	3	3	-	2	3		

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional

G) Teaching & Learning Scheme:

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		L	T				
2451404	Women's Wear Garment Construction	03	-	04	02	09	06

Legend:

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H) Assessment Scheme:

Course Code	Course Title	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
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2451404	Women's Wear Garment Construction	30	70	20	30	20	30	200

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

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Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
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I) **Course Curriculum Detailing:** This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

J) **Theory Session Outcomes (TSOs) and Units: T2451404**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 1a.</i> Classify the garments according to fabric, age, occupation, dress style, occasion.</p> <p><i>TSO 1b.</i> Select fabric for the given garment.</p> <p><i>TSO 1c.</i> Differentiate the methods of pattern making.</p> <p><i>TSO 1d.</i> Select the pattern layout for the given garment.</p> <p><i>TSO 1e.</i> Identify the fitting principle for the given garment.</p> <p><i>TSO 1f.</i> Use the fitting, grading, and tracing terminologies.</p> <p><i>TSO 1g.</i> Make patterns for Indian wear.</p>	<p>Unit-1. Introduction, Pattern and Marker Making:</p> <p>1.1 Classification of garments for Women; Fabric Selection: According to Age, Occupation, Religion, Dress style, Occasion, and Figure. Basic body measurements and its importance.</p> <p>1.2 Pattern making- Objectives, Importance of paper pattern, Types of paper patterns, Methods of pattern making-</p> <p>a) Drafting b) Flat pattern c) Draping.</p> <p>1.3 Pattern layout, according to types of fabrics, Different types of lays, Economy of fabrics in layouts, Cloth layouts, Working with different fabrics.</p> <p>1.4 Principle of fitting- ease, line, grain, set, balance.</p> <p>1.5 Grading.</p> <p>1.6 Tracing and marking terminology-Chalked marking, chalked thread, color coding, pin marking, tailors' tacks, thread tracing.</p> <p>1.7 Pattern making of Indian wear (blouse variation, Kurti variation, Salwar, chudidar), Basic women's shirt, shirt with yoke, Shirt plackets. Fly attachment, pocket variation (Patch pocket, inseam pocket, Bound pocket, Welt pocket) variations of trousers, jeans, pants, Shorts, Variation of blouse, Culottes, Corset, and women's jackets.</p>	CO1
<p><i>TSO 2a.</i> Identify the process parameters for spreading.</p> <p><i>TSO 2b.</i> Identify the methods of spreading.</p> <p><i>TSO 2c.</i> Differentiate the types of markers.</p> <p><i>TSO 2d.</i> Use marker planning for the given sample.</p> <p><i>TSO 2e.</i> Identify the process parameters for cutting.</p> <p><i>TSO 2f.</i> Explain Efficiency of marker plan, methods of marker panning and marker use.</p> <p><i>TSO 2g.</i> Select the appropriate tools for cutting of the given sample.</p>	<p>Unit-2. Spreading, Marker Planning and Cutting:</p> <p>2.1 Spreading: The requirements of the Spreading process, methods of spreading, the nature of fabric packages.</p> <p>2.2 Types of Markers</p> <p>2.3 Marker Planning: Requirement of the marker planning Efficiency of marker plan, methods of marker panning and marker use.</p> <p>2.4 Cutting: The objectives of cutting, Requirements of cutting. Cutting room layout and Organization.</p> <p>2.5 Tools & equipment for cutting: Band knife, Round Knife click press, electrical notcher, Straight knife, Circular knife, Cutting Board,</p>	CO1, CO2

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 2h. Apply tools & equipments for cutting.	Cutting Table, Drill, Pattern perforator, Shears, Leaser, UV, Plasma and Jet Cutting. Bundling- labeling.	
<p>TSO 3a. Explain the Stitch definition,</p> <p>TSO 3b. Classify the stitches</p> <p>TSO 3c. Differentiate the hand stitches and machine stitches.</p> <p>TSO 3d. Classify the different types of seams.</p> <p>TSO 3e. Make stiches and seams for the given sample.</p>	<p>Unit-3. Stitches and Seams:</p> <p>3.1 Stitch definition, classification & designation. Hand stitches: Hand stitch needle, Back stitch (Half back, Prick), Blanket stitch, Blind stitch, Catch stitch, Felling stitch, Pick stitch, saddle stitch, Button hole/eyelets, Over hand stitch, Running stitch, hemming.</p> <p>3.2 Machine Stitches –Chain stitch, Blind stitch, Lock stitch, Zigzag stitch, over edge machine stitch, Safety stitch, Lettuce edging, shirring stitch.</p> <p>3.3 Classification of different types of Seams: Curved seam, enclosed seam, exposed seam, extended seam allowances, intersecting seam, rolled seam edge, Plain seam, Flat seam, French seam, Edge seam, flat fell seam, Run and fell seam, lapped seam, Bound seam, Corded seam, Slot seam, piped seam, fused seam, Padded seam, Seams of fur, Seam of lace, Top stitched seam, Tucked seam, Welt seam, Taped seam, Zigzag seam, Safety stitched seam.</p> <p>3.4 Seam finishing – different methods.</p>	CO3, CO4
<p>TSO 4a. Identify various parts of Sewing Machines and Attachments.</p> <p>TSO 4b. Explain feeding mechanism, sewing bed and generation of different kinds of stitches.</p> <p>TSO 4c. Illustrate use of Bar tacking machine, Over-edging m/c, Interlock m/c, Double need high speed m/c, Button attaching and button hole making m/c.</p> <p>TSO 4d. Identify the defects and perform the maintenance of sewing machines.</p>	<p>Unit-4. Sewing Machines and Attachments:</p> <p>4.1 Sewing Machine: Feeding mechanism and Sewing machine beds. Detailed Knowledge on different kind of Stitching machines– Chain, lock, blind, zigzag, buttonhole, multi needle and multithread Stitching m/c, their mechanism, function, and different parts.</p> <p>4.2 Principle and utility of the following machine used in garment manufacturing – Bar tacking machine, Over-edging m/c, Interlock m/c, Double need high speed m/c, Button attaching and button hole making m/c.</p> <p>4.3 Defects and remedies, Care and maintenance of sewing machines.</p>	CO3, CO4
<p>TSO 5a. Select Sewing Accessories and Trims with Fusing and Pressing.</p> <p>TSO 5b. Analyze Sewing Needles, Sewing Threads, sewing components</p> <p>TSO 5c. Explain types of pressing, Pressing equipment and methods; Pleating, Classification of pressing.</p> <p>TSO 5d. Identify the process parameters and operating parameters of Garment finishing machines.</p> <p>TSO 5e. Identify the process parameters and operating parameters for Fusing.</p> <p>TSO 5f. Differentiate between the different method of fusing.</p>	<p>Unit-5.0 Sewing Accessories and Trims with Fusing and Pressing: (10Hrs)</p> <p>5.1 Sewing Needles: Type, Characteristic and Use.</p> <p>5.2 Sewing Threads: Fibre types, Thread composition, Thread Finishes, Thread Properties and Their Relationship with Needles. Trims and use of Other Components-Labels and motif, Wadding, Lace, Braid, Elastic, Hook and Loop Fastening, Zip Fasteners, Buttons, Shoulder Pad, Tuck Button, snap fastener etc.</p> <p>5.3 Lining and Interlining, need for pressing, Types of pressing, Pressing equipment and methods; Pleating, Classification of pressing.</p> <p>5.4 Garment finishing machines.</p> <p>5.5 Fusing Technology: Requirement of fusing, method of fusing, fusing process.</p>	CO4, CO5

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 5g.</i> Describe the different types of packing based on the packing materials, labels and tags.	5.6 Packing: different types of packing, packing materials, labels and tags.	

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2451404

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<p><i>LSO 1.1.</i> Taking body measurements with stitching allowance.</p> <p><i>LSO 1.2.</i> Identify the technique for creating patterns.</p> <p><i>LSO 1.3.</i> Identify the process parameters for different patterns.</p> <p><i>LSO 1.4.</i> Select the appropriate technique for creating design for the given sample.</p>	1.	Method of taking important body measurements for women's wear and developing and creating different patterns by using of 3 techniques. a) Drafting, b) Flat Pattern Technique, c) Draping	CO1
<p><i>LSO 2.1.</i> Identify the types of basic hand stitches.</p> <p><i>LSO 2.2.</i> Identify the tools and process parameters for hand stitches.</p> <p><i>LSO 2.3.</i> Prepare the hand stitches for the given sample</p> <p><i>LSO 2.4.</i> Identify the types of machine stitches</p> <p><i>LSO 2.5.</i> Identify the tools and process parameters for machine stitches.</p> <p><i>LSO 2.6.</i> Prepare the machine stitches for the given sample</p>	2.	Preparation of sample of basic stitches (HandStitches) and Preparation of samples of basic machine stitches.	CO1
<p><i>LSO 3.1</i> Identify the tools and process parameters for different cuts.</p> <p><i>LSO 3.2</i> Identify the tools and process parameters for different stitches</p> <p><i>LSO 3.3</i> Identify the tools and process parameters for seams</p> <p><i>LSO 3.4</i> For the given sample prepare the appropriate cut and stitches</p> <p><i>LSO 3.5</i> For the given women's wear sample prepare the appropriate seam</p>	3.	Making of sample of different cut and stitch and types of seam for women's wear	CO1
<p><i>LSO 4.1.</i> Identify the tools and process parameters for sewing (superimposed seam, lapped seam, bound seam and flat seam.)</p> <p><i>LSO 4.2.</i> For the given sample make the appropriate seam sewing.</p>	4.	Sewing practice of superimposed seam, lapped seam, bound seam, and flat seam.	CO2
<p><i>LSO 5.1.</i> Identify the different garment components.</p> <p><i>LSO 5.2.</i> Identify appropriate seams for assembling various garments</p> <p><i>LSO 5.3.</i> For the given sample assemble various components using appropriate seams.</p>	5.	Assembling of various garment components using appropriate seams	CO3, CO4, CO5
<p><i>LSO 6.1.</i> Identify the different parts of sewing machine.</p> <p><i>LSO 6.2.</i> Perform sewing in a machine and study different parts.</p>	6.	Study of the Sewing machineries, different parts and functions.	CO3, CO4, CO5

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<p><i>LSO 7.1.</i> Identify the different types of pockets plackets.</p> <p><i>LSO 7.2.</i> Identify the tools and process parameters for pockets plackets.</p> <p><i>LSO 7.3.</i> For the given sample prepare the appropriate pockets Placket.</p>	7.	Preparation of sample of different types of pockets plackets.	CO3, CO4, CO5
<p><i>LSO 8.1.</i> Identify the different types of necklines using facing and piping.</p> <p><i>LSO 8.2.</i> Identify the tools and process parameters for facing and piping.</p> <p><i>LSO 8.3.</i> For the given sample make the appropriate neckline using facing and piping.</p>	8.	Preparation of sample of different necklines using facing and piping.	CO3, CO4, CO5
<p><i>LSO 9.1.</i> Identify the different components of basic women's top & bottom-wear.</p> <p><i>LSO 9.2.</i> Identify the tools and process parameters for making the basic women's top and bottom wear garment from normal plain dyed fabric.</p> <p><i>LSO 9.3.</i> For the given sample stitch the basic women's top and bottom wear garment from normal plain dyed fabric.</p>	9.	Sewing and finishing basic women's top & bottom-wear.	CO4, CO5
<p><i>LSO 10.1.</i> Identify the different components of women's wear.</p> <p><i>LSO 10.2.</i> Identify the tools and process parameters for making the basic women's wear.</p> <p><i>LSO 10.3.</i> For the given sample stitch whole garment from normal traditional fabric.</p>	10.	Sewing and finishing of women's wear from traditional fabric like Kalamkari, Sambalpuri, Bandhini etc ..	CO5

L) Suggested Term Work and Self Learning: S2451404 Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. Assignments: Questions/Problems/Numerical/Exercises to be provided by the course teacher in line with the targeted COs.

b. Micro Projects:

1. Perform pattern making.
2. Download 5 videos on working and maintenance of sewing machine.
3. Stitch different types of seams.
4. Collect sewing accessories from market.

c. Other Activities:

1. Seminar Topics:
 - Pattern and Marker Making.
 - Types of Stitches and Seams.
 - Functioning of Sewing Machines and Attachments.
 - Sewing Accessories and Trims with Fusing and Pressing.
2. Visits: Visit nearby garment making centres / boutiques.

M) Suggested Course Evaluation Matrix: The course teacher has to decide and use appropriate assessment strategy and its weightage in theory, laboratory and Term Work for ensuring CO attainment. The response/performance of each student in each of these designed activities is to be used to calculate **CO attainment**.

COs	Course Evaluation Matrix						
	Theory Assessment (TA)**		Term Work Assessment (TWA)			Lab Assessment (LA)#	
	Progressive Theory Assessment (PTA) Class/Mid Sem Test	End Theory Assessment (ETA)	Term Work & Self Learning Assessment			Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)
Assignments			Micro Projects	Other Activities*			
CO-1	15%	15%	15%	-	-	20%	20%
CO-2	10%	10%	10%	25%	-	10%	20%
CO-3	15%	15%	15%	25%	33%	15%	20%
CO-4	30%	30%	30%	25%	33%	15%	20%
CO-5	30%	30%	30%	25%	34%	40%	20%
Total Marks	30	70	20	20	10	20	30
			50				

Legend:

*: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.

** : Mentioned under point- (N)

#: Mentioned under point-(O)

Note:

- The percentage given are approximate
- In case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided in all those COs mapped with total experiments.
- For CO attainment calculation indirect assessment tools like course exit survey need to be used which comprises of questions related to achievement of each COs.

N) Suggested Specification Table for End Semester Theory Assessment: Specification table represents the reflection of sample representation of assessment of cognitive domain of full course.

Unit Title and Number	Total Classroom Instruction (CI) Hours	Relevant COs Number(s)	Total Marks	ETA (Marks)		
				Remember (R)	Understanding (U)	Application & above (A)
Unit-1.0 Introduction, Pattern and Marker Making	12	CO1	20	3	3	4
Unit-2.0 Spreading, Marker Planning and Cutting	10	CO1, CO2	10	3	2	5
Unit-3.0 Stitches and Seams	8	CO3, CO4	10	5	2	3
Unit-4.0 Sewing Machines and Attachments	10	CO3, CO4	20	5	6	9
Unit-5.0 3D Sewing Accessories and Trims with Fusing and Pressing	10	CO4, CO5	10	4	6	10
Total	48	-	70	20	19	31

Note: Similar table can also be used to design class/mid-term/ internal question paper for progressive assessment.

O) Suggested Assessment Table for Laboratory (Practical):

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
1.	Method of taking important body measurements for women's wear and developing and creating different patterns by using of 3 techniques. a) Drafting, b) Flat Pattern Technique, c) Draping	CO1	30	60	10
2.	Preparation of sample of basic stitches (Hand Stitches) and Preparation of samples of basic machine stitches.	CO1	40	50	10
3.	Making of sample of different cut and stitch and types of seam for womens wear	CO1	30	60	10
4.	Sewing practice of superimposed seam, lapped seam, bound seam and flat seam.	CO2	30	60	10
5.	Assembling of various garment components using appropriate seams	CO3, CO4, CO5	30	60	10
6.	Study of the Sewing machineries, different parts and functions.	CO3, CO4, CO5	30	60	10
7.	Preparation of sample of different types of pockets Plackets.	CO3, CO4, CO5	30	60	10
8.	Preparation of sample of different necklines using facing and piping.	CO3, CO4, CO5	40	50	10
9.	Sewing and finishing basic women's top & bottomwear. Pattern making of Indian wear (blouse variation, Kurti variation, Salwar, chudidar), Basic women's shirt, shirt with yoke, Shirt plackets. Fly attachment, pocket variation (Patch pocket, inseam pocket, Bound pocket, Welt pocket) variations of trousers, jeans, pants, Shorts, Variation of blouse, Culottes, Corset and women's jackets.	CO4, CO5	40	50	10
10.	Sewing and finishing of womens wear from traditional fabric like Kalamkari, Sambalpuri, Bandhini etc ..	CO5	40	50	10

Legend:

PRA*: Process Assessment

PDA**: Product Assessment

Note: This table can be used for both end semester as well as progressive assessment of practical. Rubrics need to be prepared by the course teacher for each experiment/ practical to assess the student performance.

P) Suggested Instructional/Implementation Strategies: Different Instructional/ Implementation Strategies may be appropriately selected, as per the requirement of the content/outcome. Some of them are Improved Lecture, Tutorial, Case Method, Group Discussion, Industrial visits, Industrial Training, Field Trips, Portfolio Based, Learning, Role Play, Live Demonstrations in Classrooms, Lab, Field Information and Communications Technology (ICT)Based Teaching Learning, Blended or flipped mode, Brainstorming, Expert Session, Video Clippings, Use of Open Educational Resources (OER), MOOCs etc.

Q) List of Major Laboratory Equipment, Tools and Software:

S. No.	Name of Equipment, Tools and Software	Broad Specifications	Relevant Experiment/Practical Number
1.	Pattern making tools: measuring tape, French curve, hip curve, scissors, rulers, push pin, satin tape, notcher, tracing wheel, awl tailors chalk, pronunciation paper, L square, push pin, iron with stand. Mannequin of different size.	----- ----	All
2.	Single needle lock stitch machines, Double needle lock stitch machines, overlock machines, chain stitch machines, embroidery m/c	----- ----	ALL

R) Suggested Learning Resources:**(a) Books:**

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	The Complete guide to clothing construction	Christine Haynes	Creative Publishing International ISBN: 9781610588706, 1610588703
2.	Advanced Garment Construction Guide	M. Sumithra	Woodhead Publishing India ISBN: 9788193644645
3.	Couture Sewing Techniques	Claire B. Shaeffer	Taunton Press ISBN-10. 1600853358. ISBN-13. 978-1600853357
4.	Apparel Manufacturing hand book	Jacob Solinger	Textile Book Publishers ISBN-13: 978-0442219048 ISBN-10: 0442219040.
5.	Technology of clothing manufacture	D.J.Tylor	Black well publishing ISBN-13: 978-1405161985 ISBN-10: 9781405161985.
6.	Clothing Technology	Carr & Latham	Wiley ISBN-13. 978-3808562260
7.	Classic Tailoring Techniques a Construction Guide for Women's Wear	Roberto Cabrera	Fairchild Pubns ISBN-10. 1870054350. ISBN-13. 978-1870054355.
8.	Garment Construction Skills	Mullick, Premalata	Kalyani ISBN-13: 978-8127202675 ISBN-10: 8127202673.
9.	Fashion Patternmaking Techniques: How to make Shirts, Undergarments, Dresses and Suits, Waistcoats and Jackets for Women and Men	Donnanno, Antonion	Promo Press ISBN-10. 8415967683. ISBN-13. 978-8415967682.
10	Patternmaking for Fashion Design	Armstrong, H. J	Pearson ISBN-10. 9332518114; ISBN-13. 978-9332518117

(b) Online Educational Resources:

- https://onlinecourses.swayam2.ac.in/nou22_ge28/preview
- https://onlinecourses.nptel.ac.in/noc22_te06/preview
- https://onlinecourses.nptel.ac.in/noc19_te08/preview
- <https://www.classcentral.com/course/swayam-apparel-designing-22894>

Note: Teachers are requested to check the creative commons license status/ financial implications of the suggested, online educational recourses before use by the students.

- A) **Course Code** : 2451405(T2451405/P2451405/S2451405)
 B) **Course Title** : Surface Embellishment
 C) **Pre- requisite Course(s)** : Nil
 D) **Rationale** :

This course involves different styles of Indian regional embroidery which has its own diversity. This course provides comprehensive guidelines to identify color, motif, and fabric. The Knowledge of Indian traditional embroidery enables an individual in embellishing the garment and hence enhances traditional and contemporary designing abilities, which are further used in theme-based designing in project and product development. Surface Embellishment with embroidery on garments increases the aesthetic as well as monetary value of garments. This technique of Value addition is a one of the professional areas of this programme, which is practiced by many designers. This course develops the skill of Indian embroidery application professionally and have an identity in designing.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of following course outcomes by the learners. For this, the learners are expected to perform various activities related to three learning domains (Cognitive, Psychomotor and Affective) in classroom/laboratory/workshop/field/ industry.

After completion of the course, the students will be able to-

- CO-1** Use embroidery stitches of various stitch families for surface Embellishment.
CO-2 Select relevant tools, equipment's, materials, motifs, charting methods, colors, thread types, embroidery stitches of Indian states for embellishment of given fabric.
CO-3 Analyze the history, origin, features, and inspiration of mentioned embroidery technique.
CO-4 Implement traditional motifs of different embroidery styles to embellish articles/costumes.
CO-5 Apply embroidery technique to create innovative and sustainable Surface embellishment on Fashion Accessory.

- F) **Suggested Course Articulation Matrix (CAM):**

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)	
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2
CO-1	3	-	--	-	-	-	3		
CO-2	3	1	1	3	1	-	3		
CO-3	3	-	-	2	2	2	2		
CO-4	3	1	1	3	2	2	2		
CO-5	3	2	2	3	3	3	3		

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional

G) Teaching & Learning Scheme:

Course Code	Course Title	Scheme of Study (Hours/Week)					
		Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+ SL)	Total Hours (CI+LI+TW+SL)	Total Credits (C)
		L	T				
2451405	Surface Embellishment	03	-	04	02	09	06

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)

Notional Hours: Hours of engagement by learners, other than the contact hours for ensuring learning.

TW: Term Work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.)

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours)

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

H) Assessment Scheme:

Course Code	Course Title	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
		Theory Assessment (TA)		Term Work & Self-Learning Assessment (TWA)		Lab Assessment (LA)		
		Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2451405	Surface Embellishment	30	70	20	30	20	30	200

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)

TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.)

Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities like assignment, micro project, seminar and self-learning is to be done by internal faculty (Internal Assessment) whereas assessment of output/product/presentation related to these activities will be carried out by external faculty/expert (External Assessment). However, criteria of internal as well as external assessment may vary as per the requirement of respective course. For valid and reliable assessment, the internal faculty should prepare checklist & rubrics for these activities.

I) **Course Curriculum Detailing:** This course curriculum detailing depicts learning outcomes at course level and session level and their attainment by the students through Classroom Instruction (CI), Laboratory Instruction (LI), Term Work (TW) and Self Learning (SL). Students are expected to demonstrate the attainment of Theory Session Outcomes (TSOs) and Lab Session Outcomes (LSOs) leading to attainment of Course Outcomes (COs) upon the completion of the course. While curriculum detailing, NEP 2020 related reforms like Green skills, Sustainability, Multidisciplinary aspects, Society connect, Indian Knowledge System (IKS) and others must be integrated appropriately.

J) **Theory Session Outcomes (TSOs) and Units: T2451405**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 1a.</i> Describe salient aspects and origin of Embroidery</p> <p><i>TSO 1b.</i> Identify the Tools & supplies for Embroidery.</p> <p><i>TSO 1c.</i> List out fabrics suitable for hand embroidery.</p> <p><i>TSO 1d.</i> Explain stitch families</p> <p><i>TSO 1e.</i> List out types of Stitches of Loop family</p> <p><i>TSO 1f.</i> Draw the needle diagram of Running, Back, Satin, Fishbone, Herringbone, fishbone, Chevron</p> <p><i>TSO 1g.</i> State the importance of Charting of Design.</p> <p><i>TSO 1h.</i> Outline the importance of reduction and enlargement of Motifs.</p> <p><i>TSO 1i.</i> Compare hoops and frames.</p> <p><i>TSO 1j.</i> Explain different precautions to be taken while design transferring.</p>	<p>Unit-1.0 Introduction to Embroidery and Stitch Families</p> <p>1.1 Definition and Origin of art of Embroidery, Introduction to Indian Embroidery History (IKS-2HR)</p> <p>1.2 Tools & supplies for Embroidery, Yarns & threads, Types of needles, Hoops & frames, Design transfer materials</p> <p>1.3 Embroidery Fabrics</p> <p>1.4 Flat stitch family– Running, Back, Satin, Fishbone, Herringbone, fishbone</p> <p>1.5 Looped –Feather, Creaton, Vandyke, Chain, Wheat, Buttonhole</p> <p>1.6 Knotted-French, Bullion, Corel</p> <p>1.7 Couching-Romanian, Spider web (Single sample for each family), Chevron.</p> <p>1.8 Charting of design</p>	CO1
<p><i>TSO 2a.</i> Explain the origin of Kashida</p> <p><i>TSO 2b.</i> Identify the features of Kashmiri embroidery</p> <p><i>TSO 2c.</i> Describe different styles of Kashida embroidery.</p> <p><i>TSO 2d.</i> Differentiate between the popular motifs of Kashida embroidery</p> <p><i>TSO 2e.</i> Describe colours, ground fabric, threads of Kashida embroidery.</p> <p><i>TSO 2f.</i> Describe/ Illustrate the types of stitches used in Kashmiri Embroidery with needle diagram.</p> <p><i>TSO 2g.</i> Compare Sozni and Rezkari style with Kashmiri couching</p> <p><i>TSO 2h.</i> Draw different motifs for Kashmiri Sozni and Rezkari style.</p> <p><i>TSO 2i.</i> Explain different features of Gaba & Namda and other articles</p> <p><i>TSO 2j.</i> Differentiate between pashmina shawl & Do-shala</p>	<p>Unit-2.0 Kashida of Kashmir</p> <p>2.1 Origin of Kashida</p> <p>2.2 Classification of Kashida styles</p> <p>2.3 Study of Color, fabric, threads used</p> <p>2.4 Types of motifs used with drawing and illustrations.</p> <p>2.5 Stitches employed in Kashmiri Embroidery.</p> <p>2.6 Types of shawls-- Pashmina Do-shala, Do-Rookha, Jamewar , Kasba, Gaba, Namda, Zalakdozo, Suzni, Vata-chikan, Shikargarhs, Hashiya, Phala, Jangir or Zanju, Kunj butta</p>	CO2, CO3

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 3a.</i> State the meaning of Term-Phulkari</p> <p><i>TSO 3b.</i> Explain the origin of Phulkari.</p> <p><i>TSO 3c.</i> Identify the features of different styles of Phulkari Phulkari</p> <p><i>TSO 3d.</i> Compare different types of Bagh and Phulkari.</p> <p><i>TSO 3e.</i> Differentiate between popular motifs of Phulkari embroidery</p> <p><i>TSO 3f.</i> Differentiate between motifs of Bagh</p> <p><i>TSO 3g.</i> Mention the types of stitches used in Phulkari Embroidery with needle diagram.</p> <p><i>TSO 3h.</i> Mention special threads and its characteristics required for Phulkari work.</p> <p><i>TSO 3i.</i> Describe colors, ground fabric for embroidery.</p>	<p>Unit-3.0 Phulkari of Punjab</p> <p>3.1 Origin of Phulkari</p> <p>3.2 Difference between Phulkari & Bagh</p> <p>3.3 Phulkari-Chop, Subar, Til patra, Nilak, Shishedar, Thirma, Darshan dwar or darwaza, Sainchi.</p> <p>3.4 Bagh- Ghunghat bagh, Vari da bagh, Suraj mukhi bagh, Reshmi shisha bag, Velianin bag Bawan bagh, Nazar butti.</p> <p>3.5 Characteristics of stitches used in embroidery & Working styles</p> <p>3.6 Study of Color, fabric, threads used in Phulkari & Bagh</p> <p>3.7 Different Types of motifs used with drawing.</p>	<p>CO2, CO3</p>
<p><i>TSO 4a.</i> Explain the origin of Gujarat Embroidery</p> <p><i>TSO 4b.</i> Identify the features of Sindh taropa and Kathiawar embroidery</p> <p><i>TSO 4c.</i> Different the popular motifs of Kathiawar embroidery.</p> <p><i>TSO 4d.</i> Describe different styles of Kutch, Kathiawar and Sindh embroidery.</p> <p><i>TSO 4e.</i> Mention the types of stitches used in Embroidery with needle diagram.</p> <p><i>TSO 4f.</i> Compare Sidhi taropa with Rabari work</p> <p><i>TSO 4g.</i> Draw different motifs for Sindh taropa</p> <p><i>TSO 4h.</i> Explain different features of Heer bharat and Moti Bharat</p> <p><i>TSO 4i.</i> Identify colours, ground fabric, threads of Gujarati Embroidery</p>	<p>Unit-4.0 Sindh Taropa of Kutch and Kathiawar of Gujarat</p> <p>4.1 Introduction and origin of embroideries of Kutch, Kathiawar and Sindh</p> <p>4.2 Types of Kutch embroidery--Ahirbharat, Kunbi, Mochi, Rabari.</p> <p>4.3 Kathiawar embroidery of Gujarat</p> <p>4.4 Abla Bharat, Heer Bharat, Moti Bharat, Beed work, Appliqué work</p> <p>4.5 Motifs for Sindh Torapa</p> <p>4.6 Stitches used for embroidery, motifs and design of Gujarati Embroidery.</p>	<p>CO2, CO3</p>
<p><i>TSO 5a.</i> Explain the origin of Kashida of Bihar</p> <p><i>TSO 5b.</i> State the classification of Embroideries of Bihar</p> <p><i>TSO 5c.</i> Identify the features of Bihar embroidery</p> <p><i>TSO 5d.</i> State the popular motifs of Kashida of Bihar embroidery</p> <p><i>TSO 5e.</i> Describe different styles of Kashida embroidery.</p> <p><i>TSO 5f.</i> Mention the types of stitches used in Kashida Embroidery of Bihar according to different styles.</p> <p><i>TSO 5g.</i> Describe colors, ground fabric, threads of Kashida embroidery</p> <p><i>TSO 5h.</i> Draw different motifs for Bharat and Kashida style.</p> <p><i>TSO 5i.</i> Compare Bharat style embroidery with Kashida style embroidery.</p>	<p>Unit-5.0 Kashida of Bihar</p> <p>5.1 Origin of Kashida of Bihar</p> <p>5.2 Classification of Bihar Kashida styles</p> <p>5.3 Study of Color, fabric, threads used</p> <p>5.4 Types of motifs used with drawing.</p> <p>5.5 Stitches employed in Kashida of Bihar Embroidery.</p> <p>5.6 Recent trends in Kashida of Bihar.</p>	<p>CO2, CO3</p>

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<p><i>TSO 6a.</i> Explain the origin of Kasuti embroidery</p> <p><i>TSO 6b.</i> State the classification of Kasuti embroidery</p> <p><i>TSO 6c.</i> Identify the features of Kasuti embroidery</p> <p><i>TSO 6d.</i> Explain stages involve in Kasuti making</p> <p><i>TSO 6e.</i> Draw the popular motifs of Kasuti embroidery: floral motifs & animal motifs</p> <p><i>TSO 6f.</i> Distinguish between the types of stitches used in Kasuti embroidery</p> <p><i>TSO 6g.</i> Differentiate between Gavanti & Murgi, Negi & Menthi.</p>	<p>Unit-6.0 Kasuti of Karnataka</p> <p>6.1 Origin & history of Kasuti embroidery</p> <p>6.2 Characteristics of stitches used in embroidery</p> <p>6.3 Classification of Kasuti Working styles</p> <p>6.4 Stitches –Gavanti, Murgi, Negi, Menthi.</p> <p>6.5 Color, fabric, threads used</p> <p>6.6 Types of motifs, drawing of swan, a serpent, a Gopuram etc.</p>	CO2, CO3
<p><i>TSO 7a.</i> Describe the origin of Kantha</p> <p><i>TSO 7b.</i> Explain stages involved in Kantha making</p> <p><i>TSO 7c.</i> Differentiate between Arshilata & Bayton</p> <p><i>TSO 7d.</i> Explain the features of Durjani with diagram.</p> <p><i>TSO 7e.</i> Explain different type of kantha with its uses.</p> <p><i>TSO 7f.</i> Illustrate floral motifs & animal motifs.</p> <p><i>TSO 7g.</i> Illustrate motifs for Kantha of Bengal.</p>	<p>Unit-7.0 Kantha of Bengal</p> <p>7.1 Origin & history of Kantha embroidery</p> <p>7.2 Characteristics of stitches used in Kantha embroidery</p> <p>7.3 Classification of Kantha embroidery</p> <p>7.4 Color, fabric, threads used</p> <p>7.5 Types of motifs</p>	CO2, CO3
<p><i>TSO 8a.</i> Analyze the current trends of Embroidery.</p> <p><i>TSO 8b.</i> Discuss digitization of Embroidery.</p> <p><i>TSO 8c.</i> Explain different strategies for commercialization of Indian embroidery.</p> <p><i>TSO 8d.</i> Discuss different methods of recycling and upcycling of Old Embroidery pieces.</p> <p><i>TSO 8e.</i> Identify the scope of embroidery in Future</p> <p><i>TSO 8f.</i> Illustrate innovative styles and motifs in embroidery.</p>	<p>Unit-8.0 Survival and Revival of Embroidery</p> <p>8.1 Study of current scenario of Indian embroidery</p> <p>8.2 Commercialization of different styles of regional embroidery</p> <p>8.3 Ecofriendly embroidery</p> <p>8.4 Digitization of Embroidery</p> <p>8.5 Upcycling of Old embroidery Pieces</p> <p>8.6 Sustainable Future of Indian traditional embroidery.</p>	CO4, CO5

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2451405

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<i>LSO 1.1.</i> Use different stitches and tools on relevant fabric according to stitch family to make sampler.	1.	Prepare a sampler of all stitch families.	CO1
<i>LSO 2.1.</i> Develop an article as per given specification using Kashida of Kashmir	2.	Develop two articles using charting of design, colour combination, traditional stitches and motifs of Kashida of Kashmir	CO2, CO4
<i>LSO 3.1.</i> Develop an article as per given specification using Phulkari of Punjab.	3.	Develop two articles using charting of design, colour combination, traditional stitches and motifs of Phulkari of Punjab.	CO2, CO4
<i>LSO 4.1.</i> Develop an article as per given specification using Kutch or Kathiawar Embroidery.	4.	Develop two articles using charting of design, colour combination, traditional stitches and motifs of Kutch or Kathiawar-of Gujarat.	CO2, CO4
<i>LSO 5.1.</i> Develop an article as per given specification using Kashida of Bihar.	5.	Develop two articles using charting of design, colour combination, traditional stitches and motifs of Kashida of Bihar.	CO2, CO4

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 6.1. Develop an article as per given specification using kasuti of Karnataka.	6.	Develop two articles using charting of design, colour combination, traditional stitches and motifs of Kasuti of Karnataka	CO2, CO4
LSO 7.1. Develop the given sample using Kantha of Bengal.	7.	Develop two articles using charting of design, colour combination, traditional stitches and motifs of Kantha of Bengal.	CO2, CO4
LSO 8.1. Prepare the given sample using 3R concept to promote sustainable Regional Indian Embroidery and Textile.	8.	Prepare two articles of clothing by use of the 3Rs concept (Reduce, Reuse and Recycle) to promote sustainable Regional Indian embroidery and Textiles (make a group of student)	CO4, CO5
LSO 9.1. Develop the given sample accessory using innovative surface embellishment.	9.	Develop innovative surface embellishment on a creative fashion clothing accessory.	CO4, CO5
LSO 10.1 Develop the given sample accessory using innovative European surface embellishment technique.	10.	Develop innovative European surface embellishment on a creative fashion clothing accessory	CO5

L) **Suggested Term Work and Self Learning: S2451405** Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. Assignments: Problems/ Exercises to be provided by the course teacher in line with the targeted COs. Some examples are-

1. Create a display of full calendar size to depict families of embroidery. (CO1, CO4)
2. Arrange free embroidery workshop for below poverty line families/orphanage school/need base group and create opportunity to generate work for their hands. (CO4, CO5)
3. Illustrate stylized motifs inspired from above mentioned Indian Regional Embroidery and create Library. (CO3)
4. Study the influence of embroidery through any two Indian movies /serials and Prepare a report and write details about embroidery. (CO3)
5. Prepare a report with neat sketches about embroidery work in sustainable clothing

b. Micro Projects:

1. In-house Fashion show: -Execute a fashion show based on contemporary embroidery styles inspired from Indian.
2. Window Display: -Prepare a window display on traditional Indian embroidery articles /accessories and present in groups.
3. Theme based Display: -Collect photos of professional window display based on traditional themes/Indian culture/Special occasions from local market.
4. Arrange sale cum exhibition of Products prepared during laboratory hours.
5. Prepare albums of traditional embroideries images.
6. Prepare a scrap book of Indian designer collection inspired from the Indian embroidery.

c. Other Activities:

1. Seminar Topics: (suggested)
 - Trends in India related to embroidery in different age groups
 - Methods of developing sustainable embroidered pieces.
 - Analysis of Global utilization of Embroidered garments
 - Digitization of embroidery and its effect on Craftsmen /Artisans business
 - Study of two prominent Indian designers and influence of their work.

- Fast fashion and Indian Embroidery
 - Effect of Forecasting on Indian Embroidery business
 - Traditional Embroidery motifs and their re-emergence in current trends.
 - Prepare a brief journal of tools and equipment
2. Visits: Visit nearby Historical Museums /weaving centers/Craft Exhibitions to observe traditional embroidered costumes samples. Prepare report of visit with special features of these costumes, crafts and embroidery samples. Prepare visit report with photographs.
3. Self-learning topics:
- Modern embroidery using sustainable material.
 - ARTIFICIAL INTELLIGENCE in Embroidery industry.

M) Suggested Course Evaluation Matrix: The course teacher has to decide and use appropriate assessment strategy and its weightage in theory, laboratory and Term Work for ensuring CO attainment. The response/performance of each student in each of these designed activities is to be used to calculate **CO attainment**.

COs	Course Evaluation Matrix						
	Theory Assessment (TA)**		Term Work Assessment (TWA)			Lab Assessment (LA)#	
	Progressive Theory Assessment (PTA) Class/Mid Sem Test	End Theory Assessment (ETA)	Term Work & Self Learning Assessment			Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)
Assignments			Micro Projects	Other Activities*			
CO-1	15%	15%	15%	15%	10%	20%	20%
CO-2	10%	10%	15%	10%	15%	10%	20%
CO-3	15%	15%	25%	25%	25%	15%	20%
CO-4	30%	30%	15%	30%	15%	10%	40%
CO-5	30%	30%	30%	20%	25%	20%	25%
Total Marks	30	70	20	20	10	20	30
			50				

Legend:

*: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.

** : Mentioned under point- (N)

: Mentioned under point-(O)

Note:

- The percentage given are approximate
- In case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided in all those COs mapped with total experiments.
- For CO attainment calculation indirect assessment tools like course exit survey need to be used which comprises of questions related to achievement of each COs.

N) Suggested Specification Table for End Semester Theory Assessment: Specification table represents the reflection of sample representation of assessment of cognitive domain of full course.

Unit Title and Number	Total Classroom Instruction (CI) Hours	Relevant COs Number(s)	Total Marks	ETA (Marks)		
				Remember (R)	Understanding (U)	Application & above (A)
Unit-1.0 Introduction to Embroidery and Stitch Families	08	CO1	10	4	6	--
Unit-2.0 Kashida of Kashmir	06	CO2, CO3	09	3	3	3
Unit-3.0 Phulkari of Punjab	06	CO2, CO3	10	3	4	3
Unit-4.0 Sindh Taropa of Kutch and Kathiwar of Gujarat	06	CO2, CO3	10	3	4	3
Unit-5.0 Kashida of Bihar	06	CO2, CO3	09	3	3	3
Unit-6.0 Kasuti of Karnataka	06	CO2, CO3	09	2	3	4
Unit-7.0 Kantha of Bengal	06	CO2, CO3	09	2	3	4
Unit-8.0 Survival and Revival of Embroidery	04	CO4, CO5	04	-	2	2
Total	48	-	70	20	28	22

Note: Similar table can also be used to design class/mid-term/ internal question paper for progressive assessment.

O) Suggested Assessment Table for Laboratory (Practical):

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
1.	Prepare a sampler of all stitch families.	CO1	40	50	10
2.	Develop two articles using charting of design, colour combination, traditional stitches and motifs of Kashida of Kashmir	CO2, CO4	40	50	10
3.	Develop two articles using charting of design, colour combination, traditional stitches and motifs of Phulkari of Punjab.	CO2, CO4	40	50	10
4.	Develop two articles using charting of design, colour combination, traditional stitches and motifs of Kutch or Kathiawar-of Gujarat.	CO2, CO4	40	50	10

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
5.	Develop two articles using charting of design, colour combination, traditional stitches and motifs of Kashida of Bihar.	CO2, CO4	40	50	10
6.	Develop two articles using charting of design, colour combination ,traditional stitches and motifs of Kasuti of Karnataka	CO2, CO4	40	50	10
7.	Develop two articles using charting of design, colour combination ,traditional stitches and motifs of Kantha of Bengal.	CO2, CO4	40	50	10
8.	Prepare two articles of clothing by use of the 3Rs concept (Reduce, Reuse and Recycle) to promote sustainable Regional Indian embroidery and Textiles (make a group of student)	CO4, CO5	40	50	10
9.	Develop innovative surface embellishment on a creative fashion clothing accessory.	CO4, CO5	40	50	10
10.	Develop innovative European surface embellishment on a creative fashion clothing accessory	CO5	40	50	10

Legend:

PRA*: Process Assessment
PDA**: Product Assessment

Note: This table can be used for both end semester as well as progressive assessment of practical. Rubrics need to be prepared by the course teacher for each experiment/practical to assess the student performance.

P) Suggested Instructional/Implementation Strategies: Different Instructional/ Implementation Strategies may be appropriately selected, as per the requirement of the content/outcome. Some of them are Improved Lecture, Tutorial, Case Method, Group Discussion, Industrial visits, Industrial Training, Field Trips, Portfolio Based, Learning, Role Play, Live Demonstrations in Classrooms, Lab, Field Information and Communications Technology (ICT)Based Teaching Learning, Blended or flipped mode, Brainstorming, Expert Session, Video Clippings, Use of Open Educational Resources (OER), MOOCs etc.

Q) List of Major Laboratory Equipment, Tools and Software:

S. No.	Name of Equipment, Tools and Software	Broad Specifications	Relevant Experiment/Practical Number
1.	High end computers	Processor Intel Core i7 with Open GL Graphics Card, RAM 32 GB, DDR3/DDR4, HDD 500 GB, Graphics Card NVIDIA OpenGL 4 GB, OS Windows 10	All
2.	Dress Forms /Dummy	Ladies Dress Form of Size 8/10/12 L/M/XL	CO2, CO4, CO5
3	Fabric	-Muslin ,Cotton, Khaddar,Silk,Casement, Flannel , Aida (Matty) (As per requirement of project)	ALL
4	Needles	-1-12-Hand Needle,14-18-Machine Needle	ALL
5	Embroidery Rings/Hoops	-13-27 cm	ALL
6	Embroidery Threads	-High quality (Doli/Anchor/DMC)- Six-Stranded Cotton	ALL
7	Carbon paper	Yellow and white –A4 size	ALL
8	Tracing paper /drawing paper	full size	ALL
9	Butter Paper	A-4 size Butter Paper	ALL
10	Pencil, Pencil, Pen, Eraser fevicol	2B pencil, Pencil, Pen ,Eraser.fevicol	ALL
11	Adornment material	Glass & plastic mirror-round shape ,square shape . SHELL/KAWADI	ALL

R) Suggested Learning Resources:**(a) Books:**

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Complete guide to needle work	Reader's digest.	Reader's Digest; Eighth printing edition ISBN-0895770598
2.	Traditional Embroideries of India	Shailaja D. Naik	Publisher A.P.H. Publishing Corporation, 1996 ISBN-8170247314, 9788170247319
3.	The Sari	Linda Lyntan	Blackwell science ISBN 10 : 1405102780
4.	Indian Embroidery-	KamaladeviChattopadhy a	Wiley Eastern Limited ISBN-10: 085226111X
5	Ethnic Embroidery of India	UshaShrikant-part-I	Honesty bpublishers. ISBN-9788175250796
6	The needle lore	Grewal, Neelam	Ajanta Publications ISBN-812020204X
7	Embroidery Designs	Nirmala Mistry	Navneet Publication ISBN13-9781000681
8	The complete guide to needle work	Readers Digest	Readers Digest PublicationISBN10:0895770598

(b) Online Educational Resources:**• Kantha Embroidery-**

<https://www.youtube.com/watch?v=3Q5r3ntffB8>
https://www.youtube.com/watch?v=Qn_cVzusaVY

• Phulkari embroidery-

<https://www.youtube.com/watch?v=jlwaxiY7GXA>
<https://www.youtube.com/watch?v=UJNeKn1qMyw>

• Kutch embroidery of Gujarat-

https://www.youtube.com/watch?v=_TRTTdqXMPg
<https://www.youtube.com/watch?v=CoKhyv9nPNw>
<https://www.youtube.com/watch?v=CjDx3ikLFBA>
<https://www.youtube.com/watch?v=vCXWt9uWPrM>
<https://www.youtube.com/watch?v=X4bM8RBe6QU>
<https://www.youtube.com/watch?v=VNTh14jScaQ>

• Kasuti Embroidery-

<https://youtu.be/VsIFW03enFU?si=tL4PqqTEmA0VdGw1>
<https://youtu.be/vrEEINnZnZI?si=yXTgmohgXUoBD8u9>
<https://youtu.be/sXQyuFDmHqY?si=7w1fer353c4qwa7x>
<https://youtu.be/1-ctOgG4jgY?si=qLSf2Dy4x4tQqKV0>
<https://www.embroidery.rocksea.org/hand-embroidery/kasuti/>

Note: Teachers are requested to check the creative commons license status/ financial implications of the suggested, online educational resources before use by the students.
