

Curriculum of Diploma Programme in Fashion & Clothing Technology



Department of Science, Technology and Technical Education (DSTTE), Govt. of Bihar

**State Board of Technical Education
(SBTE), Bihar**

Semester – I

Teaching & Learning Scheme

Course Codes	Category of course	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				
2451101	PCC	Basics of Fashion and Textile	03	-	-	02	05	04
2451102	PCC	Fashion Design Fundamentals	03	-	04	02	09	06
2400103C	ASC	Applied Chemistry -C (TE, CACDDM, GT, FCT)	03	-	04	02	09	06
2400105D	ASC	Applied Mathematics -D (CACDDM, FCT, TE, GT, FPP)	02	01	-	02	05	04
2451106	PCC	Workshop Practice for Tailoring and Garment Making	-	-	04	02	06	03
2451107	PCC	Elements of Garment Construction	-	-	04	02	06	03
2400008	NRC	Sports, Yoga and Meditation (Common for All Programmes)	-	-	01	01	02	01
2400108	NRC	Essence of Indian Knowledge System and Tradition (Common for All Programmes)	01	-	-	-	01	01
2451110	NRC	Basics of IPR (FCT, TE)	02	-	-	-	-	02
Total			14	01	17	13	43	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 – I Assessment Scheme

Course Codes	Category of course	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)	
2451101	PCC	Basics of Fashion and Textile	30	70	20	30	-	-	150
2451102	PCC	Fashion Design Fundamentals	30	70	20	30	20	30	200
2400103C	ASC	Applied Chemistry -C (TE, CACDDM, GT, FCT)	30	70	20	30	20	30	200
2400105D	ASC	Applied Mathematics -D (CACDDM, FCT, TE, GT, FPP)	30	70	20	30	-	-	150
2451106	PCC	Workshop Practice for Tailoring and Garment Making	-	-	20	30	20	30	100
2451107	PCC	Elements of Garment Constrsruction	-	-	20	30	20	30	100
2400008	NRC	Sports, Yoga and Meditation (Common for All Programmes)	-	-	10	-	06	09	25
2400108	NRC	Essence of Indian Knowledge System and Tradition (Common for All Programmes)	25	-	-	-	-	-	25
2451110		Basics of IPR (FCT, TE)	25	-	25		-	-	50
Total			170	280	155	180	86	129	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 classroom (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** : 2451101 (T2451101 / S2451101)
- B) **Course Title** : Basics of Fashion and Textile
- C) **Pre- requisite Course(s)** :
- D) **Rationale** :

Basics of Clothing Technology are the language of fashion technologist. The concepts of fashion and clothing are used in expressing the ideas, conveying the instructions that are used in carrying out the jobs on the shop floor, industries, assembly units, designing units, etc. Textile, the basic ingredient of fashion, has evolved from the basic need of mankind i.e. clothing. Knowledge about raw material is very important in area of Fashion Design and Clothing Technology. A fashion technologist should have a basic knowledge about fibre, yarn and fabric. Students of diploma course must know the process sequence in spinning and weaving departments of textile manufacturing. This course enables students to use the basic concepts in different scenarios of fashion and clothing industry. The aim is to develop the ability to identify the various clothing styles and use them in further adaptations or styles one is aiming to use design. This preliminary course has two distinct sections– one of fashion and the other of textile. This course builds a foundation for the further courses related to fashion and clothing technology.

- 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** Interpret the concept of fashion and clothing with reference to given design / production related situation.
- CO-2** Classify the given garments on basis of clothing and fashion terminologies.
- CO-3** Relate given design to fashion theories.
- CO-4** Use the yarn numbering system to specify yarn and fabric for further use in industry.
- CO-5** Use relevant terminologies in communication related to weaving.

- 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	-	3	-	3		
CO-2	3	1	-	-	3	-	3		
CO-3	3	1	-	2	3	-	3		
CO-4	3	1	-	2	-	-	-		
CO-5	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				
2451101	Basics of Fashion and Textile	03	-	-	02	05	04

Legend:

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H) Assessment Scheme:

Course Code	Course Title	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
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		Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2451101	Basics of Fashion and Textile	30	70	20	30	-	-	150

Legend:

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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: T2451101

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 1a.</i> Use relevant terms related to clothing, apparel and clothing technology. <i>TSO 1b.</i> Use the concept of Fashion to interpret current trend in clothing. <i>TSO 1c.</i> Identify the role of fashion technology in a given clothing related situation. <i>TSO 1d.</i> Relate the concepts of boutique, brand, designer label to given fashion and clothing situation.	Unit-1.0 Concept of Clothing and Fashion 1.1 Concept and definition of Clothing, Concept of apparel, 1.2 Concept and Definition of fashion, Definition of Fashion. Introduction to fashion technology 1.3 Concept of Clothing technology and its objectives 1.4 Concept of boutique, brand, collection, couture house, designer label	CO1
<i>TSO 2a.</i> Identify the category of given Men's wear. <i>TSO 2b.</i> Identify the category of given women's wear. <i>TSO 2c.</i> Identify the category of given kid's wear. <i>TSO 2d.</i> Identify the category of given inner wear.	Unit-2.0 Apparel Categories and Terminology: 2.1 Categories of Men's wear:- shirts, polos, t-shirts, tanks, jeans, pants, joggers, shorts, bell-bottom, sweatshirts, hoodies 2.2 Categories of Women's wear: Blouses, coats, jackets, Kurti, hatler top, tank top, tunics, crop tops, leggings, jeans, shorts, capris, trousers, palazzos, salwar, herum, gaggies, hipster, circular skirt, wrap around skirts, gored skirt, trumpet, jumpsuit, evening gowns. 2.3 Categories of Kids wear: Romper, dungarees, sleep suit, pinafore. 2.4 Categories of Inner wear: Lingerie.	CO2
<i>TSO 3a.</i> Relate the given trend of fashion with fashion cycle. <i>TSO 3b.</i> Differentiate in various fashion theories. <i>TSO 3c.</i> Compare the features of different fashion theories <i>TSO 3d.</i> Use relevant terminology to communicate with reference to given fashion situations.	Unit-3.0 Fashion Theories 3.1 Concept of Fashion cycle 3.2 Fashion Theories – trickle up, trickle down and trickle across. 3.3 Comparison of fashion theories. 3.4 Fashion terminology: prêt-a-porter, silhouette, custom made, domestic market, fashion innovator, franchise, ethnic, haute couture, high fashion, knock offs, wardrobe, fashion year, fashion season, fashion followers, fashion forecast.	CO1, CO3
<i>TSO 4a.</i> Identify properties of given textile fibre and corresponding yarn <i>TSO 4b.</i> classify fibres based on origin. <i>TSO 4c.</i> Describe the subprocesses in yarn production. <i>TSO 4d.</i> Specify given yarn using different numbering systems	Unit-4.0 Basics of Fiber and Yarn Construction 4.1 Definition of textile fibers, Staple, filament, Yarn, properties of textile fibres – essential & desirable. 4.2 Classification of fiber based on origin, types of fibre- Cotton, wool, silk, jute, viscose, polyester, nylon, acrylic. 4.3 Introduction to Preopening - Ginning process, brief study of baling & pressing, spinning, carded and combed yarn 4.4 Yarn numbering system: Indirect numbering systems – Number English, Metric, Woolen, worsted, linen, French. Simple calculation based on different yarn numbering system, Yarn specification- Linear density, Practical	CO3, CO4

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	difficulties in measuring the yarn diameter. Count, Tex, Denier.	
<i>TSO 5a.</i> Describe the sequence of basic steps in fabric manufacturing. <i>TSO 5b.</i> Identify the process flow as per process flow chart in given situation <i>TSO 5c.</i> Distinguish between different methods to produce fabric	Unit 5.0 Elements and Principles of Fabric Construction 5.1 Introduction to Fabric Manufacturing, Fabric: Warp, weft, Objects: winding, warping, sizing, drawing-in, cone dyeing, beam dyeing, Pirn winding, weaving. 5.2 Process flow charts: (a) Grey fabric (b) Mono colour fabric (dyed warp and grey weft) (c) warp or weft stripes, classification of fiber based on origin, types of fibre- Cotton, wool, silk, jute, viscose, polyester, nylon, acrylic. 5.3 Classification of looms, Methods to produce fabric: Weaving, knitting, braiding, felting, non-woven	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: (Not Applicable)

L) Suggested Term Work and Self Learning: S2451101 Some sample suggested assignments, micro project and other activities are mentioned here for reference.

a. Assignments:

- View any 2 you tube videos on fashion cycle, watch them and write key points.
- Prepare with illustrations/ pictures, a write up about different types of kids garments.
- Draw proportionate sketches of any two garments and fill with colours.
- Prepare an album to show traditional clothing of Men and women of Indian states such as, Kashmir, Kerala, Rajasthan, Chhattisgarh. Prepare a ten line write up to describe the differences.
- Collect different samples of woven fabric and prepare a creative collage by writing names and uses.
- Draw collage-based process flow chart for woven fabric. Show pictures relevant machines at different stages.
- Collection of accessories of handloom and preparing a write up with actual pictures.

b. Micro Projects:

- Prepare a digital album of pictures related to Sources of fibre.
- Yarn spinning: Collect different type of yarn sample and prepare booklet by giving information related to collected sample.
- Yarn spinning: Each batch will collect photographs of each machine required for yarn manufacturing and prepare flash presentation by listing objective of each process.
- Yarn numbering system: Collect different sizes of yarns and prepare black card sheet by labeling their yarn numbers in tex and Ne.
- Prepare an album of images of five Men's wear categories having different colour themes.
- Prepare an album of images of five women's wear categories having different colour themes.
- Prepare album of pictures of five kids wear categories.

c. Other Activities:

1. Seminar Topics:

- My understanding of fashion
- Men's Fashion Cycle in India
- About One Fashion designer in India
- Different types of cloths and their uses
- Weaving process in handloom industry
- Ecofriendly and season friendly clothing

2. Visits:

- Visit nearby Boutique and interact with persons about the process of garment design, styles, market covered.
- Visit local market/ mall/ superstores and observe the different garments on display. Take pictures and prepare digital presentation
- Visit to Handloom / Loom workshop / lab

3. Self-Learning Topics:

- Videos on topics such as Types of Clothing, Popular fashion designers, Different Applications of Clothing such as PPE Kit Clothing, Industrial clothing, clothing for soldiers in Siachin Galciar

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	30%	20%	10%	20%	20%	-	-
CO-3	15%	15%	25%	20%	20%	-	-
CO-4	15%	20%	25%	20%	20%	-	-
CO-5	20%	20%	25%	20%	20%	-	-
Total Marks	30	70	20	20	10		
			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 percentages 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 Elements and Principles of Fabric Construction	10	CO1	15	4	6	5
Unit-2.0 Concept of Clothing and Fashion	10	CO2	15	4	6	5
Unit-3.0 Fashion Theories	6	CO1, CO3	10	4	4	2
Unit-4.0 Basics of Fiber and Yarn Construction	11	CO3, CO4	15	4	6	5
Unit-5.0 Elements and Principles of Fabric Construction	11	CO4, CO5	15	4	6	5
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): (Not Applicable)**

- 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, Field Trips, Portfolio Based, Learning, Live Demonstrations in Classrooms, 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: (Not Applicable)**

- R) Suggested Learning Resources:**

(a) Books:

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Elements of fashion and design	Gertrud Lehnert	West Duxbury Manchesters. 1995
2.	Inside the fashion business	Dickerson Kitty G.	Pearson Education Pvt. Ltd., Singapore, 2004., ISBN: 9780130108555
3.	Fashion from Ancient Egypt to the present day	Mila Contini	West Duxbury, Manchester, ISBN No. 9780517099872
4.	History of fashion in 20th Century	Gertrud Lehnert	West Duxbury, Manchester, ISBN No. 9783829020336
5.	Technology of short- staple spinning – Vol I to IV.	W. Klein,	Textile institute pub, Manchester
6.	Spun Yarn Technology	Eric Oxberg	Butterworths (Publishers) Limited, 1983, ISBN :0-408014644
7.	Spinning of Manmades and Blends on Cotton Spinning.	K.R. Salhotra	The Textile Association of India
8.	Elements of Raw Cotton and Blow Room	Khare A. R	Sai Book Center
9.	Cotton Spinning Calculation	Pattabhiraman T. K	Mahajan Publisher Private Limited.

(b) Online Educational Resources:

1. www.textileword.com
2. www.textileinfo.com
3. <http://www.textileschool.com/articles/109/blow-room-functions>
4. http://textilelearner.blogspot.in/2011/07/basic-operations-in-blowroom_485.html
5. http://textilelearner.blogspot.in/2011/03/blowroom-objects-of-blow-room-basic_2485.html
6. <http://www.rieter.com/cz/rikipedia/articles/rotor-spinning/applications-engineering/preparation-of-raw-material/the-processing-stages/blowroom/>
7. <https://www.youtube.com/watch?v=IDGmXssFa6s>
8. https://en.wikipedia.org/wiki/Cotton_gin
9. <https://s-media-cache-ak0.pinimg.com/564x/b8/76/b6/b876b60703a1b40138e5b800dd7212e2.jpg>
10. <http://gluedideas.com/Encyclopedia-Britannica-Volume-6-Part-2-Colebrooke-Damascius/Cotton-Ginning-Machinery.html>
11. http://textilelearner.blogspot.in/2011/08/what-is-ginning-cotton-ginning-types-of_8829.html
12. <http://textilefashionstudy.com/what-is-textile-fiber-classifications-of-textile-fiber/>
13. <http://cms.gcgc11.ac.in/attachments/article/87/CLASSIFICATION%20OF%20YARN.pdf>

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. 3D Printing Projects DK Children; Illustrated edition, 2017

- A) **Course Code** : 2451102 (T2451102 / P2451102 /S2451102)
- B) **Course Title** : Fashion Design Fundamentals
- C) **Pre- requisite Course(s)** :
- D) **Rationale** :

Textile and fashion designers should have thorough knowledge about basic elements and principles of designing. That includes repetition, alternation, harmony, gradation, balance, etc. Fashion is instinct in people. The field of fabric decoration, now commonly called surface design, has seen great deal of growth and development. Interaction of design professional at national and international level requires thorough knowledge of the aspects of fashion design. The aspects of design affect differently to human beings of different age groups. The students of diploma course should develop very good skills related to textile and fashion design. The aim of this course is to enable the student to Use media, elements & principles of design for development of textile and fashion through various teaching learning experiences. This competence in students has been identified is a requirement of the fashion industry.

- 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 relevant Medias and Techniques of drawing to create good presentations.
- CO-2** Apply elements of art in fashion design
- CO-3** Create garment designs using fundamental principles of design.
- CO-4** Create traditional and innovative textile designs and fashion designs using relevant colour theories and harmonies.
- CO-5** Compare Figure types with reference to the standard figure type.
- CO-6** Propose design features in garment to conceal drawbacks of different figure types.

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 Engineerig 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	3	1	2		
CO-2	3	2	3	2	2	1	2		
CO-3	3	-	2	2	3	1	1		
CO-4	3	-	2	2	2	1	1		
CO-5	3	2	3	2	3	1	2		
CO-6	3	2	3	2	2	1	2		

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Legend:

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

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J) Theory Session Outcomes (TSOs) and Units: T2451102

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 1a.</i> Use relevant media and material effectively for creating drawing. <i>TSO 1b.</i> Use correct terminology of drawing in communication <i>TSO 1c.</i> Use values to create illusions and negative forms. <i>TSO 1d.</i> Implement layout & presentation styles.	Unit-1.0-Basics of Drawing. 1.1. Dry & Wet material, Fixatives, Types of paper. 1.2. Basic artistic terms-Highlight, shadow, reflected light, value, vanishing point. 1.3. Importance of Light source, Creation of distance & depth-Value, Illusion of forms, Negative forms 1.4. Techniques of layout & presentation. (positive & negative space) story boards, working drawing, Designer workboards.	CO1
<i>TSO 2a.</i> Use lines to create design <i>TSO 2b.</i> Use Direction to create design effect <i>TSO 2c.</i> Use shapes to create design <i>TSO 2d.</i> Use relevant size to create design <i>TSO 2e.</i> Create desired value of design <i>TSO 2f.</i> Use colors & textures to create design effect <i>TSO 2g.</i> Use relevant forms to create design <i>TSO 2h.</i> Use relevant library element to create design	Unit-2.0 Elements of Art and Fashion Design 2.1. Concept and definition of design 2.2. Line – concept, definition, types of line 2.3. Direction – types 2.4. Shape – definition, types 2.5. Size - concept, type 2.6. Texture – concept and application, Colour – definition, sensation process and use, Form – concept, use 2.7. Value – concept, use 2.8. Implement Library of elements of Garment - necklines Collars, sleeves, pockets, skirts, trousers.	CO2
<i>TSO 3a.</i> Illustrate the effects of repetition, alteration, Harmony, gradation, contrast, unity, balance in various designs <i>TSO 3b.</i> Illustrate effect of dominance and subordination in design creation <i>TSO 3c.</i> Illustrate difference between structural designs and decorative designs <i>TSO 3d.</i> Illustrate various silhouettes.	Unit-3.0 Principles of Design 3.1. Repetition – technical concept, Alteration – size, direction, colour, shape, permutation and combination, Harmony – pure and discord, Gradation – shape, size and colour, Contrast – colour and value. Unity – concept development. Balance – formal and informal balance. 3.2. Dominance and sub-ordination – concept and application. 3.3. Overview, Types of Structural design and Decorative design. 3.4. Definition of silhouette, Types of silhouettes with their features. - Straight, Triangular, oval, wedge, hourglass etc.	CO1, CO3
<i>TSO 4a.</i> Apply relevant theory of colour to decide application of colour <i>TSO 4b.</i> Recognize the need of colour modification <i>TSO 4c.</i> Use relevant colour modification <i>TSO 4d.</i> Use relevant harmony of colour to create desired effect <i>TSO 4e.</i> Select relevant textile substrate to create desired effects on weaves	Unit-4.0 Colour Theories and Harmonies 4.1. Light theory of colour – chromatic circle, colour vision. 4.2. Pigment theory of colour – colour wheel, attributes of primary and secondary colours. 4.3. Colour modification – concept, need and requirements 4.4. Colour harmony – achromatic, monochromatic, analogous, complementary, polychromatic. 4.5. Effect of textile substrate on appearance of colour and simple colour and weave effects.	CO3, CO4

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 5a.</i> Identify the design composition of given textile sample. <i>TSO 5b.</i> Create different designs -traditional allover, drop based designs and innovative designs. <i>TSO 5c.</i> Identify patterns of different Indian Brocades & textile. <i>TSO 5d.</i> Identify designs including traditional Indian embroideries.	Unit- 5.0 Composition of Textile Design and Traditional Textile Designs 5.1. All over repeating design 5.2. Drop based designs – half, full, drop reverse and universe, diamond, ogee, sateen (regular and irregular) 5.3. Indian Textiles motif study. (North, South, East, West) 5.4. Indian embroidery motif study. (North, South, East, West)	CO1 & CO4
<i>TSO 6a.</i> Describe the standards of human figure & different types of figures. <i>TSO 6b.</i> Compare human figure with fashion figure. <i>TSO 6c.</i> Justify with examples criteria for selection of proper garment elements for different type of human figures.	Unit-6.0 Do's & Don't's of Clothing 6.1. Definition of standard figure. 6.2. Difference between Human & Fashion figure. 6.3. Do's & Don'ts for a) Women—Pear, diamond, round, hourglass inverted triangle, straight. (tops & Bottoms) (Dos & Don'ts.) b) men—short & heavy, tall and heavy, tall & thin, athletic. (Tops and bottoms) (Dos & Don'ts)	CO1, CO4, CO5, CO6

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

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practicals: P2451102

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<i>LSO 1.1.</i> Develop the natural, decorative, geometrical and abstract motifs with inspirations.	1.	Develop on paper any one of the motif category using inspirations with color media (natural, decorative motifs)	CO1, CO3.
	2.	Develop on paper any one of the motif category using inspirations with color media (geometrical and abstract motifs)	
<i>LSO 2.1.</i> Develop different geometric shirting designs for office wear with various colour harmonies.	3.	Develop on paper, striped shirting design with achromatic color analogous harmony.	CO1, CO3, CO4
	4.	Develop on paper, drapery design with achromatic color analogous harmony.	
	5.	Develop on paper, checks shirting design with monochromatic, complementary color harmony.	CO1, CO3, CO4
	6.	Develop on paper, upholstery with monochromatic, complementary color harmony.	
<i>LSO 3.1.</i> Develop a color wheel of 24 colors.	7.	Draw an Innovative color wheel with 24 colors. primary, secondary, tertiary, quaternary, quinary.	CO4
<i>LSO 4.1.</i> Develop kids wear design with polychromatic colour harmony.	8.	Develop on paper, kids wear design with polychromatic colour harmony.	CO1, CO2, CO3, CO4
<i>LSO 5.1.</i> Develop tints, tones and shades of primary & secondary colors.	9.	Develop a scale of eight, tints, tones and shades of primary and secondary colors.	CO1, CO4

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 6.1. Compose all textile design categories with various repeats.	10.	Compose floral and Geometrical, design with any four textile repeats.	CO1, CO2, CO3, CO4
	11.	Compose conversational, & ethnic textile design with any four textile repeats.	
LSO 7.1. Development of Indian Traditional motif and making its contemporary.	12.	Develop on paper, any one Indian traditional embroidery or textile motif with inspiration.	CO1, CO2, CO4
	13.	Convert on paper, the above traditional motif to contemporary one with inspiration.	
LSO 8.1. Develop one standard & four different human figure types (female)	14.	Develop on paper one standard figure of female & three different designs for each figure type (Pear, round) and draw the do's & don'ts for figure type and write the analysis of design	CO1, CO2, CO3, CO4, CO5, CO6
	15.	Develop on paper one standard figure of female & three different designs for each figure type (diamond, hourglass) and draw the do's & don'ts for figure type and write the analysis of design.	CO1, CO2, CO3, CO4, CO5, CO6
	16.	Develop on paper one standard figure of female & three different designs for each figure type (inverted triangle, straight) and draw the do's & don'ts for figure type and write the analysis of design.	CO1, CO2, CO3, CO4, CO5, CO6

* All practicals are Compulsory.

L) Suggested Term Work and Self Learning: S2451102

Some sample suggested assignments, micro project and other activities are mentioned here for reference.

1.	Assignments based on creation of at least three different designs based on different elements & principles of design applied on various figure types to create illusions. Use presentation techniques.	CO1, CO2, CO3
2.	Assignments relating collections of different designs and making useful items from scrap cloth pieces	CO2, CO3,
3.	Micro projects on collections of traditional and innovative designs and artistic presentations, Collage, artwork etc.	CO1, CO2, CO3
4.	Microprojects on Collection of pictures of traditional motifs of different states of India and identifying the use of design principles and elements of art.	CO2, CO3, CO4
5.	Microprojects on Collection of pictures of human figures of different types and analysis of suitable costumes to conceal the drawbacks of the figure	CO2, CO3, CO4, CO5, CO6

Other Activities: Organizing Competitions of above themes, design and dressing, Innovative techniques of Emphasis, repetition, gradation. Organize days to celebrate the Illusion of Figure type.

- 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%	10%	5%	20%	15%	15%
CO-2	15%	15%	25%	20%	20%	15%	15%
CO-3	20%	20%	25%	20%	20%	20%	20%
CO-4	15%	15%	20%	20%	20%	15%	15%
CO-5	15%	15%	20%	20%	10%	15%	15%
CO6	20%	20%	-	15%	10%	20%	20%
Total	30	70	20	20	10	20	30

Legend:

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

**: Details Mentioned under point- (N)

#: Details Mentioned under point- (O)

Note:

- The percentages 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-Basics of Drawing	08	CO1	10	3	4	3
Unit-2.0 Elements of Art and Fashion Design	08	CO1 and CO2	10	3	4	3
Unit-3.0 Principles of Design	08	CO1 CO2 CO3	14	4	6	4
Unit-4.0 Colour Theories and Harmonies	08	CO4	10	3	4	3
Unit- 5.0 Composition of Textile Design and Traditional Textile Designs	08	CO4	10	3	4	3
Unit-6.0 Do's & Don't's of Clothing	08	CO1 CO2 CO3 CO4 CO5, CO6	16	4	6	6
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.	Develop on paper any one of the motif category using inspirations with color media (natural, decorative motifs)	CO1, CO4.	30	60	10
2.	Develop on paper any one of the motif category using inspirations with color media (geometrical and abstract motifs)	CO1, CO4.	40	50	10
3.	Develop on paper, striped shirting design with achromatic color analogous harmony.	CO1, CO4	30	60	10
4.	Develop on paper, drapery design with achromatic color analogous harmony.	CO1, CO4	30	60	10
5.	Develop on paper, checks shirting design with monochromatic, complementary color harmony.	CO1, CO2, CO3, CO4	30	60	10
6.	Develop on paper, upholstery with monochromatic, complementary color harmony.	CO1, CO2, CO3, CO4	30	60	10
7.	Draw an Innovative color wheel with 24 colors. primary, secondary, tertiary, quaternary, quinary.	CO4	30	60	10
8.	Develop on paper, kids wear design with polychromatic colour harmony.	CO1, CO2, CO3, CO4	40	50	10
9.	Compose floral and geometrical, design with any four textile repeats.	CO1, CO2, CO3, CO4	40	50	10
10.	Develop on paper, any one Indian traditional embroidery or textile motif with inspiration.	CO1, CO2, CO3, CO4,	40	50	10
11.	Convert on paper, the above traditional motif into contemporary with certain inspiration.	CO2, CO3, CO4	30	60	10
12.	Develop on paper, any one Indian traditional embroidery or textile motif with inspiration.	CO1, CO2, CO3, CO4	30	60	10
13.	Convert on paper, the above traditional motif to contemporary with inspiration.	CO1, CO2, CO3, CO4	30	60	10
14.	Develop on paper one standard figure of female & three different designs for each figure type (Pear, round) and draw the do's & don'ts for figure type and write the analysis of design.	CO1, CO2, CO3, CO4, CO5, CO6	30	60	10
15.	Develop on paper one standard figure of female & three different designs for each figure type (diamond, hourglass) and draw the do's & don'ts for figure type and write the analysis of design.	CO1, CO2, CO3, CO4, CO5, CO6	30	60	10
16.	Develop on paper one standard figure of female & three different designs for each figure type (inverted triangle, straight) and draw the do's & don'ts for figure type and write the analysis of design.	CO1, CO2, CO3, CO4, CO5, 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: Improved Lecture, Case Method, Group Discussion, Role Play, 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.	Pencil – HB.	HB	ALL EXPERIMENTS.
2.	Tracing paper –	Gateway quality.	ALL EXPERIMENTS.
3.	Drawing sheet – types	A4 size.	ALL EXPERIMENTS.
4.	Poster colours, Pencil colors	Standard	ALL EXPERIMENTS.
5.	Colouring brush – round (0, 2, 4), flat (1/2”).	round (0, 2, 4), flat (1/2”).	ALL EXPERIMENTS.
6.	Bow pen. Bow compass	Standard	ALL EXPERIMENTS.
7.	Pallete,	Standard	ALL EXPERIMENTS.

R) Suggested Learning Resources:

5.3.1 Books:

S. No.	Titles	Author(s)	Publisher with Edition and ISBN
1	Inside the fashion business	Dickerson K. G.	Pearson education private limited, Singapore.
2	Element of fashion and design.	Gertrude Lehnert	West Duxbury, Manchester.
3	Watson’s textile design and colour	Grosicki Z.	Universal publishing corporation – London.
4	Joy of Drawing.	Bill Martine.	ISBN 0-8230-2370-2
5	Textile Design	Suzan Meller & Joost Elffers.	Harry N. Abrams ISBN10:0810938537
6	Instruction package on application of art and design to textile	Sadhale C. R.	Private circulation TTTI, Bhopal and DKTE, Ichalkaranji.
7	Color Harmony	Hideghi Chijiwa	Publisher: Rockport Pub ISBN-10: 0935603069 ISBN-13: 978-0935603064
8	Joy of Drawing	Bill Martin.	ISBN-0-8230-2730-2

(b) Online Educational Resources:

1. [https:// www.fibertofashion.com](https://www.fibertofashion.com)
2. www.youtube.com/ light and pigment theory and similar links
3. www.wikipedia.com/ colour harmonies and similar links
4. www.yepme.com
5. <http://www.fashionillustrationtribe.com/art-supplies-for-fashion-illustration>
6. https://en.wikipedia.org/wiki/Theory_of_Colours
7. https://en.wikipedia.org/wiki/Subtractive_color
8. https://en.wikipedia.org/wiki/Additive_color
9. www.myntra.com
10. www.onlineclothingstudy.com

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. Lab Manuals

- A) **Course Code** : 2400103C (T2400103C / P2400103C / S2400103C)
- B) **Course Title** : Applied Chemistry- C (TE, CACDDM, FCT, GT)
- C) **Pre- requisite Course(s)** :
- D) **Rationale** :

Given course is the applied form of Chemistry. It is an application of basic knowledge of chemistry to understand the requirements of the industries related to textile and garments. This course intends to impart technical knowledge along with productive practice to the students of the diploma engineering. Students will learn about the chemical characteristics of materials, such as their reactivity, bonding, and molecular structures, through the chemistry course. With this understanding, students will be able to choose materials intelligently for certain applications and create new materials that fulfil market demands. Diploma engineers have to deal with various chemicals in diverse technical and engineering fields. Dying, bleaching and cleaning fabric in the textile and garment industry and related areas will require engineers to acquire essential knowledge in chemistry to choose appropriate chemicals, dyes, bleaching agents, soap, detergents and enzyme-based detergents which should be economical and eco-friendly. Student will learn about various types of natural and man-made fibres which requires basics of monomers used and polymerization. Basic knowledge of chemistry is essential to treat textile industry effluents containing various types of synthetic dyes, metals, chlorine and other pollutants which has become an environmental concern.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of the 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-

- 5.4 Solve various engineering problems applying the basic concepts of atomic structure, chemical bonding and solutions.
- 5.5 Apply the concepts of chemical structure, properties and identification of polymers and fibers in textile and garment industry.
- 5.6 Apply suitable wastewater treatment techniques in textile industry.
- 5.7 Use appropriate chemicals such as dyes, bleaching agents, soaps, detergents and enzyme-based detergents in textile and garment industry.
- 5.8 Use concepts of organic molecules and isomerism to solve various engineering problems.

- 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	-	-	-	-	-	-		
CO-2	3	-	2	-	2	1	2		
CO-3	3	3	1	2	-	1	-		
CO-4	3	-	-	-	1	-	1		
CO-5	3	-	-	-	-	-	1		

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				
2400103C	Applied Chemistry- C	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)	
2400103C	Applied Chemistry - C	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: T2400103C

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 1a.</i> Explain quantum numbers and their significance briefly. <i>TSO 1b.</i> Explain the importance of principles followed in expressing electronic configuration of elements. <i>TSO 1c.</i> Explain different types of Chemical Bonding with examples. <i>TSO 1d.</i> List different modes of expressing the concentration of solutions-Molarity, Normality, and parts per million. <i>TSO 1e.</i> Prepare solution of given concentration. <i>TSO 1f.</i> Describe the balancing of chemical equation of redox reaction using ion-electron method.	Unit-1.0 Atomic Structure, Chemical Bonding, solutions, and Redox Reactions 1.1 Fundamental particles- mass and charges of electrons, protons, and neutrons with names of the scientists who discovered these fundamental particles. 1.2 Atomic number, atomic mass number. 1.3 Definition of orbit and orbitals, shapes of s and p orbitals. 1.4 Brief concept of quantum numbers and their significance. 1.5 Introduction to Aufbau's principle, Pauli's exclusion principle and Hund's rule of maximum multiplicity. 1.6 Electronic configurations of elements with atomic number up to 20. 1.7 Chemical bonding- Ionic or Electrovalent bond, Covalent bond, Coordinate bond, Hydrogen bond. 1.8 Solutions, Solute and Solvent, Modes of expressing concentration of solutions-Molarity, Normality, and parts per million. 1.9 General introduction Oxidation and Reduction, Oxidation number, Balancing of Chemical Equations of Redox Reaction by Ion-Electron Method. 1.10 Indian Chemistry: -Philosophy of atom by Acharya Kanad. (IKS)	CO1
<i>TSO 2a.</i> Differentiate between addition and condensation polymerization. <i>TSO 2b.</i> Explain molecular arrangement of polymers. <i>TSO 2c.</i> Describe primary and secondary properties of fibre. <i>TSO 2d.</i> Classify Fibre based on origin. <i>TSO 2e.</i> List monomers and chemical reactions involved in the synthesis of Rayon, Nylon-6, Nylon-6,6, Polyester, Polyethylene and Spandex. <i>TSO 2f.</i> Explain identification tests of fibres. <i>TSO 2g.</i> Identify fibers based on physical and chemical tests.	Unit-2.0 Fibres and Polymers 2.1 Definition of Monomer, Polymer-types of polymers: homopolymer and copolymer, Degree of Polymerization, Types of polymerization-addition and condensation polymerization, Polymer arrangement: Crystalline and Amorphous arrangement, Orientation of fibre. 2.2 Definition of the Terms: Textile, Fibre, Textile fibre, Staple, Filament, Yarn and thread. 2.3 Primary and secondary properties of textile fibre. 2.4 Fibre classification by origin: Natural fibres- Plant fibre-cotton, bast fibre-jute and flax, Protein/Animal fibre- wool and silk, Mineral 2.5 Fibre – Asbestos, monomers and chemical reaction involved in the synthesis of man-made fibres: Rayon, Nylon (6 & 6,6), Polyester, Acrylic, Olefins (Polyethylene and	CO2

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	Polypropylene) and Elastomeric fibres-spandex, Comparison of natural and man-made fibres. 2.6 Identification of fibres- feeling test, burning test, chemical test.	
<i>TSO 3a.</i> Differentiate between hard water and soft water. <i>TSO 3b.</i> Estimate the hardness of water using EDTA titration method. <i>TSO 3c.</i> Explain the effect of hardness of water in textile industry. <i>TSO 3d.</i> Explain the various water softening techniques. <i>TSO 3e.</i> Determine the dissolved oxygen (DO) and biological oxygen demand (BOD) of a wastewater sample. <i>TSO 3f.</i> Identify given samples as acid, base or neutral. <i>TSO 3g.</i> Explain the two parameters BOD and COD to measure water quality and the amount of organic pollutants present in water. <i>TSO 3h.</i> Use the Indian standard specification of drinking water.	Unit-3.0 Water 3.1 Introduction, Sources of Water, Hardness of water, types of hardness, Degree of Hardness (In terms of CaCO₃ equivalent), Unit of Hardness, Quantitative Measurement of Water Hardness by EDTA method. 3.2 Bad effect of hard water in textile industries- scale and sludge formation in boilers, disadvantage of scale formation. 3.3 Water Softening Technique-Soda Lime Process, Zeolites method and cation-anion exchange method. 3.4 Concept of pH and its applications. 3.5 Determination of Dissolved Oxygen, Water Quality Index - Biological Oxygen Demand, Chemical Oxygen Demand, Simple Numerical Problems. 3.6 Indian standard specification of drinking water.	CO3
<i>TSO 4a.</i> Differentiate between soap and detergent. <i>TSO 4b.</i> Explain the cleansing action of soap. <i>TSO 4c.</i> List different types of detergents. <i>TSO 4d.</i> Describe the importance of saponification values. <i>TSO 4e.</i> Use of different enzyme-based detergents in textile industry. <i>TSO 4f.</i> Classify stains and their removal techniques. <i>TSO 4g.</i> list different bleaching agents used in textile industry. <i>TSO 4h.</i> Describe the use of indigo, phenolphthalein and methyl orange dye in textile industry.	Unit-4.0 Soap, Detergents and Dyes 4.1 Cleaning agent: soap- chemical composition, Detergent: chemical composition, types of detergent. Cleansing action of soaps and detergents, difference between soap and detergent. 4.2 Saponification values- Definition, determination, and significance. 4.3 Enzyme based detergents: Introduction to enzyme-based detergents and their types: proteases, amylases, lipases, cellulases, mannanases and pectinases, merits of enzyme-based detergents over synthetic detergents, cleansing action of enzyme-based detergents. 4.4 Stain: Definition of stain, classification, and removal techniques of stains -Protein stain, Tannin stains, Oil – based stains, Dye stains, Combination Stains, Stains require special treatment methods. 4.5 Bleaching agent: Definition of bleaching agent, classification of bleaches: oxidizing bleaches- halogen and peroxide bleaches (universal bleaching agent) and reducing bleaches, purposes of bleaching, advantages, and disadvantages of bleaching. 4.6 Dyes: Definition of dye, classification of dyes, Introduction to some dyes: indigo dye, phenolphthalein, methyl orange.	CO4

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 5a.</i> Identify the structures of organic compound based on their classification. <i>TSO 5b.</i> Classify structures of organic molecules. <i>TSO 5c.</i> Draw structures of organic molecules. <i>TSO 5d.</i> Identify different types of structural isomerism in different molecules. <i>TSO 5e.</i> Differentiate amongst different organic compounds based on the functional group.	Unit-5.0 Basics of Organic Chemistry 5.1 Classification of organic compounds (acyclic or open chain compounds, cyclic or closed chain or ring compounds- aromatic compounds). 5.2 Introduction to Functional groups (alkenes, alkynes, halides, alcohols, aldehydes, ketones, nitriles, ethers, carboxylic acids, esters, amines, amides, nitro compounds). 5.3 Isomerism, structural isomerism (chain, position and functional), stereoisomerism (geometrical and optical isomerism).	CO5

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

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2400103C

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 1.1. Weigh oxalic acid.	1.	Preparation of 250ml N/10 Oxalic acid Solution.	CO1
LSO 1.2. Prepare a solution of oxalic acid.			
LSO 2.1. Weigh Sodium Carbonate.	2.	Preparation of 250ml N/10 Sodium Carbonate Solution.	CO1
LSO 2.2. Prepare a solution of sodium carbonate.			
LSO 3.1. Use of appropriate indicator for acid-base titration.	3.	Determination of strength of Sodium Hydroxide Solution by Titrating against Oxalic Acid solution.	CO1
LSO 3.2. Analyze titration curves for weak acid and strong base.			
LSO 4.1. Identify given textile fibre using chemicals.	4.	Identification of textile fibres like cotton, linen, wool, silk, nylon, polyester, and acrylic using chemical tests.	CO2
LSO 4.2. Distinguish between animal and vegetable fibre.			
LSO 5.1. Identify given textile fibre using burning test.	5.	Identification of textile fibres like cotton, linen, wool, silk nylon, polyester and acrylic by burning test.	CO2
LSO 5.2. Distinguish between animal and vegetable fibre.			
LSO 6.1. Determine the total hardness of given sample of water in terms of CaCO ₃ by EDTA titration method.	6.	Determination of total hardness of water sample in terms of CaCO ₃ by EDTA titration method using Eriochrome black-T as indicator.	CO3
LSO 6.2. Draw the structure of complex of metal ions with ethylenediaminetetraacetic acid (EDTA).			
LSO 7.1. Determine the saponification value of oil.	7.	Determination of saponification value of the given oil/fat.	CO4
LSO 7.2. Compare saponification values of some given oils.			
LSO 8.1. Perform Baeyer's test	8.	Identification of the presence of unsaturation in a given organic compound.	CO5
LSO 8.2. Perform Bromine Test			
LSO 9.1. Perform Ceric Ammonium Nitrate test	9.	Identification of the presence of alcoholic functional group in a given organic compound.	CO5
LSO 9.2. Perform Iodoform test			
LSO 10.1. Perform 2,4-Dinitrophenyl Hydrazine Test	10.	Identification of the presence of aldehyde and ketone functional groups in a given organic compound.	CO5
LSO 10.2. Perform Fehling's Test			
LSO 10.3. Perform Tollen's Test			

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 11.1. Determine the pH of the given sample using; pH paper, Universal indicator and pH meter.	11.	Determination of pH-Values of given Solution by using pH paper, Universal Indicator and pH-meter.	CO3
LSO 12.1. Perform Fehling's Test LSO 12.2. Perform Sodium Bicarbonate Test	12.	Identification of the presence of a carboxylic acid functional group in a given organic compound.	CO5
LSO13.1. Describe the principle behind the estimation of the dissolved oxygen in water LSO13.2. Determine the oxygen content of the different aquatic habitats.	13.	Determination of Dissolved Oxygen (DO) in the given Sample of Water.	CO3

L) Suggested Term Work and Self Learning: S2400103C 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 such as

- Write the exceptional behavior of elements Chromium and copper based on their electronic configuration.
- Prepare the chart displaying different steps involved in wastewater treatment in textile industries.
- Prepare the model, showing the difference between covalent and ionic bond.
- Prepare a report on the impact of waste generated from textile production on the environment.

b. Micro Projects:

- Prepare a report by analyzing the cleansing capacity of the different soaps in distilled water and tap water.
- Collect the sample of water from various water bodies nearby and analyze pH, temperature and dissolved oxygen prepare a report on the same.
- Sterilization of water samples using bleaching powder.
- Collect and measure the hardness of different water samples from different sources by using the EDTA titration method.
- Collect the water samples containing bleaching powder from various sources and measure the percentage of available Chlorine in the collected samples.

c. Other Activities:

2. Seminar Topics:

- Methods for Wastewater treatment in textile/ garment industry
- Dye used for the given fiber in textile/ garment industry.
- Chemistry of Dyeing
- Application of chemistry in textile/ garment industry
- Application of enzymes in textile/ garment industry
- Cleansing action of soap and detergents

Visits:

- Organize a visit to the nearby garments industry related to printing and embroidery followed by garment production. There they can explore the different sections like store section, embroidery section, pattern making, drafting section, cutting section, stitching, finishing section, workshop etc.
- Organize a visit to nearby traditional dying and synthetic dying shops to comprehend the different stages and types of dyeing.
- Visit textile industries to learn the bleaching process.

3. Self-Learning Topics:

- Basic structure of atom
- Basics of organic chemistry
- Cleansing action of soap and detergents
- Wastewater treatment
- Dyes

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	10%	10%	15%	15%	15%	10%	10%
CO-2	15%	15%	20%	20%	20%	20%	20%
CO-3	30%	25%	20%	20%	20%	25%	25%
CO-4	15%	20%	20%	20%	20%	15%	15%
CO-5	30%	30%	25%	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 percentages 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 Atomic Structure, Chemical Bonding and Solutions	12	CO1	18	6	8	4
Unit-2.0 Fibre and Polymers	7	CO2	10	3	3	4
Unit-3.0 Water	5	CO3	08	3	3	2
Unit-4.0 Soap, Detergents and Dyes	12	CO4	17	5	7	5
Unit-5.0 Basics of Organic Chemistry	12	CO5	17	5	7	5
Total	48	-	70	22	28	20

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.	Preparation of 250ml N/10 Oxalic acid Solution.	CO1	40	50	10
2.	Preparation of 250ml N/10 Sodium Carbonate Solution.	CO1	40	50	10
3.	Determination of the strength of Sodium Hydroxide Solution by Titrating against Oxalic Acid Solution.	CO1	30	60	10
4.	Identification of textile fibres like cotton, linen, wool, silk, nylon, polyester and acrylic using chemical tests.	CO2	30	60	10
5.	Identification of textile fibres like cotton, linen, wool, silk nylon, polyester and acrylic by burning test.	CO2	30	60	10
6.	Determination of the total hardness of water sample in terms of CaCO ₃ by EDTA titration method using Eriochrome black-T as indicator.	CO3	30	60	10
7.	Determination of pH-Values of given samples of Solution by using pH paper, Universal Indicator and pH-meter.	CO3	30	60	10
8.	Determination of saponification value of the given oil/fat.	CO5	30	60	10
9.	Identification of the presence of unsaturation in a given organic compound.	CO5	40	50	10
10.	Identification of the presence of alcoholic functional group in a given organic compound.	CO5	40	50	10
11.	Identification of the presence of aldehyde and ketone functional group in a given organic compound.	CO5	40	50	10
12.	Identification of the presence of a carboxylic acid functional group in a given organic compound.	CO5	30	60	10
13.	Determination of Dissolved Oxygen (DO) in the given Sample of Water.	CO3	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.	Electronic Weighing Balance	Type of Laboratory Balance: Analytical, Sensitivity (mg): 1 mg, Maximum Capacity of weighing (grams): 200 g, Shape of PAN: Circular, Power Supply: Single Phase, Display: LED.	1,2,3, 6, 7, 13
2.	Hot plate magnetic stirrer	Hot plate with Magnetic stirrer: Number of stirring Positions:1, Calibration: Automatic Calibration, Magnetic stirrer with a hot plate, Speed Control Accuracy of set speed (+/-) (RPM): 5, Maximum Stirring capacity per position: 3000 ml, Top plate Material: Stainless steel	7
3.	Digital pH meter	Digital pH Meter: Type: Microcontroller Based, Display: LED / LCD / Touch Screen, 3 digits, Calibration: up to 3 points with auto buffer, pH Range (pH): 0.00 to 14.00, +/- 0.05, Power Requirements: 230 V +/- 10, 50 Hz AC, Modes: pH mV- C, Temperature Compensation Type: Automatic, Temperature Compensation Range (Degree C): 0 to 100, Temperature Accuracy (Degree C): +/- 0.3, Resolution (pH): 0.01	8

R) Suggested Learning Resources:

i Books:

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Engineering Chemistry	Jain & Jain	Dhanpat Rai Publishing Co.(P) Ltd., New Delhi, 2015, ISBN: 93-521-6000-2
2.	A Textbook of Engineering Chemistry	Dr S. S. Dara & Dr S. S. Umare	S. Chand & Co.(P) Ltd., New Delhi, 2014, ISBN:81-219-0359-9
3.	Textbook of Chemistry for Class XI & XII (Part-I & II)	NCERT	NCERT, New Delhi, 2017-18, Class-XI, ISBN: 81-7450-494-X (part-I), 81-7450-535-O (part-II), Class-XII, ISBN: 81-7450-648-9 (part-I), 81-7450-716-7 (part-II)
4.	A Textbook of Polymer Chemistry	Dr. M. S. Bhatnagar	S. Chand & Co.(P) Ltd., New Delhi, 2012, ISBN: 9788121941129
5.	Textile Science	E.P.G. Gohl & L.D. Vilensky	CBS, 2nd edition, ISBN-13: 978-8123910383
6.	Textile Auxiliaries and Chemicals with Processes & Formulations	Eiri Board	Engineers India Research Institute (1 December 2009), ISBN : 978-8186732939
7.	Applied Chemistry with Lab manual	Anju Rawlley Devdatta V. Saraf	Khanna Book Publishing Co. (P) Ltd. New Delhi, 2021, ISBN- 978-93-91505-44-8.

(b) Online Educational Resources:

1. <https://ncert.nic.in/textbook/pdf/kech102.pdf>
2. [https://chem.libretexts.org/Bookshelves/Inorganic_Chemistry/Supplemental_Modules_and_Websites_\(Inorganic_Chemistry\)/Chemical_Compounds/Introduction_to_Chemical_Bonding](https://chem.libretexts.org/Bookshelves/Inorganic_Chemistry/Supplemental_Modules_and_Websites_(Inorganic_Chemistry)/Chemical_Compounds/Introduction_to_Chemical_Bonding)
3. [https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_\(Analytical_Chemistry\)/Electrochemistry/Redox_Chemistry/Balancing_Redox_reactions](https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Electrochemistry/Redox_Chemistry/Balancing_Redox_reactions)
4. <https://www.onlinetextileacademy.com/basics-of-textile-fibres/>
5. <https://www.ancient-origins.net/history-famous-people/indian-sage-acharya-kanad-001399>
6. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=31024>
7. <http://ecoursesonline.iasri.res.in/course/view.php?id=235>
8. <https://ncert.nic.in/textbook/pdf/lech206.pdf>
9. <https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/canadian-conservation-institute-notes/identification-natural-fibres.html>
10. https://www.sctce.ac.in/faculty/facultylogin/Admin/Attachments/Upload/1559025037_1559025037.pdf
11. [https://chem.libretexts.org/Bookshelves/Introductory_Chemistry/Chemistry_for_Allied_Health_\(Soult\)/08%3A_Properties_of_Solutions/8.06%3A_The_pH_Concept](https://chem.libretexts.org/Bookshelves/Introductory_Chemistry/Chemistry_for_Allied_Health_(Soult)/08%3A_Properties_of_Solutions/8.06%3A_The_pH_Concept)
12. <https://textilelearner.net/soap-and-micelle-in-textile-wet-processing/>
13. <https://textilelearner.net/stain-removal-techniques-from-clothes/>
14. <https://archive.epa.gov/water/archive/web/html/vms52.html>
15. <https://infiniabiotech.com/blog/overview-on-detergent-enzymes/>
16. <https://www.textileadvisor.com/2022/01/objectives-of-bleaching-process-types.html>
17. <https://textilelearner.net/different-types-of-dyes-with-chemical-structure/>
18. <https://ncert.nic.in/ncerts/l/lech205.pdf>

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:

- Learning Packages
- Lab Manuals
- Manufacturers' Manual
- Users' Guide

- A) **Course Code** : **2400105D (T2400105D / S2400105D)**
- B) **Course Title** : **Applied Mathematics -D (CACDDM, FCT, TE, GT, FPP)**
- C) **Prerequisite Course(s)** : **Algebra, Trigonometry, Coordinate Geometry**
- D) **Rationale** :

Mathematics is the core course to develop the competencies of most of the technological courses. It provides students with a fundamental understanding of mathematical principles and concepts necessary for solving engineering problems. Textile engineering and allied programs involve dealing with various quantitative aspects, including measurements, material properties, production data, and quality control. Proficiency in basic engineering mathematics enables students to analyze and interpret these quantitative data accurately. Statistical methods are useful to evaluate and optimize textile processes, conduct experiments, analyze experimental data, and make data-driven decisions for process improvement and quality enhancement. The application of basic engineering mathematics in various aspects of textile engineering, including problem-solving, quantitative analysis, design, optimization, and computer-aided tools, makes this course an indispensable subject for aspiring textile engineers. The course provides an insight to analyze engineering problems scientifically using differentiation, trigonometry, coordinate geometry, mensuration, and statistics.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of the 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** Demonstrate the ability to solve branch-specific engineering-related problems using applications of differentiation.
- CO-2** Demonstrate the ability to algebraically analyze basic functions using Trigonometry.
- CO-3** Solve engineering-related problems based on Straight lines.
- CO-4** Solve the problems based on measurements of regular close figures and regular solids.
- CO-5** Apply the concept of statistics to solve engineering-related problems.

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

Course Outcomes (COs)	Program 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	-	-	-	-	-	-		
CO-2	3	1	1	-	-	-	-		
CO-3	2	1	-	-	-	-	-		
CO-4	3	1	-	-	-	-	1		
CO-5	3	2	-	1	-	-	1		

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

* PSOs will be developed by the respective program coordinator at the institute level. As per the 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				
2400105D	Applied Mathematics - D	02	01	-	02	05	04

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= (1xCIhours) + (0.5xLIhours) + (0.5xNotionalhours)

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of the teacher to ensure the 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)	
2400105D	Applied Mathematics - D	30	70	20	30	-	-	150

Legend:

PTA: Progressive Theory Assessment in the classroom (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 assignments, micro-projects, seminars, 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 the respective course. For valid and reliable assessment, the internal faculty should prepare a 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 the 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: T2400105D

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 1a.</i> Apply the working rules and standard forms of differentiation to find the derivative of simple functions. <i>TSO 1b.</i> Invoke the concept of the Chain rule to find the derivative of simple functions. <i>TSO 1c.</i> Apply the concept and rules of derivative to solve the problems related to the velocity and acceleration of a given simple function. <i>TSO 1d.</i> Apply the concept and rules of derivative to solve the problems related to the maxima-minima of a given simple function.	Unit-1.0 Differentiation and its Applications 1.1. Concept and Definition of Differentiation. 1.2. Working rules, sum, products, division. 1.3. Chain rules. 1.4. Applications: velocity, acceleration, maxima-minima of the given function.	CO1
<i>TSO 2a.</i> Apply the concept of compound angle, allied angle, and multiple angles to solve the given simple engineering problems. <i>TSO 2b.</i> Apply the concept of Sub-multiple angles to solve the given simple engineering problems. <i>TSO 2c.</i> Employ the concept of factorization and de-factorization formulae to solve the given simple engineering problems. <i>TSO 2d.</i> Use concepts given in Ancient Indian Mathematics for trigonometry to solve given problems. (IKS)	Unit-2.0 Trigonometry 2.1 Trigonometric ratios of compound, allied, multiple, and sub-multiple angles (without proof). 2.2 Factorization and de-factorization formula (without proofs). 2.3 Trigonometry in Indian Knowledge System: The Evolution of Sine Function in India. 2.4 Indian Trigonometry: Basic Indian Trigonometry- Introduction and Terminology (From Ancient Beginnings to Nilakantha). (IKS) 2.5 Trigonometry in Indian Knowledge System: Pythagorean triples in Sulbasutras. (IKS)	CO2
<i>TSO 3a.</i> Calculate the angle between the given two straight lines. <i>TSO 3b.</i> Formulate an equation of straight lines related to given engineering problems. <i>TSO 3c.</i> Identify the perpendicular distance from the given point to the line. <i>TSO 3d.</i> Calculate the perpendicular distance between the given two parallel lines. <i>TSO 3e.</i> Use the geometry given in Sulbasutras to solve the given problems. (IKS)	Unit-3.0 Straight line 3.1 Straight line and slope of a straight line. a. Angle between two lines. b. Condition of parallel and perpendicular lines 3.2 Various forms of straight lines. a. Slope-point form, two-point form b. Slope-intercept form, Intercept-intercept form c. General form d. The perpendicular distance from a point to the line. e. Perpendicular distance between two parallel lines. 3.3 Geometry in Sulbasutras in Indian Knowledge System (construction of the square, circling the square). (Indian Mathematics). (IKS)	CO3
<i>TSO 4a.</i> Calculate the area of the given triangle and circle Identify the isomorphic graphs. <i>TSO 4b.</i> Determine the area of the given square parallelogram, Rhombus, and Trapezium.	Unit-4.0 Mensuration 4.1 Area of regular Closed figures, Area of Triangle, Square Parallelogram, Rhombus, Trapezium, and Circle.	CO4

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 4c.</i> Compute the surface area of the given Cuboids, spheres, Cones, and Cylinders. <i>TSO 4d.</i> Determine the volume of given Cuboids, Sphere, Cone, and Cylinder.	4.2 Volume of Cuboids, Cone, Cylinder, and Sphere.	
<i>TSO 5a.</i> Obtain the range and coefficient of range of the given grouped and ungrouped data. <i>TSO 5b.</i> Calculate means and standard deviation of discrete and grouped data related to the given simple engineering problems. <i>TSO 5c.</i> Define Common causes and Special causes. <i>TSO 5d.</i> Define Upper control limit and Lower control limit. <i>TSO 5e.</i> Implement control charting to assess process stability. <i>TSO 5f.</i> Determine the appropriate type of chart for a given process.	Unit-5.0 Statistics 5.1 Range, coefficient of range of discrete and grouped data. 5.2 Mean deviation and standard deviation from the mean of grouped and ungrouped data, weighted means. 5.3 SPC (Statistical Process Control) and significance. 5.4 Histograms and Charts. 5.5 Common causes and Special causes. 5.6 Control limits (Upper control limit and Lower control limit).	CO5

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

K) Suggested Tutorial and Outcomes:

Outcomes	S. No.	Tutorial Titles	Relevant COs Number(s)
2. Apply differentiation to determine the parameters of the fabric to achieve the desired strength. 3. Use the concept of differentiation to calculate the parameters of the fabric to achieve the desired shrinkage. 4. Calculate desired thermal conductivity of the fabric that needs to be adjusted, using the concept of differentiation. 5. Use differentiation to calculate the parameters of the fabric that need to be adjusted to achieve the desired air permeability. 6. Apply differentiation to solve given problems based on the Food Industry.	1.	- Application of differentiation for determining desired strength. - Differentiation and its applications for determining desired shrinkage. - Application of differentiation for determining thermal conductivity. - Differentiation and its applications for determining desired air permeability. - Application of differentiation in the Food industry.	CO1
1.1 Measure the angles of two pieces of fabric and calculate the angle at which the seam needs to be sewn to be perfectly straight. 1.2 Measure the angle of a fabric roll and calculate the angle of the roll. 1.3 Measure the length of the conveyor belt for a given angle of the frame. 1.4 Calculate the circumference of the circle by measuring the radius of a piece of fabric.	2.	- Applications of measuring angles. - Applications of measuring length. - Applications of calculating circumferences.	CO2

Outcomes	S. No.	Tutorial Titles	Relevant COs Number(s)
4. Calculate the amount of fabric required to make a garment with specific measurements. 5. Calculate the finished length of a fabric after making a certain number of pleats. 6. Make a particular style of garment by calculating the total yardage of fabric needed. 7. Estimate the number of ems and seams needed to finish a garment. 8. Calculate the total yardage of fabric needed to make a particular style of garment.	3.	- Applications of measuring length. - Applications of finding slope. - Applications of computing perpendicular distance.	CO3
4.1 Calculate the area of a fabric piece given the measurements of length and width. 4.2 Calculate the area of a fabric piece given the measurements of length and width. 4.3 Calculate the weight of a cylindrical fabric piece given the measurements of radius, height, and density. 4.4 Calculate the Weight of a cuboid fabric piece given the measurements of length width, height, and density.	4.	- Applications of calculating area. - Applications of calculating weight.	CO4
viii. Create a frequency distribution table for the number of textile engineering diploma students in a class. ix. Create a distribution graph (bar graph) to illustrate the number of textile engineering diploma students in a class. x. Calculate the mean, median, mode, and range of the number of textile engineering diploma students in a class. xi. Explain the difference between a population and a sample in the context of textile engineering diploma students in a class. xii. Calculate the standard deviation for the number of textile engineering diploma students in a class.	5.	- Applications of frequency distribution. - Applications of mean, median, and mode. - Applications of calculating standard deviation.	CO5

L) Suggested Term Work and Self-Learning: S2400105D Some sample suggested assignments, micro-projects, 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.

1. Use differentiation to determine the rate at which dye is absorbed by the textile material.
2. Use Differential calculus to model and optimize the tensile strength of fabric based on the relationship between fabric composition, weave structure, and tensile strength.

3. Apply Trigonometric functions to create patterns like stripes, checks, or circular designs. Explain the relationship between the function parameters and resulting fabric pattern characteristics.
4. Use Library resources to find various applications of trigonometry in designing food processing equipment.
5. Use Library resources to find various applications of straight lines in fabric inspection to detect distortions or irregularities in woven or knitted fabrics.
6. Prepare a handout and a PDF file on the role of straight lines in assembling and decorating food products such as cakes or Sandwiches.
7. Employ mensuration to calculate fabric weight and Fabric Consumption and prepare a file.
8. Use the concept of mensuration for pattern layout optimization and present the findings.
9. Prepare a write-up on the role of statistical process control in identifying and addressing variations in textile production processes.
10. Prepare a presentation on the role of statistics in the nutritional analysis of food products. Discuss the use of statistical techniques to analyze and interpret data related to nutrient content, dietary intake, and health outcomes.

b. Micro Projects:

4. Prepare charts displaying various standard differential formulas.
5. Explore the use of differential calculus to calculate the velocity and acceleration of a particle.
6. Calculate the rate of change of the temperature and plot its graph.
7. Calculate profit and loss concerning business using graphs.
8. Prepare charts showing the area and volume of various geometrical shapes using mensuration.
9. Draw the graph of the Trigonometric ratio on a chart paper and verify using suitable open-source software.
10. Prepare a model showing the area of different geometrical shapes.
11. Prepare a simulated environment to study the 2D-printing under the influence of coordinate geometry.
12. Prepare a chart consisting of the surface area of cuboids, spheres, cones, and cylinders as their real-life application.
13. Download 5-7 videos based on mean deviation for group data and ungrouped data, watch them, and write a report to detail the mathematical steps involved.
14. Make a short video of duration 5-7 minutes for the use of Laplace transform to calculate the response of a system to an input signal.
15. Download 5-7 videos based on the application of Statistical process control to understand the process of manufacturing products and write a report to detail the mathematical steps involved.
16. Make a short video of duration 10-15 minutes on the engineering application of statistical process control especially in production units in the textile industry.

c. Other Activities:

1. Seminar Topics:
 - Sustainable Textile Manufacturing: Challenges and Opportunities
 - Smart Textiles and Wearable Technology
 - Nanotechnology in Textiles: Advancements and Applications
 - Digital Printing Techniques for Textile Design
 - Innovations in Textile Dyeing and Finishing Processes
 - Advances in Textile Testing and Quality Control
 - Eco-Friendly Textile Fibers: Development and Utilization
 - Trends in Textile Fashion Design and Forecasting

- Textile Supply Chain Management: Optimization and Logistics
- Surface Modification Techniques for Textile Material
- Textile Engineering for Sustainable Apparel Production
- Future Prospects of 3D Printing in Textile Manufacturing

2. Visits:

Visiting the following places would provide students an opportunity to see the application of various branches of mathematics in different fields. This will also help students to comprehend the career opportunities available in the field of mathematics.

- Visit to a mathematics museum.
- Visit a mathematics research institute.
- Visit to a mathematics laboratory.
- Visit to a Data Science Center.
- Visit the mathematics department of a college or university.
- Visit a nearby Textile Industry.
- Visit to a Space Agency.
- Visit to a Game Studio.

3. Self-Learning Topics:

- Applications of differentiation (optimization, rates of change)
- Statistical inference (confidence intervals, hypothesis testing)
- Systems of linear equations and their solutions
- Yarn calculations (count systems, conversions)
- Fabric calculations (linear density, fabric weight)
- Statistical analysis of textile data

M) Suggested Course Evaluation Matrix: The course teacher has to decide and use the 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	10%	10%	10%	20%	10%	-	-
CO-2	10%	10%	10%	20%	10%	-	-
CO-3	20%	20%	20%	20%	25%	-	-
CO-4	25%	25%	25%	20%	25%	-	-
CO-5	35%	35%	35%	20%	30%	-	-
Total Marks	30	70	20	20	10	-	-
			50				

Legend:

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

**.: Mentioned under point- (N)

#: Mentioned under point-(O)

Note:

- The percentages given are approximate
- In the case of Micro Projects and End Laboratory Assessment (ELA), the achieved marks will be equally divided among 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 the achievement of each COs.

N) Suggested Specification Table for End Semester Theory Assessment: The specification table represents the reflection of sample representation of assessment of the cognitive domain of the 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 Differentiation and its Applications	8	CO1	08	2	4	2
Unit-2.0 Trigonometry	8	CO2	08	2	4	2
Unit-3.0 Straight line	10	CO3	14	4	6	4
Unit-4.0 Mensuration	8	CO4	18	6	6	6
Unit-5.0 Statistics	14	CO5	22	6	8	8
Total	48	-	70	20	28	22

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

O) Suggested Assessment Table for Laboratory (Practical): (Not Applicable)

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 Lectures, Tutorial, Case Methods, Group Discussions, Industrial visits, Industrial Training, Field Trips, Portfolios, Learning, Role Play, Live Demonstrations in Classrooms, Labs, 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 Compilers and Programming Languages, RAM 32GB, DDR3/DDR4, HDD 500 GB, OS Windows 10	All
2.	Software	Scientific Calculators, Graphing Calculator, SCILAB, GraphEq^2.13, Microsoft Mathematics, GeoGebra, Math3D	1,2,3,4,5
3.	Printer	High-Speed Duplex Printer	4,5

S. No.	Name of Equipment, Tools and Software	Broad Specifications	Relevant Experiment/Practical Number
4.	Scanner	Handheld 3D scanner, Accuracy up to 0.1mm, Resolution up to 0.2 mm, Wireless technology with an in-built touchscreen and battery, Extended field of view for capturing both large and small objects	4,5

R) Suggested Learning Resources:

i. Books:

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Elementary Engineering Mathematics	B. S. Grewal	Khanna Publishers, 15th Edition. ISBN: 978-81-7409-257-1
2.	Engineering Mathematics (Third edition)	Croft, Anthony	Pearson Education, New Delhi, 2014. ISBN 978-81-317-2605-1
3.	Calculus and Its Applications	Marvin L. Bittinger David J. Ellenbogen Scott A. Sargent	Addison-Wesley 10th Edition ISBN-13: 978-0-321-69433-1
4.	Calculus and Analytic Geometry	G. B. Thomas, R. L. Finney	Addison Wesley, 9th Edition, 1995. ISBN 978-8174906168
5.	Advanced Engineering Mathematics	Krezig, Ervin	Wiley Publ., New Delhi, 2014, ISBN: 978-0-470-45836-5
6.	Understanding Engineering Mathematics	John Bird	Routledge; First Edition ISBN 978-0415662840
7.	Indian Mathematics Engaging with the World from Ancient to Modern Times	George Gheverghese Joseph	World Scientific Publishing Europe Ltd. 57 ISBN 978-17-86340-61-0
8.	A Modern Introduction to Ancient Indian Mathematics	T.S. Bhanumurthy	New Age International Private Limited, 1 January 2008 ISBN- 10. 812242600X, ISBN- 13. 978-8122426007
9.	Mathematics-I	Deepak Singh	Khanna Book Publishing Co. (P) Ltd. ISBN: 978-93-91505-42-4
10.	Mathematics-II	Garima Singh	Khanna Book Publishing Co. (P) Ltd. ISBN: 978-93-91505-52-3
11.	Sansar Ke Mahan Ganitagya	Gunakar Muley	First Edition, Rajkamal Prakashan, ISBN-10. 8126703571, ISBN-13. 978-8126703579.
12.	Consider Dimension and Replace Pi	M.P. Trivedi and P.Y. Trivedi	Notion Press; 1st edition (2018), ISBN: 978-1644291795

(b) Online Educational Resources:

1. <https://ocw.mit.edu/>
2. <https://tutorial.math.lamar.edu/>
3. <https://www.khanacademy.org/>
4. <https://www.feynmanlectures.caltech.edu/>
5. <https://www.wolframalpha.com/>
6. <https://www.dplot.com/>
7. <https://www.geogebra.org/>
8. <https://www.easycalculation.com/>

9. <https://www.scilab.org/>
10. <https://www.desmos.com/>
11. <https://nptel.ac.in/>
12. <https://swayam.gov.in/>
13. <https://ndl.iitkgp.ac.in/>
14. <https://parakh.aicte-india.org/>
15. <https://ekumbh.aicte-india.org/>
16. <https://learnengg.com/LE/Index>

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

(c) Others:

1. Online Mathematics Courses.
2. Mathematics Communities and Forums.
3. Mathematics Journals.
4. Mathematics Podcast.
5. Mathematics Tutorials.
6. Mathematics Quizzes.
7. Mathematics Animation.
8. Mathematics Simulations.
9. Mathematics Games.
10. Mathematics Puzzles.
11. Mathematics Brain Teasers.
12. Mathematics Apps.
13. Mathematics Blog.

- A) **Course Code** : 2451106 (P2451106 /S2451106)
- B) **Course Title** : Workshop Practice for Tailoring and Garment Making
- C) **Pre- requisite Course(s)** :
- D) **Rationale** :

This course provides the base for various special sewing techniques that needs to be used while constructing garments. It promotes students to develop and present functional and decorative details including trims, ornamental stitching and pattern matching. In addition, the course develops hands-on skill for methods of garment closure including button, buttonholes, through which students learn the basics of stitching craft for garment making.

- 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** Troubleshoot minor problems in a single needle lock stitch sewing machine for its smooth operation.
- CO-2** Use basic Tools and Machines used in Fashion design and garment making to make different stitches (temporary and permanent)
- CO-3** Classify types of seams, pleats, darts, plackets, openings, fasteners shaped necklines & decorative features applied on apparel.
- CO-4** Develop various samples of hand & machine sewn edge finishing seams, pleats, folds, darts, gathers, shirring, ruffles, openings, shaped necklines by applying relevant techniques.

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

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	-	3	3	-	2		
CO-2	3	1	3	3	-	-	2		
CO-3	3	1	3	3	-	-	2		
CO-4	3	1	3	3	2	-	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				
2451106	Workshop Practice for Tailoring and Garment Making	-	-	04	02	06	03

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)	
2451106	Workshop Practice for Tailoring and Garment Making	-	-	20	30	20	30	100

Legend:

PTA: Progressive Theory Assessment in classroom (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: (Not Applicable)**

K) **Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2451106**

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
Setting, Preventive Care and Basic Operation of Sewing Machine. (03Hrs) <i>LSO 1.1.</i> Locate the different parts of the machine. <i>LSO 1.2.</i> Perform preventive care (cleaning and oiling) in Bobbin area and the identified machine parts. <i>LSO 1.3.</i> Operate the mechanism of threading & bobbin winding & bobbin case fitting and pedal operation and control. <i>LSO 1.4.</i> Rectify minor problems while running the machine. <i>LSO 1.5.</i> Perform basic sewing on Single needle lock stitch domestic purpose machine for different colour threads and different stitch widths	1.	Locate the parts of each of the functional blocks of single needle lock stitch domestic purpose machine sewing machine (0.5 Hrs)	CO1, CO2
	2.	Perform cleaning, oiling & regular maintenance of sewing machine and set the machine for basic stitching. (1Hr)	
	3.	Perform basic setting machine by bobbin fitting and checking belt alignment and pedal control. (0.5Hr)	
	4.	Perform basic settings, alignment and belt- changing (1Hr)	
	5.	Perform the basic sewing operations using the machine to demonstrate simple stitches of various lengths on waste cloth pieces/ paper. (1Hrs)	
Perform Basic Sewing Operations using basic tools and machine for developing different patterns (05 Hrs) <i>LSO 2.1.</i> Identify basic tools used in garment design and sewing/ stitching. <i>LSO 2.2.</i> Operate the machine with controlled speed to sew in straight line, squares, circles & zigzag lines. <i>LSO 2.3.</i> Develop samples of straight line, Zigzag, square, circular, & lock stitch. Lock the stitch at the beginning & at the end of the stitch line. Paste samples on the chart sheet (15 cm X 15 cm)	6.	Identify different basic tools used in garment design and sewing/ stitching (2 Hr)	CO2
	7.	Prepare and present 4 samples of Straight, Zigzag, using lock stitch machine. Lock the stitch at the beginning & at the end of the stitch line. (2 Hrs)	
	8.	Prepare and present 4 samples of circular, & lock stitch using lock stitch machine. Lock the stitch at the beginning & at the end of the stitch line. (2 Hrs.)	
Apply Temporary & Permanent Stitches (06 Hrs): <i>LSO 3.1.</i> Use even basting, uneven basting, diagonal basting, on a sample to understand its use. <i>LSO 3.2.</i> Use slip basting, running stitch, back stitch and hem stitch to finish four sides of the sample fabric. <i>LSO 3.3.</i> Make different constructive (temporary and permanent) stitches on the sample. <i>LSO 3.4.</i> Prepare samples of hand temporary stitches: Even basting, Uneven basting,	9.	Prepare and present samples of hand temporary stitches: Even basting, Uneven basting. (1.5hrs)	CO1
	10.	Prepare and present samples of hand temporary stitches: Diagonal basting, Slip basting. (1.5 Hrs)	
	11.	Prepare and present different constructive (temporary and permanent) stitches on the sample. (1Hr)	
	12.	Prepare and present samples of hand permanent stitches: Running Stitch, Back stitch, run & back or combination	

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
Diagonal basting, Slip basting. (size of sample 15 X 15 cm.)		stitch, Hem stitch, half back stitch. (2Hrs.)	
LSO 3.5. Develop samples of hand permanent stitches: Running Stitch, Back stitch, run & back or combination stitch, hem stitch, half back stitch, Over sewing, blind hemming stitch, buttonhole stitch (size of sample 15 X 15 cm.)	13.	Prepare and present samples of hand permanent stitches: Over sewing, blind hemming stitch, buttonhole stitch (2 Hrs.)	
LSO 3.6. Identify relevant stitches in clothing			
Apply Seams & Seam Finishes (06Hrs)	14.	Prepare and present samples for Seams & seam finish: Plain Seams, Top Stitched seam (One Side & Two Side), French seam, Flat Felled seam, Hong - Kong Seam (4 Hrs) (Any 3 to be prepared)	CO3, CO4
LSO 4.1. Develop samples for Seams & seam finish: Plain Seams, Top Stitched seam (One Side & Two Side), French seam, Flat Felled seam, Hong - Kong Seam, Edge stitched finish, Pinked finish, slot finish and bias bound seam finish. (size of sample 15 X 15 cm.)	15.	Prepare and present samples for Seams & seam finish: Edge stitched finish, Pinked finish, slot finish and bias bound seam finish, (Any 3 to be prepared) (4 Hrs)	
LSO 4.2. Identify relevant Seams & seam finish in clothing			
Use Darts & Pleats (06 Hrs)	16.	Prepare and present samples of darts and dart finishes: Single point, French and dart. (1 Hr)	CO3, CO4
LSO 5.1. Use bodice block samples & make single point & French dart.	17.	Prepare and present samples of darts and dart finishes: Contour (Fish) dart. (1Hr)	
LSO 5.2. Use sample fabric & make fish dart.	18.	Develop dart on actual bodice block of any size provided by teacher (2 Hr)	
LSO 5.3. Develop samples of darts and dart Finishes: Single point, French and Contour (Fish) dart.	19.	Prepare and present samples of Box pleat, Knife Pleat. (2 Hr)	
LSO 5.4. Develop dart on actual bodice block of any size	20.	Prepare and present samples of inverted box pleat, knife pleat (2 Hr)	
LSO 5.5. Develop samples of Pleats, Knife/ Box & inverted box pleats (Ready sample may be of (15X15cm.) Paper cuttings with markings to be provided by teachers. (4 Hrs.)			
Implement Neck Finishing (06 Hr):	21.	Prepare and present samples for Neck finishing- Round Neck ,Square Neck using paper canvas for Children size body block) (4.0 Hr)	CO3, CO4
LSO 6.1. Use Front & back bodice samples & make round, square, V neck & any other specified shape of neck finish.	22.	Prepare and present samples for Neck finishing- V Neck, & any other shape of neck for Children size body block (4.0 Hr)	
LSO 6.2. Finish the necklines using paper canvas.			
LSO 6.3. Develop samples for Neck Finishing- Round Neck Square Neck, V Neck, & any other shaped neck as specified (make samples for any two on Children size bodice block provided by teacher.)			
LSO 6.4. Present the samples on the chart sheet.			
Implement Openings & fasteners (04 hrs):	23.	Prepare samples of front and bodice shaped one piece opening, two piece opening, faced slashed opening. (1.5 hrs)	CO3, CO4
LSO 7.1. Use front & bodice shaped sample fabric & make one piece, two piece & slashed opening.	24.	Apply/ Implement fasteners like, hook & loop, buttons & eye lets, touch buttons	

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<i>LSO 7.2.</i> Use fasteners like, hook & loop, buttons & eye lets, touch buttons to stitch at openings.		to stitch at openings on above sample. (1.5 hrs)	
<i>LSO 7.3.</i> Prepare sample with One-piece opening, two-piece opening, faced slashed opening.	25.	Prepare sample with One-piece opening, two-piece opening, faced slashed opening. (1.5 hrs)	
<i>LSO 7.4.</i> Prepare sample with Hooks& loops, buttons & eyelets, touch buttons, welcro for specified bodice block	26.	Prepare samples of Hooks& loops, buttons & eyelets, touch buttons, welcro for specified bodice block. (1.5 hrs)	
Apply Tucks (03 Hrs): <i>LSO 8.1.</i> Use sample fabric to make Pin tucks, Shell tucks, Graduated, Released, & Corded tucks. <i>LSO 8.2.</i> Develop samples of tucks: Pin tucks, Shell tucks, Graduated, Released, & Corded tucks. make samples for any two or three on specified bodice	27.	Prepare samples of tucks: Pin tucks, Shell tucks, (2Hrs) Prepare samples of tucks: Graduated, Released, & Corded tucks. (2Hrs)	CO3, CO4
Implement Decorative features (03 Hrs): <i>LSO 9.1.</i> Use sample fabric & make samples of gathers, shirring, ruffles, and flounce.	28.	Prepare and present samples of gathers, shirring, ruffles (2 Hrs)	CO3, CO4
<i>LSO 9.2.</i> Develop two samples of gathers, shirring, ruffles, flounces, cording, hangings, bow, etc.		Prepare and present samples of flounces, cording, waist hangings, bow, etc. (2 Hrs)	
Implement single colour Batik Printing (06 Hrs) <i>LSO 10.1.</i> Prepare the fabric for dyeing. <i>LSO 10.2.</i> Transfer/tie given design on sample. <i>LSO 10.3.</i> Prepare the dye-bath / apply wax on the sample. <i>LSO 10.4.</i> Dye the sample with given colour.	29	Implement single colour batik printing to create a decorative table cloth for centre table.	CO5

The above samples can be developed from waste or left out fabric to reduce wastage & practice sustainability. Portfolio of all practicals need to be prepared for record and assessment. The hours allotted are approximate.

Legend:

PRA*: Process Assessment

PDA**: Product Assessment

Note: This table can be used

L) Suggested Term Work and Self Learning: S2451106

Some sample suggested assignments, micro project and other activities are mentioned here for reference.

- a. **Assignments:** Collection of photographs demonstrating different temporary & permanent stitches, seams, seam finishes, tucks, darts, gathers, shirring, frills, flounces, cording, hangings, bows, openings, fasteners.

- b. **Micro Projects:**

- i. Develop a sample Pouch/ wall hanging/ or any other decorative article of your choice, where you can apply few seams & seam finishing techniques & other applications which you have practiced during the lab work.
- ii. Design & develop an article/ sample product with any other decorative features like, gathers, frill, flounce, shirring, ruffle, cording, waist hangings etc.

c. Other Activities:

1. Visit to sewing machine repair technician shop

- Visit to boutique, mall, store and Observe readymade garments & note the application of all the temporary & permanent stitches, seams, seam finishes, tucks, darts, gathers, shirring, frills, flounces, cording, hangings, bows, openings, fasteners.
- Select garment videos and watch

2. Self-Learning Topics:

Watching the VDO's available to know various garment construction process.

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	-	-	10%	10%	-	10%	-
CO-2	-	-	20%	15%	25%	20%	20%
CO-3	-	-	35%	25%	25%	35%	40%
CO-4	-	-	35%	25%	25%	35%	40%
Total Marks	-	-	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 percentages 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:(Not Applicable)

O) Suggested Assessment Table for Laboratory (Practical):

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
1.	Setting, preventive care and basic operation of sewing machine. (03Hrs) Locate the parts of each of the functional blocks of single needle lock stitch domestic purpose machine sewing machine (0.5 Hrs.)	CO2	40	50	10
	Perform cleaning, oiling & regular maintenance of sewing machine and set the machine for basic stitching. (1Hr)				
	Perform basic setting machine by bobbin fitting and checking belt alignment and pedal control. (0.5Hr)				
	Perform basic settings, alignment and belt- changing (1Hr)				
	Perform the basic sewing operations using the machine to demonstrate simple stitches of various lengths on waste cloth pieces/ paper. (1Hrs)				
2.	Perform Basic Sewing Operations using basic tools and machine for developing different patterns (05 Hrs.) Identify different basic tools used in garment design and sewing/ stitching	CO1	40	50	10
	Prepare and present 4 samples of Straight, Zigzag, using lock stitch machine. Lock the stitch at the beginning & at the end of the stitch line. (2 Hrs)				
	Prepare and present 4 samples of circular, & lock stitch using lock stitch machine. Lock the stitch at the beginning & at the end of the stitch line. (2 hrs.)				
3.	Apply Temporary & Permanent Stitches- basting etc (06 Hrs.): Prepare and present samples of hand temporary stitches: Even basting, Uneven basting. (1.5hrs)	CO1	40	50	10
	Prepare and present samples of hand temporary stitches: Diagonal basting, Slip basting. (1.5 Hrs)				
	Prepare and present different constructive (temporary and permanent) stitches on the sample. (1Hr)				
	Prepare and present samples of hand permanent stitches: Running Stitch, Back stitch, run & back or combination stitch, Hem stitch, half back stitch. (2Hr)				
	Prepare and present samples of hand permanent stitches: Over sewing, blind hemming stitch, buttonhole stitch (2 Hr)				
4.	Apply Seams & Seam Finishes (06 Hrs) Prepare and present samples for Seams & seam finish: Plain Seams, Top Stitched seam (One Side &Two Side), French seam, Flat Felled seam, Hong - Kong Seam (4 Hrs) (Any 3 to be prepared)	CO3, CO4,	40	50	10
	Prepare and present samples for Seams & seam finish: Edge stitched finish, Pinked finish, slot finish and bias bound seam finish, (Any 3 to be prepared) (4 Hrs)				

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
5.	Use Darts & Pleats (06 Hrs) Prepare and present samples of darts and dart finishes: Single point, French and dart. (1 Hr)	CO3, CO4,	40	50	10
	Prepare and present samples of darts and dart finishes: Contour (Fish) dart. (1Hr)				
	Develop dart on actual bodice block of any size provided by teacher (2 Hr)				
	Prepare and present samples of Box pleat, Knife Pleat. (2 Hr)				
	Prepare and present samples of inverted box pleat, knife pleat (2 Hr)				
6.	Implement Neck Finishing (06 Hr) Prepare and present samples for Neck finishing- Round Neck, Square Neck using paper canvas for Children size body block (4.0 Hr)	CO3, CO4,	40	50	10
	Prepare and present samples for Neck finishing- V Neck, & any other shape of neck for Children size body block (4.0 Hr)				
7.	Implement Openings & fasteners (04 hrs): Prepare samples of front and bodice shaped one piece opening, two piece opening, faced slashed opening. (1.5 hrs)	CO3, CO4,	40	50	10
	Apply/ Implement fasteners like, hook & loop, buttons & eye lets, touch buttons to stitch at openings on above sample. (1.5 hrs)				
8.	Apply Tucks (03 Hrs): Prepare and present samples of tucks: Pin tucks, Shell tucks (2Hrs)	CO3, CO4	40	50	10
	Prepare and present samples of tucks: Graduated, Released, & Corded tucks. (2Hrs)				
9.	Implement Decorative features (03 Hrs): Prepare and present samples of gathers, shirring, ruffles (2 Hrs)	CO3, CO4	40	50	10
	Prepare and present samples of flounces, cording, waist hangings, bow, etc (2 Hrs)				
10.	Implement single colour Batik Printing (06 Hrs) Implement single colour batik printing to create a decorative table cloth for centre table.	CO5	40	50	10
Note: Teacher can Plan an article/ product/ sample (like, wall hanging, vanity hanger, letter holder, pouch, makeup kit, multipurpose wall hanging, toiletry kit, napkin holder/ roti cover) to get done from students during practical exam to assess the application of skills developed in stitching/handling sewing machine & classifying any of the above- mentioned techniques of sewing various features.					

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 needle lock stitch machine	Single needle lock stitch machine (Domestic purpose)	For all Practicals
2.	Fabric cutting shears	Fabric cutting shears 10 to 12" long, made up of metal & fiber	For all Practicals
3.	Hand & Machine sewing needles, Bobbin, bobbin case etc. Threads, Notions, fabric ring, fabric, etc.	Tools relevant for domestic sewing purpose for	For all Practicals
6.	Iron / Steam Iron for fabric	1200 to 2500-watt fabric iron/ steam iron to Iron the product/ samples.	For all Practicals
	Sketch book or Drawing sheets	Sketch book Or drawing sheet or album to paste the samples& mention the features of the same.	For all Practicals

R) Suggested Learning Resources:

1.4.A Books:

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Illustrated Guide to Sewing: Garment Construction.	Collene Dorsey	Chapel Publishing
2.	Basics of Garment construction	-	NCERT Publication
3.	Basics of pattern Making	Mithlesh Bhati	Fiber2 fashion
4.	The complete photo guide to clothing construction	Christine Haynes	Paperback
5.	Garment Construction-I	-	Central Board of Community Education
6.	Garment Construction-II	-	Central Board of Community Education

(b) Online Educational Resources: -

1. <https://sewguide.com/pattern-making-books/>
2. <https://www.fibre2fashion.com/industry-article/5658/basics-of-pattern-making>
3. <https://shoutoutla.com/meet-anita-morris-author-speaker-sewing-instructor/>
4. <https://sewport.com/learn/pattern-making>
5. <https://ncert.nic.in/vocational/pdf/ivsm103.pdf>

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: -

- A) **Course Code** : 2451107 (P2451107 / S2451107)
 B) **Course Title** : Elements of Garment Construction
 C) **Pre-requisite Course(s)** :
 D) **Rationale** :

Developing the individual garment components is the pre-requisite towards development of entire garment. The student should be able to develop modified components from the basic by following relevant manufacturing process. This course intends to develop skills in the students to identify the garment components, modifying from basic and manufacturing it. Further, this course will make the students able Students should be able to apply knowledge of garment component modifications and manufacturing to add value to final garment manufacture.

- 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 different types of seams and stitches.
CO-2 Apply fullness principles to develop modified garment components.
CO-3 Develop different types of plackets, pockets, and sleeves.
CO-4 Develop different collars, necklines, and cuffs.
CO-5 Apply hemming and garment closure techniques.

- 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	1	-	2	-	1	1		
CO-2	3	1	-	2	-	1	1		
CO-3	3	2	2	2	-	1	1		
CO-4	3	2	2	2	-	1	1		
CO-5	3	1	-	2	-	-	1		

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

* PSOs will be developed by respective programme's 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				
2451107	Elements of Garment Construction	-	-	04	02	06	03

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)	
2451107	Elements of Garment Construction	--	-	20	30	20	30	100

Legend:

PTA: Progressive Theory Assessment in classroom (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: (Not Applicable)**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 1a.</i> Enlist types of entanglements. <i>TSO 1b.</i> Explain formation of lapped seam. <i>TSO 1c.</i> Explain the given seam quality parameter. <i>TSO 1d.</i> Select the type of seams for given woven and knitted garment manufacturing. <i>TSO 1e.</i> Use method of seam finishing for relevant seam type. <i>TSO 1f.</i> Differentiate between lockstitch and chainstitch. <i>TSO 1g.</i> Identify seam and stitch defects to suggest remedial measures.	Unit-1.0 Seams and Stitches 1.1 Types of entanglements- intra-looping, interloping, interlacement 1.2 Seams- definition, types of seams- superimposed, lapped, bound, flat, decorative, French. 1.1. Seam quality parameters. 1.2. Factors for seam selection. 1.3. Seam finishing techniques. 1.4. Stitch- definition, types- lockstitch, chainstitch 1.5. Stitch sub-classes 1.6. Stitch quality parameters. 1.7. Defects and remedial measures.	CO1
<i>TSO 2a.</i> State principle of fullness used in pattern making. <i>TSO 2b.</i> Enlist different types of yokes. <i>TSO 2c.</i> Describe the dart terminology. <i>TSO 2d.</i> Explain construction of the given type of tucks. <i>TSO 2e.</i> Use types of pleats to add fullness to the given garment component. <i>TSO 2f.</i> Explain the procedure to perform gathers. <i>TSO 2g.</i> Use any or combination of pleats, darts, tucks, flare godets, gathers, shirrings, frills and ruffles to modify the given garment.	Unit-2.0 Fullness Principle in Garments 2.1 Principle of fullness and types of fullness. 2.2 Yokes: Definition, different styles and construction of yoke- simple yoke, yoke with or without fullness, midriff yokes, methods of attaching. 2.3 Darts: definition, types, and construction of darts. 2.4 Tucks: definition, types, and construction of - pin tucks, cross tuck, piped tuck, shell tucks. 2.5 Pleats: definition, types, and construction of - knife pleats, box pleats, inverted box pleats, accordion pleats, kick pleats. 2.6 Flare godets, gathers, shirrings, frills and ruffles.	CO2
<i>TSO 3a.</i> Classify plackets in inconspicuous and conspicuous category. <i>TSO 3b.</i> Explain construction method of the given type of pocket. <i>TSO 3c.</i> Describe construction of the given one piece and set-in type of sleeves.	Unit-3.0 Placket, Pocket and Sleeves 3.1 Plackets: definition, types, and construction of different conspicuous and inconspicuous plackets. 3.2 Pockets: Types and construction of pockets- patch pocket, with flap, front hip, side seam pocket, slash pocket with flap, single lip, double lip.	CO3

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 3d.</i> Develop the given type of placket, pocket, and sleeves.	3.3 Sleeves: Types- set in and one piece, and construction of sleeves - plain, puff or gathered, bell, Raglan, bishop, leg-o-mutton, Magyar, dolman, kimono.	
<i>TSO 4a.</i> Classify the collars in convertible and non-convertible type. <i>TSO 4b.</i> Suggest neck-line for the given garment type. <i>TSO 4c.</i> Explain procedure to attach the cuff to the given full sleeve shirt. <i>TSO 4d.</i> Develop the given collar, neckline, and cuffs.	Unit-4.0 Collar, Neckline and Cuff 4.1 Collars: Classification- full roll, partial roll, flat, types and construction of convertible and non-convertible collars-basic shirt collar, sailor collar, peter pan collar, scalloped collar, mandarin, shawl reverse, notch collar 4.2 Neckline: types of necklines- round neck, boat neck, V-neck, cowl neck, hater neck, turtle neck, sweat heart neck, asymmetrical neck. 4.3 Cuff- Making and attaching procedure	CO4
<i>TSO 5a.</i> Write procedure to attach the given type of waistband to lower garment. <i>TSO 5b.</i> Explain hemming procedure by using folder. <i>TSO 5c.</i> State procedure to apply relevant garment enclosure type to the given garment. <i>TSO 5d.</i> Apply hemming and garment closure techniques to the given garment.	Unit-5.0 Waistband, Hemming and Garment Enclosure 5.1 Waist Band: types-one piece, two-piece, elastic waist band, construction procedure. 5.2 Hemming Techniques: Definition, Selection of hem type, hemming techniques, machines for hemming, hemming folder. 5.3 Garment closure techniques: application of zipper, Velcro, button-hole and button, hook and eye, snap fasteners.	CO5

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

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2451107

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<i>LSO 1.1.</i> Use single needle lockstitch machine. <i>LSO 1.2.</i> Prepare samples for different seam types.	1.	Prepare sample for following seam types: • Superimposed • Lapped • bound • Flat • decorative	CO1
<i>LSO 2.1.</i> Prepare catalogue for different sewing machine types.	2.	Prepare samples for different lockstitch and chainstitch machines:	CO1
<i>LSO 3.1.</i> Use single needle lockstitch machine. <i>LSO 3.2.</i> Construct single and double dart.	3.	Prepare sample for single and double dart.	CO2
<i>LSO 4.1.</i> Use single needle lockstitch machine. <i>LSO 4.2.</i> Construct the given type of tuck.	4.	Prepare samples for following types of tucks: • Pin tuck • Cross tuck • Corded tuck • Shell tuck	CO2
<i>LSO 5.1.</i> Use single needle lockstitch machine. <i>LSO 5.2.</i> Construct the given type of pleat.	5.	Prepare samples for following types of pleats: • Knife pleat • Box pleat • Inverted box pleat • Kick pleat	CO2

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<i>LSO 6.1.</i> Use single needle lockstitch machine. <i>LSO 6.2.</i> Construct the given type of placket.	6.	Construct the following types of plackets: • top stitched /edge stitched, • concealed placket, kurta placket, • faced placket, continuous bound ,diamond plackets, • zipper placket	CO3
<i>LSO 7.1.</i> Use single needle lockstitch machine. <i>LSO 7.2.</i> Construct the given type of pocket.	7.	Construct the following types of pockets: • patch pocket, • side seam pocket, • slash pocket • Single lip, double lip.	CO3
<i>LSO 8.1.</i> Use single needle lockstitch machine. <i>LSO 8.2.</i> Construct the given type of sleeve.	8.	Construct the following types of sleeves: • Puff • Raglan • Leg-o-mutton • kimono	CO3
<i>LSO 9.1.</i> Use single needle lockstitch machine. <i>LSO 9.2.</i> Construct the given type of collar.	9.	Construct the following types of collar: • Shirt collar • Peter pan • Mandarin • Shawl collar	CO4
<i>LSO 10.1.</i> Use single needle lockstitch machine. <i>LSO 10.2.</i> Construct the given type of neckline.	10.	Construct the following types of neckline: • Round • V-neck • Boat neck	CO4
<i>LSO 11.1.</i> Construct the given type of neckline.	11.	Prepare cuff and attach to full sleeve shirt	CO4
<i>LSO 12.1</i> Perform hemming and garment closure.	12	Construct a formal shirt and apply following: • Bottom hemming • Button and buttonhole	CO5

L) Suggested Term Work and Self Learning: S2451107 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.

- Prepare pictorial charts indicating use of different seams & stitches in selected garment
- Prepare pictorial charts indicating use of different modified garment components

b. Micro Projects:

- Classify the sleeves and collars for 50 different apparels
- Perform online decade study to analyze style changes in different garment components
- Design the women wear and study the look of different types of sleeves and necklines on same given garment.

c. Other Activities:

1. Seminar Topics:

- Commercially stitched different types of modified garment components.

- Comparative study of construction of woven and knitted garments.
- Properties of different types of stitches and seam lines.
- Different work aids and attachments used in construction of modified garment components.

2. Visits:

- Visit nearby garment manufacturing industry to study construction process for different garment styles.
- Visit to different retail outlets to study different structural value additions in apparels.

3. Self-Learning Topics:

- Different work aids and attachments.
- Parts and functions of single needle lockstitch machine.
- Costing of modified garment component manufacturing.

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%	-	-	10%	20%
CO-2	-	-	30%	25%	25%	20%	20%
CO-3	-	-	30%	25%	25%	20%	20%
CO-4	-	-	10%	25%	25%	20%	20%
CO-5	-	--	15%	25%	25%	30%	20%
Total Marks	-	-	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 percentages 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: (Not Applicable)

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 sample for following seam types: • Superimposed • Lapped • bound • Flat • Decorative	CO1	30	60	10
2.	Prepare samples for different lockstitch and chainstitch machines:	CO1	30	60	10
3.	Prepare sample for single and double dart.	CO2	30	60	10
4.	Prepare samples for following types of tucks: • Pin tuck • Cross tuck • Corded tuck • Shell tuck	CO2	30	60	10
5.	Prepare samples for following types of pleats: • Knife pleat • Box pleat • Inverted box pleat • Kick pleat	CO2	30	60	10
6.	Construct the following types of plackets: • top stitched /edge stitched, • concealed placket, kurta placket, • faced placket, continuous bound, diamond plackets, zipper placket	CO3	30	60	10
7.	Construct the following types of pockets: • patch pocket, • side seam pocket, • slash pocket • Single lip, double lip.	CO3	30	60	10
8.	Construct the following types of sleeves: • Puff • Raglan • Leg-o-mutton • Kimono	CO3	30	60	10
9.	Construct the following types of collar: • Shirt collar • Peter pan • Mandarin • Shawl collar	CO4	30	60	10
10.	Construct the following types of neckline: • Round • V-neck • Boat neck	CO4	30	60	10
11.	Prepare cuff and attach to full sleeve shirt	CO4	30	60	10

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
12.	Construct a formal shirt and apply following: - Bottom hemming - Button and buttonhole	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.	Single needle lockstitch machine	Industrial SNLS machine- Juki	All
2.	Over lock machine	3-thread and 5-thread over lock machine	1,2
3.	Buttonhole and button stitch machine	Industrial buttonhole and button stitch machine- Juki	12
4.	Scissors	Scissors – fabric cutting	All
5.	Measure tape, marking chalk, tracing wheel, ruler	Measure tape, marking chalk, tracing wheel, ruler	All
6.	Fusible interlining	Fusible interlining	6, 9,10,11

R) Suggested Learning Resources:**i Books:**

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Garment Technology for fashion designers	Cooklin Gerry	Black well science Ltd, 1997, England, ISBN No. 978-1-4051-9974-2. 208
2.	Sewing for Apparel Industry	Shaeffer Claire	Pearson Publications, 2000, ISBN No.13: 978-0131884434
3.	Step by step dress making course	Aitken Leila	BBC Books, 1992, England ISBN No. 9781409352617
4.	The Technology of clothing Manufacture	Barbara Latham Carr Herald	Om Book Service, Eng, 1994 ISBN No. 978-1-4051-6198-5. 344

(b) Online Educational Resources:

i. www.pinterest.com/pin/471892867180608344/

- ii. www.fashiondesignscope.com/?p=3094
- iii. www.businessinsider.in/these-are-the-only-6-types-of-shirt-collars-guys-should-wear-2015-7?r=US&IR=
- iv. www.charlesparsons.com/categories/componentry/
- v. textilefashionstudy.com/basic-components-of-garment-sewing/
- vi. books.google.co.in/books?id=jGWWIVedQTQC&pg=PA139&lpg=PA139&dq=garment+components&source

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

- A) **Course Code** : 2400008 (P2400008 /S2400008)
- B) **Course Title** : Sports, Yoga and Meditation (Common for all Programmes)
- C) **Pre- requisite Course(s)** :
- D) **Rationale**

Sports or Physical Education, Yoga and Meditation is an integral part of a person's overall well-being and is imperative for a healthy mind and body balance. So, it is necessary that every educational institutes should lay ample emphasis on including sports, yoga and meditation as a necessary part of education, however, it depends on how it is introduced in the curriculum makes all the difference. Sports, Yoga and Meditation plays a very important role in overall Well-being for a good personality, develops value system, sense of friendliness, feeling of togetherness thereby developing team spirit and mutual cooperation. It also plays a major role in reducing level of stress/anxiety and add to the mental toughness. Looking to the ample benefits there is need to inculcate sports, Yoga and meditation as a day-to-day habit and imparting education related to physical education is more critical than ever before.

- 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 appropriate physical activities to maintain healthy lifestyle.

CO-2 Apply basic principles and practices of Yoga and meditation for overall growth & development.

CO-3 Use fitness and wellness techniques for optimal health and wellbeing

CO-4 Apply ancient Indian ayurvedic methods and techniques, exercises, yoga and meditation for fitness and wellness.

- 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 Engineer- ing Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Managem ent	PO-7 Life Long Learning	PSO-1	PSO-2
CO-1	3	3	3	-	1	-	2		
CO-2	3	3	3	-	1	-	2		
CO-3	3	3	3	-	1	-	2		
CO-4	3	2	1	-	1	-	1		

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				
2400008	Sports, Yoga and Meditation	-	-	01	01	02	01

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)	
2400008	Sports, Yoga and Meditation	-	-	10	-	06	09	25

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: (Not Applicable)

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO.1a</i> Explain ancient history and development of yoga in India <i>TSO.1b</i> Compare the ancient Indian games with the modern games. <i>TSO.1c</i> Differentiate between given terms used in sports <i>TSO.1d</i> Describe the different aspects of Mental Toughness <i>TSO.1e</i> Use Imagery Training for sports <i>TSO.1f</i> Apply motivation techniques to motivate students in sports. <i>TSO.1g</i> Use concentration techniques for playing and exercising. <i>TSO.1h</i> Manage Stress, Anxiety and Arousal during sports. <i>TSO.1i</i> Select sports and exercise for healing and developing health and mental wellness <i>TSO.1j</i> Describe the impact of parents' involvement in their children's sports activities <i>TSO.1k</i> Select sports and exercises for physically challenged as per their need.	Unit-1.0 Sports and Exercises 1.1 Historical development of physical activities and sports in India, Indian ancient games- Kho-Kho and Kabaddi, Chariot races, riding elephants and horse, swordsmanship, wrestling, boxing, atyapatya, archery, dancing, dands baithak, malkhamb, lezim, lathi etc 1.2 Origin of traditional sports, 3rd century BCE-martial arts and archery, indoor games like Chess and Snakes & Ladders have origins in ancient India, in the form of games of Chaturanga and Gyan Chauper, 1.3 Dholavira, the world's oldest terraced arena 3000 BC 1.4 Definition of play, game, sports, exercise, psychology, sports psychology and exercise psychology, psychology and common sense. 1.5 Mental toughness- mind, Imagery, use of imagery and imagery in sports, types of imagery (visual, kinesthetic, auditory and olfactory) 1.6 Motivation in sport and goalsetting in sports 1.7 Arousal regulation – self-awareness of regulation, anxiety reduction techniques-somatic anxiety reduction techniques, cognitive Anxiety reduction, multimodal anxiety reduction, coping with stress. Arousal-inducing techniques. Arousal and anxiety measurement factors, Arousal and anxiety signs recognition 1.8 Nutrition and rehabilitation, Importance of concentration and attentional focus in sports and training, Impact of health on healing from physical athletic injuries. Impact of exercise to increase mental wellness, Role of coach in sports, parents' involvement in their children's sports activities. 1.9 Adaptation of sports and exercises for physically challenged students in all levels.	CO1, CO4
<i>TSO.2a</i> Explain ancient history and development of yoga in India <i>TSO.2b</i> Identify the physiology of yoga and meditation. <i>TSO.2c</i> Evaluate meditation and yoga as a healing modality. <i>TSO.2d</i> Select asanas and pranayama as per need. <i>TSO.2e</i> Describe the effect of yoga and meditation on ageing, stress and hypertension. <i>TSO.2f</i> Select mediation techniques as per the need. <i>TSO.2g</i> Explain Bandha, Mudra and Chakra <i>TSO.2h</i> Enumerate the steps of Suryanamaskar. <i>TSO.2i</i> Select Yoga and Meditation for physically challenged as per their need.	Unit-2.0 Yoga and Meditation 2.1 Origin of yoga, History and development of yoga, Adi yogi, evidences of yoga in pre-Vedic period (2700 B.C.), Vedic Period, Pre-Classical Period, Classical Period- Patanjali's period, Modern Period. 2.2 Yoga practices and the related literature-Vedas (4), Upanishads (108), Smritis, teachings of Buddhism, Jainism, Panini, Epics (2), Puranas (18) 2.3 Importance of Yoga & Mediation, meaning of the term Yoga and Meditation, Fundamentals Principles of Yoga & Fitness training, Eight Limbs of Yoga	CO2, CO4

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	2.4 Difference between yoga asana and physical exercises, Difference between yoga and meditation 2.5 Role of Yoga and Meditation in Purificatory Process, in character building, developing concentration, will power and discipline 2.6 Types of Yoga Practices - Asanas, Pranayama, Meditation 2.7 Mindfulness – knowing the mind, training the mind, feeling the mind 2.8 Different Methods of meditation, Physiology of meditation, Mental, physical and emotional benefits of Asanas, Pranayama, Concentration and Meditation 2.9 Bandha, Mudra and Chakra 2.10 Effects of Asanas and pranayama on physiology of human body 2.11 Importance of “Suryanamaskar” 2.12 Adaptation of Yoga and meditations for physically challenged students in all levels. 2.13 Yoga Asanas Do’s and Don’ts for Beginners	
TSO.3a Explain the ancient Indian ayurvedic methods for fitness and wellness TSO.3b Identify the different factors affecting the fitness and wellness in the given situation TSO.3c Use different methods to maintain Health and Wellness TSO.3d Explain the components of Balance Diet TSO.3e Identify the causes of stress and anxiety in the given situation TSO.3f Use stress reduction techniques to manage Stress and Anxiety TSO.3g Manage Stress, Anxiety and Depression in the given situation TSO.3h Select recovery process for energy replenishment after exercise.	Unit 3.0 Fitness and Wellness 3.1 Evolution of wellness, 3,000-1,500 BC: Ayurveda –holistic system, Tailored Ayurvedic regimens as per unique constitution of each person (their nutritional, exercise, social interaction and hygiene needs) – with the goal of maintaining a balance that prevents illness. 3.2 Meaning, Importance, Definition and dimensions of Health and Wellness (WHO/Yoga) 3.3 Factors affecting Fitness and Wellness 3.4 Role of Physical Activities and Recreational Games in maintaining physiological and psychological wellbeing. 3.5 Different Methods to Maintain Health, Wellness and to enhance mood 3.6 Nutrition for Health & Wellness, Relationship between Diet and Fitness Components of Balance Diet and its importance – Carbohydrates, Protein, Fat, Vitamins & Minerals, Water, Healthy Lifestyle through Diet and Fitness 3.7 Anxiety, Stress and Aging-Meaning of Anxiety, Stress and Aging, Types and Causes of Stress, 3.8 Stress, anxiety and depression reduction with exercise, yoga and meditation 3.9 Energy Continuum and Recovery Process, Metabolism and exercise, Recovery from exercise, Replenishment of energy stores during recovery process, Removal of excess lactic acid produced during exercise	CO3, CO4

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

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2400008

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
<i>LSO 1.1.</i> Perform various sports activities for overall growth and development <i>LSO 1.2.</i> Select suitable sport activities as per your need.	1.	Track & Field: Running, Jumping, walking and Throwing, Cycling Event to develop Endurance, Speed, Strength, Agility, Flexibility etc	CO1
	2.	Aerobics and Gymnastics to develop Strength, Agility and Flexibility	
	3.	Net/Wall Sports – Volleyball and Basketball to develop Endurance, Speed, Strength, Agility and Flexibility	
	4.	Striking & Fielding sports like Cricket, bowling, Hockey, Football Baseball etc. to develop Endurance, Speed, Strength, Agility, Flexibility and Coordination	
	5.	Racket Game- Tennis, Badminton, Table tennis etc to develop Endurance, Speed, Strength, Agility and Flexibility	
	6.	Outdoor games: Kho-Kho and Kabaddi and cycling develop Endurance, Speed, Strength, Agility and Flexibility	
	7.	Indoor games: Chess and Carrom, Swimming, Boxing, Karate Weightlifting, Power Lifting, Physique Training, Archery, Roller Skating etc to develop concentration.	
	8.	Prepare and organize Adapted Sports for various levels of physically challenged and impairments.	
<i>LSOs 2.1</i> Perform various yogic techniques for internal purification and development.	9.	Shat Karmas: Tratakam, Jala-Neti, Sutra-Neti, Vamana Dhauti, Danda Dhauti, Agnisara, Nauli	CO2
	10.	Perform following asanas with correct posture: Ardha-Padmasana [virasana], Ardha-Halasana, Pavana-Muktasana, Naukasana, Ardha-shalabhasana, Shalabhasana, Makarasan, Bhujangasana, Dhanurasana	
	11.	Perform following asanas with correct posture: Vakrasana, Chakrasana, Paschimottanasana, Ugrasana, Gomukhasana, Padmasana, Siddhasana, Bhadrasana, Swastikkasana, Vajrasana, Supta-Vajrasana, Yoga-Mudra	
	12.	MUDRAS & SURIYANAMASKAR Brahma-Mudra, Simha-Mudra, Shanmugi Mudra, Viparithakarani-Mudra, Ashwsini-Mudra, Suriyanamaskar	
	13.	BANDHAS Jalandhara-Bandha, Jihva-Banda, Uddiyana Bandha, Moola-Bandha	
	14.	PRANAYAMAS Nadi-Shuddhi, Nadi-Shodhana, Suryabhadana, Ujjayi, Bhastrika Pranayama, Bhramari Pranayama, Sitkari, Sitali, Kapalabhati	
	15.	MEDITATION -Silent Meditation	
	16.	MEDITATION – Mantra Meditation	
<i>LSO 3.1.</i> Prepare diet chart for optimal health and wellbeing	17.	Prepare a diet chart for the given sport.	CO3
<i>LSO 3.2.</i> Use health monitoring device	18.	Measure heart rate and heart function with health monitoring device	
	19.	Measure blood sugar and blood pressure	

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 3.3. Use different equipment's	20.	Use massage therapy equipment, Hot and cold therapy equipment, Ultrasound therapy equipment	
LSO 3.4. Identify your own threshold and identification level for different taste Stimulations	21.	Determine the taste threshold for three different sensations- sweet salty and sour	
LSO 3.5. Check the given sample for conformance to the standard for moisture content.	22.	Determine the moisture content in the given sample of oil/fat	
LSO 3.6. Purity tests of oils/fats	23.	Determine the impurities in the given sample of oil.	
LSO 3.7. Acidity test in given sample of fat/oil	24.	Determines the acid value and free fatty acids in the given sample of oil/fat.	
LSO 3.8. Check whether any given samples of oils/fats conform to the standard.	25.	Determine the peroxide value in the given sample of fat or oil.	

L) Suggested Term Work/ Activities and Self Learning: S2400008 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. Calculate your Body Composition (BMI) and Cardiovascular Assessment
- ii. Assessment for Muscular Endurance, Muscular Strength,
- iii. Flexibility, Cardio-respiratory Endurance, Body Composition
- iv. Rules and Regulations of different indoor and outdoor games.

b. Micro Projects:

- i. Identify and synthesize the factors that influence health in various situations (05 situations). Prepare a report with details of situations and solutions to remove the factors.
- ii. Visit different sports club, gyms, and schools and identify various measure taken by them for Fitness and wellness of students/ members
- iii. Visit different sports club, gyms, and schools and identify various measure taken by them for Fitness and wellness of physically challenged students/ members
- iv. Identify which type of stress, anxiety and depression students are facing and steps and solutions to overcome this.

c. Other Activities:

1. Seminar Topics:

- Identify the health-related challenges in current time and able to apply the preventive measures.
- Role of peers, community and media in health and wellbeing in each level
- Knowledge and skills required to preserve community health and well-being
- Effect of yoga and meditation in maintaining fitness.
- Methods to involve physically challenged students /members in all levels in sports, yoga and meditation in community.
- Counselling techniques to counsel players in matters of handling success and failure.

2. Visits: Visit nearby sports complex, Gyms, stadium etc and prepare a report on hygiene maintenance, medical facilities available, facilities available for physically challenged members, facilities available for old aged members, tools and equipment available and training facilities.

3. Self-Learning Topics:

- Anatomy and physiology of human being
- Role of Yoga and Meditation in Purificatory Process, in character building, developing concentration, will power and discipline
- Mindfulness
- Different Methods to Maintain Health, Wellness and to enhance mood
- Diet and Nutrition
- Metabolic adaptations to exercise
- Cardio-respiratory changes

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, CO4	-	-	35%	-	-	35%	35%
CO-2, CO4	-	-	35%	-	-	35%	35%
CO-3, CO4	-	-	30%	-	-	30%	30%
Total Marks	-	-	10	-	-	06	09
			10				

Legend:

- *: Other Activities include self- learning, seminar, visits, surveys, product development, software development etc.
 **: Mentioned under point- (N)
 #: Mentioned under point-(O)

Note:

- The percentages 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: (Not Applicable)

O) Suggested Assessment Table for Laboratory (Practical):

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
1.	Track & Field: Running, Jumping, walking and Throwing, Cycling Event to develop Endurance, Speed, Strength, Agility, Flexibility etc	CO1	30	60	10
2.	Aerobics and Gymnastics to develop Strength, Agility and Flexibility		30	60	10
3.	Net/Wall Sports – Volleyball and Basketball to develop Endurance, Speed, Strength, Agility and Flexibility		30	60	10
4.	Striking & Fielding sports like Cricket, bowling, Hockey, Football Baseball etc. to develop Endurance, Speed, Strength, Agility, Flexibility and Coordination		30	60	10
5.	Racket Game- Tennis, Badminton, Table tennis etc to develop Endurance, Speed, Strength, Agility and Flexibility		30	60	10
6.	Outdoor games: Kho-Kho and Kabaddi and cycling develop Endurance, Speed, Strength, Agility and Flexibility		30	60	10
7.	Indoor games: Chess and Carrom, Swimming, Boxing, Karate Weightlifting, Power Lifting, Physique Training, Archery, Roller Skating etc to develop concentration.		30	60	10
8.	Prepare and organize Adapted Sports for various levels of physically challenged and impairments.		30	60	10
9.	Shat Karmas Tratakam, Jala-Neti, Sutra-Neti, Vamana Dhauti, Danda Dhauti, Agnisara, Nauli	CO2	40	50	10
10.	Perform following asanas with correct posture: Ardha-Padmasana [virasana], Ardha-Halasana, Pavana-Muktasana, Naukasana, Ardha-shalabhasana, Shalabhasana, Makarasan, Bhujangasana, Dhanurasana		40	50	10
11.	Perform following asnas with correct posture: Vakrasana, Chakrasana, Paschimottanasana, Ugrasana, Gomukhasana, Padmasana, Siddhasana, Bhadrasana, Swastikkasana, Vajrasana, Supta-Vajrasana, Yoga-Mudra		40	50	10
12.	MUDRAS & SURIYANAMASKAR Brahma-Mudra, Simha-Mudra, Shanmugi Mudra, Viparithakarani-Mudra, Ashwsini-Mudra, Suriyanamaskar		40	50	10
13.	BANDHAS Jalandhara-Bandha, Jihva-Banda, Uddiyana Bandha, Moola-Bandha		40	50	10
14.	PRANAYAMAS Nadi-Shuddhi, Nadi-Shodhana, Suryabhadana, Ujjayi, Bhastrika Pranayama, Bhramari Pranayama, Sitkari, Sitali, Kapalabhati		40	50	10
15.	MEDITATION -Silent Meditation		40	50	10
16.	MEDITATION - Mantra Meditation		40	50	10
17.	Prepare a diet chart for the given sport.	CO3	40	50	10
18.	Measure heart rate and heart function with health monitoring device		40	50	10
19.	Measure blood sugar and blood pressure		40	50	10
20.	Use massage therapy equipment, Hot and cold therapy equipment, Ultrasound therapy equipment		40	50	10

S. No.	Laboratory Practical Titles	Relevant COs Number(s)	PLA/ELA		
			Performance		Viva-Voce (%)
			PRA* (%)	PDA** (%)	
21.	Determine the taste threshold for three different sensations- sweet salty and sour		40	50	10
22.	Determine the moisture content in the given sample of oil/fat		40	50	10
23.	Determine the impurities in the given sample of oil.		40	50	10
24.	Determines the acid value and free fatty acids in the given sample of oil/fat.		40	50	10
25.	Determine the peroxide value in the given sample of fat or oil.		40	50	10

Note: -All the above Games can be selected from the list of SGFI/AIU/IOA

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 for record keeping	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.	Aerobics and Gymnastic	Basic facilities and equipment's – Balance Beams, Gymnastic Ball, Gymnastic Chalk, Gymnastic Clubs, Flex Floor Systems, High Bars, Hoops, Horizontal Bars, Leotards, Music, Parallel Bar, Pommel Horses, Ribbons, Rings, Ropes, Single Bar Trainer, Spotting Blocks, Streamers, Trampoline, Tumble Track, Uneven Bar, Vault, Vault Spring Board Gymnastic Accessories – Chalk, Grips, Wrist Supports, Mat, Tape, Socks Singlets, Pants Shoes, Shorts Aerobics- Resistance bands, Jump rope, Step bench or box, Abdominal wheel, Exercise mat, Gliding discs, dumbbells, fitness trampolines, hoops	2
3.	Striking & Fielding sports	Complete Cricket Kit, Football Kit, Bowling Kit, Hockey Kit	4
4.	Net/Wall Sports	Complete Volley Ball and basketball kit	3
5.	Racket Game	Complete Tennis Kit, Table Tennis Kit and badminton kit	5
6.	Outdoor games	Complete Kho-Kho and Kabaddi and cycling kit	6

S. No.	Name of Equipment, Tools and Software	Broad Specifications	Relevant Experiment/ Practical Number
7.	Indoor games	Complete Chess kit, Carrom kit, Swimming kit, Boxing kit, Karate kit, Weightlifting kit, Power Lifting kit, Archery kit and Roller-Skating kit	7
8.	Physique Training	Cardio Machines- Treadmills, Elliptical Trainers, Exercise Bikes, Rowing Machines, Indoor Bikes, Vibration Machines, Steppers Recumbents Dumbbells, Multi-Purpose Bench, power rack, Adjustable Dumbbell Set 2 x 3-10 kg, Exercise mat, resistance band, balance trainer	7
9.	Sports and wellbeing equipment's for physically challenged and impairments.	Fusion Wheel – all-in-one portable wheelchair gym, Pedal exerciser, Deluxe hand exerciser, Greeper sports shoelaces, Active Hands, Ramble Tag Guidance Aid, Cat Tongue Grip Tape Adaptive Cycling- Straps, Leg/ Foot Adapters, Prosthetics, Steering Dampener, Handlebar Adapters, HANDCYCLING-Wheelchairs, Bike-On Handcycles, Trikes, Racing Wheelchairs, Trikes, Recumbent Bikes, All-terrain Handcycles, Mono Cycling, Hand Bikes - Off-Road, Cross Country, Racing, Downhill Archery - Field Tripod and Quad Mounts (Archery & Gun), In-Line Draw-Loc, Mounts (Archery & Gun), Stands (Gun), Mounts (Archery & Gun) Binoculars and Rests (Gun), Crossbows (Archery), Wheelchair Platform Stabilizing Crutch Poles, Dampeners, Crossbows (Archery), Hands free shooting rest (Gun) Bowling: ramp, roll assist Fitness: Anti-Gravity Treadmill, LapMat for Wheelchairs, Strike Assist, Adaptive Treadmill	8
10.	Yoga	Yoga Mats, Yoga Rollers, Yoga Blocks, Aero Yoga Clothing Blankets, cloth Straps, Bolsters, Wheels	9-16
11.	Fitness and wellbeing equipment's	Health monitoring devices for overall health- Personal health monitor for heart health, Blood sugar monitoring device, Wireless blood pressure device, Smart watch to track heart function, Hot and cold therapy equipment, Massage therapy equipment, Ultrasound therapy equipment	18-20
12.	Taste kit -To test three different sensations- sweet salty and sour	Salt solution (%) -0.5, 0.8, 1.0, 1.2, 1.5, Sugar solution (%) - 0.05, 0.5, 0.7, 1.0, 1.2, Citric acid (%) - 0.02, 0.04, 0.1, 0.5, 1.0 Spoons, Bowls, Beakers, Plain distilled water	21
13.	Test kit to measure peroxide value in the oil	Reagents: Acetic acid-chloroform solution, Saturated potassium iodide solution, Sodium thiosulphate solution- 0.1 N, Starch solution (1%) Apparatus: Pipette 1ml capacity, Conical flask	25
14.	Test kit to measure acid value and free fatty acids in the oil	Sample of oil/fats namely any refined oil or hydrogenated fat. Reagents - ethyl alcohol (95%), phenolphthalein indicator solution, standard aqueous sodium or potassium hydroxide solution (0.1 N or 0.5 N), Pipette (10 ml), Conical flask	24
15.	Test kit to measure impurities in the oil	Sample of Oil/fat, Oven-electric, maintained at $100 \pm 1^\circ\text{C}$., Desiccator, Weighing balance, Filter paper	23
16.	Test kit to measure moisture content in the oil	Sample of oil/fat, Moisture dish-made of porcelain, silica, glass or aluminum, Oven-electric, maintained at $105 \pm 1^\circ\text{C}$., Desiccator Weighing balance	22

R) Suggested Learning Resources:

- Books:**

S. No.	Titles	Author(s)	Publisher with ISBN
1.	Practical Applications in Sports Nutrition	Heather Hedrick Fink, Alan E. Mikesky	Jones & Bartlett Learning (2020) ISBN No: 978-1284181340
2.	Massage and Medical Gymnastics,	Lace, M. V.	London: J & A Churchill Ltd. ASIN: B000RY4YB0
3.	ACSM's Guidelines for Exercise Testing and Prescription	Gary Liguori	LWW; (2021) ISBN-13: 978-1975150198
4.	Essentials of Strength Training and Conditioning	Javair Gillett	Human Kinetics, (2021) ISBN-13: 978-1718210868
5.	Practical Applications in Sports Nutrition	Heather Hedrick Fink, Alan E. Mikesky	Jones & Bartlett Learning, (2017) ISBN-13: 978-1284101393
6.	Health Fitness Management	Mike Bates, Mike Spezzano, Guy Danhoff	Human Kinetics, (2019) ISBN-13: 978-1450412230
7.	Yoga for Every Body: A beginner's guide to the practice of yoga postures, breathing exercises and meditation	Luisa Ray, Angus Sutherland	Vital Life Books (2022) ISBN-13: 978-1739737009
8.	Science of Yoga: Understand the Anatomy and Physiology to Perfect Your Practice	Ann Swanson	DK Publisher, (2019) ISBN-13: 978-1465479358
9.	Mudras for Modern Living: 49 inspiring cards to boost your health, enhance your yoga and deepen your meditation Cards	Swami Saradananda	Watkins Publishing (2019) ISBN-13: 978-1786782786
10.	Principles and Methods of Adapted Physical Education & Recreation	Kristi Roth, Laurie Zittel, Jean Pyfer, David Auxter	Jones & Bartlett Learning, (2016) ISBN-13: 978-1284077810
11.	Adapted Physical Education and Sport Sixth Edition	Joseph P. Winnick, David L. Porretta	Human Kinetics, (2016) ISBN-13: 978-1492511533
12.	Counselling Skills in Applied Sport Psychology: Learning How to Counsel	Paul McCarthy, Zoe Moffat	Routledge, (2023) ISBN-13: 978-1032592589
13.	Basic Counselling Skills: A Helper's Manual	Richard Nelson Jones	Sage Publication 2012, New Delhi.
14.	Advancements in Mental Skills Training (ISSP Key Issues in Sport and Exercise Psychology)	Maurizio Bertollo, Edson Filho, Peter Terry	Routledge, (2020) ISBN-13: 978-0367111588
15.	The Relaxation and Stress Reduction Workbook	Martha Davis, Elizabeth Robbins, Matthew McKay, Eshelman MSW	A New Harbinger Self-Help Workbook (2019)
16.	Patanjalis Yoga Sutras	Swami Vivekananda	Fingerprint Publishing (2023) Prakash Books India Pvt Ltd, New Delhi ISBN-13: 978-9354407017

(b) Online Educational Resources:

- i. https://onlinecourses.swayam2.ac.in/aic19_ed28/preview- introduction to Yoga and Applications of Yoga
- ii. https://onlinecourses.swayam2.ac.in/aic23_ge09/preview- Yoga for Creativity
- iii. https://onlinecourses.swayam2.ac.in/aic23_ge05/preview- Yoga for concentration
- iv. https://onlinecourses.swayam2.ac.in/aic23_ge06/preview- yoga for memory development
- v. https://onlinecourses.nptel.ac.in/noc21_hs29/preview-Psychology of Stress, Health and Well-being
- vi. https://onlinecourses.swayam2.ac.in/nce19_sc04/preview- Food Nutrition for Healthy Living - Course – Swayam
- vii. <https://www.classcentral.com/course/swayam-fitness-management-17608>- Fitness Management from Swayam
- viii. https://onlinecourses.swayam2.ac.in/nce19_sc04/preview-Food Nutrition for Healthy Living
- ix. https://onlinecourses.swayam2.ac.in/cec21_ed02/preview Health Education and Recreation
- x. https://onlinecourses.swayam2.ac.in/cec22_ed31/preview Sports Administration and Management

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:

- i. <https://www.yogajournal.com/yoga-101/philosophy/good-read>
- ii. <http://hdl.handle.net/123456789/38171>- Yoga Philosophy
- iii. <https://yoga.ayush.gov.in>

- A) **Course Code** : **2400108 (T2400108)**
- B) **Course Title** : **Essence of Indian Knowledge System and Tradition**
(Common for all Programmes)
- C) **Pre- requisite Course(s)** :
- D) **Rationale** :

This course will survey the basic structure and operative dimensions of Indian knowledge system. With the new education policy-NEP 2020 focusing on Indian Knowledge Systems (IKS) and Traditions of India. This course introduces the learners to the rich and varied knowledge traditions of India from antiquity to the present. This also helps the learner to know and understand their own systems and traditions which are imperative for any real development and progress. Also, it helps the learner to think independently and originally adopting Indian frameworks and models for solving the problems related to world of work where the student is supposed to perform.

- E) **Course Outcomes (COs):** After the completion of the course, teachers are expected to ensure the accomplishment of following course out comes 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 Identify the rich heritage and legacy residing in our Indian Knowledge systems.

CO-2 Correlate the technological & philosophical concepts of IKS with engineering domain specific problems and local problems for finding out possible solutions.

- 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	2	-	-	-	1	1	1		
CO-2	1	2	2	-	3	1	1		

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				
2400108	Essence of Indian Knowledge System and Tradition	01	-	-	-	01	01

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)	
2400108	Essence of Indian Knowledge System and Tradition	25	-	-	-	-	-	25

Legend:

- PTA: Progressive Theory Assessment in classroom (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: T2400108

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 1a.</i> Explain the architecture of the Ancient Indian Knowledge Systems. <i>TSO 1b.</i> List the salient features of IKS. <i>TSO 1c.</i> Comprehend the given IKS model. <i>TSO 1d.</i> Identify the role and relevance of the given IKS model in contemporary society.	Unit-1.0 Introduction to Indian Knowledge Systems 1.1. Overview of IKS 1.2. Organization of IKS – चतुर्दश-विद्यास्थानं 1.3. Conception and Constitution of Knowledge in Indian Tradition 1.4. The Oral Tradition 1.5. Models and Strategies of IKS	CO1
<i>TSO 2a.</i> Enlist the importance of Veda, Vedanga, Visaya, Siksaka. <i>TSO 2b.</i> Describe the given IKS domain. <i>TSO 2c.</i> Identify elements of mentioned IKS domains that are relevant to Technical Education System. <i>TSO 2d.</i> Correlate the elements of mentioned IKS domains with given engineering domain.	Unit-2.0 Overview of IKS Domains and Relevance in Current Technical Education System. 2.1 The Vedas as the basis of IKS 2.2 Overview of all the six Vedangas 2.3 Relevance of following IKS domains in present Technical Education System: • Arthashastra (Indian economics and political systems) • Ganita and Jyamiti (Indian Mathematics, Astronomy and Geometry) • Rasayana (Indian Chemical Sciences) • Ayurveda (Indian Biological Sciences / Diet & Nutrition) • Jyotish Vidya (Observational astronomy and calendar systems) • Prakriti Vidya (Indian system of Terrestrial/ Material Sciences/ Ecology and Atmospheric Sciences) • Vastu Vidya (Indian system of Aesthetics- Iconography and built-environment /Architecture) • Nyaya Shastra (Indian systems of Social Ethics, Logic and Law) • Shilpa and Natya Shastra (Indian Classical Arts: Performing and Fine Arts) • Sankhya and Yoga Darshna (Indian psychology, Yoga and consciousness studies) • Vrikshayurveda (Plant Science / Sustainable agriculture/food preservation methods)	CO1, CO2

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

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: (Not Applicable)

L) Suggested Term Work and Self Learning: (Not Applicable) 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:

- Write a report on any IKS domain highlighting the correlation with one domain specific engineering course.

c. Other Activities:

1. Seminar Topics:

- discuss any one IKS domain in details a highlighting the eminent works in the area.

2. Visits:

- Visit any nearby ancient temple and correlate the geomatical, Shilpa and Vaastu on IKS dimensions specified in each domain.

3. Self-Learning Topics:

- Sustainable practices adopted in ancient India that can be applied for current engineering situations.

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	-	-	-	-	-	-	-
CO-2	100%	-	-	-	-	-	-
Total Marks	25	-	-	-	-	-	-

Legend:

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

** : Mentioned under point- (N)

: Mentioned under point-(O)

Note:

- The percentages 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: (Not Applicable)

O) Suggested Assessment Table for Laboratory (Practical): (Not Applicable)

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: (Not Applicable)

R) Suggested Learning Resources:

ii **Books:**

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Introduction to Indian Knowledge System: Concepts and Applications	Archak, K.B. (2012).	Kaveri Books, New Delhi
2.	Introduction to Indian Knowledge System: Concepts and Applications	Mahadevan, B. Bhat, Vinayak Rajat Nagendra Pavana R.N.	PHI, ISBN: 9789391818203
3.	Glimpse into Kautilya's Arthashastra	Ramachandrudu P. (2010)	Sanskrit Academy, Hyderabad
4.	"Introduction" in Studies in Epics and Purāṇas, (Eds.)	KM Munshi and N Chandrashekara Aiyer	Bhartiya Vidya Bhavan

(b) Online Educational Resources:

- <http://bhavana.org.in>
- www.academia.edu/23254393/Science_in_Ancient_India_-_an_educational_module
- www.academia.edu/23305766/Technology_in_Ancient_India_-_Michel_Danino
- www.hamsi.org.nz/http://insaindia.res.in/journals/ijhs.php
- www.niscair.res.in/sciencecommunication/ResearchJournals/rejour/ijtk/ijtk0.asp
- www-history.mcs.st-andrews.ac.uk/Indexes/Indians.html

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:

- Swami Harshananda. "A bird's eye view of vedas". R K Math. Bangalore., [http:// rkmathbangalore.org/Books/ABirdsEyeViewOfTheVedas.pdf](http://rkmathbangalore.org/Books/ABirdsEyeViewOfTheVedas.pdf).
- Sanskrit Prosody, https://en.wikipedia.org/wiki/Sanskrit_prosody.
- Vartak, P.V. (1995). "Veda and Jyotish," Part II, Chapter 2, in Issues in Veda and Astrology, H Pandya (Ed.), pp 65 – 73.
- Sundaram, A.V. (1995). "Astrology: Its usefulness and Limitations in ModernTimes", Part II, Chapter 9, in Issues in Veda and Astrology, H Pandya (Ed.), pp 129 – 135.
- Archak, K.B. (2012), "The Vedanga Literature", Chapter VIII in Essentials of Vedic Literature, Kaveri Books, New Delhi, pp 330 – 391.
- Vasant Lad (1996), "Ayurveda: A Brief Introduction and Guide", (whole article).

- A) **Course Code** : 2451110 (T2451110)
- B) **Course Title** : Basics of Intellectual Property Rights (IPR)
(FCT, TE)
- C) **Pre- requisite Course(s)** :
- D) **Rationale** :

Many of the entrepreneurs make many mistakes in the process of setting up their enterprise. This course will prepare the diploma students to avoid such mistakes. In this course, the diploma student will learn to protect their work/assets/product which is otherwise called as their intellectual property. This includes Patents, Copyrights, Trademarks, Geographical Indications, Industrial designs, layout of Integrated Circuit design, Trade and Trade secrets. This course is designed to educate students so that they will be able to protect their intellectual property/ work/ product based on appropriate classification mentioned.

- 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** Realize the need and significance of IP and IPR in India.
- CO-2** Protect your innovative product/work under Patent, Copy right, Trademark, Geographical Indication and Plant variety and Farmer's right
- CO-3** Protect your innovative product under Industrial Design/ Layout design of Integrated Circuit/Trade secret.

- 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	1	1	2	1	-	2		
CO-2	3	2	3	2	3	-	3		
CO-3	3	3	3	2	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 Title	Scheme of Study (Hours/Week)				
	Classroom Instruction (CI)		Notional Hours (TW+ SL)	Total Hours (CI+TW)	Total Credits (C)
	L	T			
Basics of IPR	02	-	-	-	02

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)	
2451110	Basics of IPR	25	-	25	-	-	-	50

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.

I) Theory Session Outcomes (TSOs) and Units: T2451110

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 1a.</i> Explain the concept of Intellectual Property (IP) and Intellectual Property Right (IPR). <i>TSO 1b.</i> Enlist the types of IPR and the type of protection it offers to a product. <i>TSO 1c.</i> Explain the enforcement of IPR <i>TSO 1d.</i> Name the legislations covering different types of IPRs in India.	Unit-1.0 Introduction to IPR and its Enforcement 1.1. Concept of IP and IPR and its importance 1.2. Types of IPR – Patent, Copyright, Trademark, Geographical Indications, Industrial designs, Layout design of Integrated Circuit and Trade secret 1.3. Enforcement of IP on a given product 1.4. Legislations covering IPRs in India	CO1
<i>TSO 2a.</i> Explain the need and significance of Copyright/Trademark/GI/ Plant variety and farmer's right <i>TSO 2b.</i> Enlist the works entitled for protection under Patent/Copyright/Trademark/GI/ Plant variety and farmer's right	Unit-2.0 Patent, Copyright, Plant Variety and Farmer's Right and Geographical Indications 2.1 Patent - Need and significance of patent, Types of Patents, tenure, legislation and	CO1, CO2

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
<i>TSO 2c.</i> List the work & protected under patent/copyright/Trademark/GI/ Plant variety and Farmer's right <i>TSO 2d.</i> Mention the legislation set up in India and fees applicable for getting Patent/Copyright/Trademark/GI/ Plant variety and Farmer's right. Also mention the tenure of protection	organization set up in India and fees and brief procedure of patent filing in India 2.2 Copyright -Need and significance of Copyright, entitlement to protection of copyright, works protected, tenure, legislation and organization set up in India and fees 2.3 Trademark - Need and significance of trademark, entitlement to protection of trademark, works protected, tenure, legislation and organization set up in India and fees, Procedure for filing application for Trademark, Passing and infringement of trademark 2.4 Geographical Indications (GI)-Need and significance of GI, entitlement to protection of GI, works protected, tenure, legislation and organization set up in India and fees, Passing and infringement of GI 2.5 Plant Variety & Farmer's Rights – Need and significance, entitlement to protection of plant varieties, register able plant varieties in India, Duration of protection for a registered new plant variety	
<i>TSO 3a.</i> Explain the need and significance of Industrial Design/ Layout design of Integrated Circuit/Trade secret. <i>TSO 3b.</i> Enlist the works entitled for protection under of Industrial Design/ Layout design of Integrated Circuit/Trade secret. <i>TSO 3c.</i> List the work protected under Industrial Design/ Layout design of Integrated Circuit/Trade secret. <i>TSO 3d.</i> Mention the legislation set up in India and fees applicable for getting Industrial Design/ Layout design of Integrated Circuit, also mention the tenure of protection <i>TSO 3e.</i> Explain the strategies to protect trade secret in India with 2 examples	Unit-3.0 Industrial Designs, Layout Design of Integrated Circuits, and Trade Secrets 3.1 Industrial Designs -Need and significance of Industrial Designs, entitlement to protection of designs, works protected, tenure, legislation and organization set up in India and fees, Infringement of design right 3.2 Layout design of Integrated Circuit - Need and significance of protection of layout designs for Integrated Circuits. entitlement to protection, works protected, tenure, legislation and organization set up in India and fees, and Infringement 3.3 Trade secret- Need and significance of Trade secret protection. entitlement to protection, works protected, tenure, legislation and organization set up in India and fees, strategies to protect trade secret in India	CO3

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

J) Suggested Term Work/ Activities and Self Learning: 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. A product is always protected simultaneously by more than one type of IPR and there is always the overlapping of rights. Considering the example of purple pill or any other product, highlight the enforcement of IP particularly Patent, Copyright, Trademark, design, and trade secret.
- ii. Mr. A has discussed an idea of a long story with Mr. B and Mr. C. Later, Mr. C has written a Novel based on discussion. Who will be author and owner of this novel? Analyze and answer
- iii. Mr. A has written a book on "How to arrange library books". Mr. B reads that book and arranges the books as discussed in that book. Whether Mr. B will be liable for copyright infringement? Analyze
- iv. Mr. Ram has created and designed an innovative website. Analyze the appropriate protection mechanism/s for that website. How to protect IC layout in India? Analyze and answer.
- v. Mention the role played by a patent document in innovation, R &D
- vi. Is it possible to register the shape and configuration of a shock absorber under Industrial Design act in India? Analyze and answer

b. Micro Projects:

- i. Scroll through <https://ipindia.gov.in/> to explore about Patents, Industrial designs, Trademarks and Geographical Indications and prepare a report.
- ii. Scroll through <https://ipindia.gov.in/> and prepare a checklist for design applications
- iii. Do internet survey to analyze the case studies related to Copyright, Trademark, Trade secret and GI

c. Other Activities:

1. Seminar Topics:

- Different forms of IPR and its need.
- Types of Patent applications and Patent filling procedure
- Relevance of different types of IPR to various professions.
- Types of Trademarks and Infringement of Trademark
- Differentiate GI with Trademark

2. Visits: Visit nearby company/industry and prepare a report/Case study of visit with special comments on how they have patented their product, registered their company's logo under trademark, protected their product design under design act and strategy used by them to protect their trade secret if any.

3. Self-Learning Topics:

- Patent filing procedure.
- Criteria for registering Industrial design in India
- Strategies to protect trade secret
- GI of various products
- Types of Trademarks and importance
- Trade secret protection – Case study of Coca-cola

K) 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.

L) List of Major Laboratory Equipment, Tools and Software:(If Any)

S. No.	Name of Equipment, Tools and Software	Broad Specifications
1.	High end computers	Processor Intel Core i7
2.	MS Office	-

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	40%	-	25%	-	-	-	-
CO-2	20%	-	40%	-	-	-	-
CO-3	40%	-	35%	-	-	-	-
Total Marks	25		25				

Legend:

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

**: Mentioned under point- (N)

#: Mentioned under point-(O)

Note:

- The percentages 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 Learning Resources:**(a) Books:**

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers	Ramakrishna B and Anil kumar H.S.	1 January 2017 Notion Press ISBN-10 1946556319 ISBN-13 978-1946556318
2.	Intellectual Property Law	Narayan P.	1 January 2001, Eastern Law House Private Ltd ISBN-10 8171772684 ISBN-13 978-8171772681
3.	Intellectual Property Rights: Text and Cases	Radhakrishnan R., Balasubramanian S	July 30, 2008 Excel Books (July 30, 2008) ISBN-10 : 8174466096 ISBN-13 : 978-8174466099
4.	Law Relating To Intellectual Property	Wasehra B.L	January 2016 Universal Law Publishing ISBN-13 978-9350350300
5.	Intellectual Property Law	Meenu Paul	Allahabad Law Agency ISBN-10 : 8190286714 ISBN-13 : 978-8190286718
6.	Law of Intellectual Property	Myneni S. R.	Asia Law House (1 January 2019) ISBN-10 : 9388437233 ISBN-13 : 978-9388437233

(b) Online Educational Resources:

- <https://ipindia.gov.in/>
- <https://nptel.ac.in/courses/109106137>
- <https://books.openedition.org/iheid/652?lang=en>

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:

- WIPO Intellectual Property Handbook
- The Intellectual Property Handbook: A Practical Guide for Franchise, Business, and IP Counsel Second Edition By Christopher P. Bussert, James R. Sims III
- IPR Handbook for Pharma Students and Researchers Parikshit Bansal, PharmaMed Press, 2015
