370 TEXTILE TRADES

EXAMINATION STRUCTURE

The Trade Related subjects are Building/Engineering Drawing and Basic Electricity.

The General Education subjects are: English Language, Mathematics, Economics, Physics, Chemistry, English Literature and Information Communication Technology.

The TRADE has FOUR OPTIONS namely:

371 - SPINNING OPTION: Consisting of
Introductory Textiles CTE 01
Preparation for Yarn Production I CTE 1
Yarn Production 1 CTE 2

372 - WEAVING OPTION: Consisting of
Introductory Textiles CTE 01
Drawing-in/Loom Gaiting CTE 5
Yarn Preparation CTE 4
Weaving CTE 6

373 - SURFACE DESIGN/TEXTILE PRINTING OPTION Consisting of
Introductory Textiles CTE 01
Surface Design Practice 1 CTE 7
Transfer Technique 1 CTE 8
Printing of Textile 1 CTE 9

374 - BLEACHING, DYEING AND FINISHING OPTION CONSISTING OF
Introductory Textiles CTE 01
Textile Preparation CTE 10
Bleaching CTE 11
Textile Finishing CTE 13
Dyeing of Textiles CTE 12

Candidates can register for examination in **any** of the **options**

Examination Schemes

371 - SPINNING OPTION will have TWO papers.

371-1 : Paper 1, Section A shall contain 40 objective questions to be answered in 40 minutes. Section B shall contain SEVEN Essay Questions out of which candidates will answer FIVE questions in 2 HOURS.

371-2 Paper II. This is a practical paper of **one** compulsory question to last for Six Hours.

372 WEAVING OPTION

372-1 Paper 1: Section A and B, same as paper 1 above.
372-2 Paper II Practical. Same as Paper II above.

373 SURFACE DESIGN/TEXTILE PRINTING OPTION
373-1 Paper 1: Section A and B, same as paper II above.
373-2 Paper II Practical. Same as paper II above.

374 BLEACHING, DYEING AND FINISHING
374-1 Paper 1: Section A and B, same as paper 1 above.
374-2 Paper II Practical. Same as paper II above.

TEXTILE TRADES:
371 SPINNING OPTION: CTE I & 2, 3 & 4

S/N.	Topic/Objectives	Contents	Activities/Remarks
1.	**Properties Of Textile Raw Materials** a. Explain the basic properties of cotton, and how they affect machine types and their setting. b. State reasons for ginning, baleing and conditioning and how these affect fibre length, colour, and degree of opening.	1i. Properties of cotton fibres. ii.Effects of the properties on yarn production. 2. Ginning and objectives. 3. Baleing, Storage and Conditioning	1. Explain properties of cotton in relationship to length, fitness, maturity, strength, elongation etc. 2. Describe how the various properties of cotton affect yarn and fabric production during spinning and weaving. 3. Explain the reasons and process of ginning by the two types of machines and the process of their initial purification of cotton. 4. Explain bailing of cotton and the systems employed. 5. Explain conditioning and storage and the need for conditions.
2.	**Blow Room Operation** 1. Describe blow room machines, their parts and functions. 2. Explain safety precautions and state sequence of blow room operation and how their varying atmospheric conditions affect lap	1i. Objectives of Blowroom operation ii. Types and functions of Blow Room machines. 2. Blow room process. 3.Mixing and Blending. 4.Mixing and feeding operations 5.Operation of control panel/ indication lights. 6.Mixing re-usable waste 7.Lap Grading 8.Blow room safety precautions 9.Standard lap control 10.Waste collection and safety precautions. 11. Abnormal noise in blow room and corrections.	1. Enumerate the objectives of the blowroom operation. i. Explain the stage by stage process of the blow room describing the working of the hoper bale opener, axiflow opener, step opener, porcupine opener, crypton, scutcher machine and lap formation. 2. Describe stage by stage process of the blow room operation. 3. Explain the reason for mixing and blending

	quality. 3. State the purpose of light panel indicating control panel and their interpretation. 4. Explain importance of mixing and blending relative to wastes, reusable, raw materials, correct weighting on standard lap formation and how this affect and cleaning of machine.		4. Explain lap grading. 5. Explain the health hazards and safety precautions e.g. fires, accident and health problems. 6. Explain the effect of dry and wet conditions on the lap formed during the blow process, and describe the optimum atmospheric working conditions on blow room operations. 7. Explain the purpose of the control panel in the blow room. 8. Interprete indicating lights e.g. green, yellow and red lights. 9. Knowledge of operating the control panel should be stressed. 10. Study of mixing ratio of the lap/cotton. 11. Mix correctly re-usable waste during feeding. 12. Weigh and grade lap accordingly to weight 13. Control lap production of standard weight 14. Explain the need for waste collection. Also collect waste and clean machines and observe safety precautions. 15. Detect and determine the cause of abnormal noise form the blow room machines and make correct report on

			a standard sheet.
3.	**Carding Process** a. Identify carding machine parts, state their functions and the processes involved. b. Explain with a sketch card drive system, describe the process and show the coiling process. c. Describe piece laps on cards, correct piece broken slivers, doffing, card faults and correction of abnormal noise form card machine.	1. Carding machine and functions e.g. Nasmith comber 2.Card drive system 3.Carding Process. 4. Coiling process 5. Safety and Health Hazards in carding. 6. Lap-piecing. 7. Sliver collection 8. Piecing Broken sliver 9. Doffing 10. Causes and remedies of carding faults. 11. Maintenance of carding machines and safety precautions.	1. Explain with diagram the working of the Feed plate, feed roller, take-in grid bars., the large cylinder, flats with pins, doffer, trumpet etc. 2. Illustrate with a diagram the drive system of the carding machine. 3. Explain the carding process in a sequential order when the lap is fed into the carding machine. 4. Explain the process of coiling into spring loaded cans. 5. Explain the effect of atmospheric conditions on the card machine and sliver. 6. Describe the optimum atmospheric working conditions for the carding process. 7. Describe health and safety hazards in carding and state precautions against them. 8. Piece correctly, broken slivers on the cards. 9. Collect correctly, web from the comb, thread through trumpet and feed sliver to the cooler head. 10. Doff correctly full cans of sliver. 11. Identify and explain faults in carding and their causes and state remedies to these faults. 12. Lubricate and clean the

		12. Abnormal noise in carding and corrections.	carding machine in accordance with prescribed regulations and safety precautions. 13. Detect and determine causes of abnormal noise for the carding machine and write out reports.
4.	**Combing Process** State object of combing, its preparation stages and identify combing machine parts, their functions and maintenance.	1. Object of combing 2. Combing preparation 3. Principles of combing/operation 4. Combing parts and their functions 5. Combing hazards and precautions. 6. Air conditioning for combing. 7. Machines Maintenance of combing	1. Explain the reasons of combing 2. Explain pre-combing operation before combing is carried out: e.g. sliver lap operation and ribbon lap operations. 3. Explain principle of combing in relation to parts of the comber machine e.g. of the lap roller, feed roller, nipper knife, top and bottom combs, half lap roller, detachable roller, etc. 5. What are the dangerous parts of the comb and state prescribed health and safety precautions for the combing process. 6. State the standard atmospheric working conditions for combing. 7. Operating combing machines 8. Clean and oil the comb in accordance with prescribed regulations and safety precautions.
5.	**Draw Frame Operations** 1. Describe drawing	1. Drawing operation. 2. Object of doubling and drafting	1. Explain a general drawing frame operation. 2. Discuss the objectives

	operation and purpose of doubling and drafting. Also explain basic working of draw frame. 2. Sketch the different types of drafting roller systems, centre coiling under coiling showing the major parts of the draw frame and their functions. 3. Describe creeling types – creel can, doff full can and enumerate safety hazards and precautions in drawing frame viz: lighting and sliver faults.	3. Principle of drawing 4. Types of roller drafting 5. Types of coiling 6. Parts and functions of Draw frames 7. Types of creeling 8. Creeling and drafting. 9. Sliver piecing 10. Working conditions for draw frames. 11. Health and safety precautions. 12. Light indicators 13. Abnormal noise and corrections.	of doubling and drafting e.g. attenuation and evening out irregularities in sliver or yarn. 3. Discuss the principle of drawing. 4. Describe with the aid of diagrams different drafting systems. 5. Explain under-centre and overcentre of coilings in relation to different can sizes. 6. Explain the functions of the parts of draw frames, e.g. lifting rollers trumpet, drafting rollers, coiler mechanism, can table etc. 7. Describe the various types of creeling e.g. net and in-line type. 8. Explain the required atmospheric working conditions for drawing operations. 9. Discuss the various health and safety hazards during draw frame operations and show precautions against them. 10. Creel and doff full cans correctly on the draw frame 11. Piece correctly broken sliver. 12. Interpret light indicators on the draw frames e.g. red, green and yellow. 13. Detect and determine the cause of abnormal

		14. Effect of faulty stopping devices. 15. Differences in types of sliver. 16. Sliver faults (by visual inspection) and remedies.	noise and vibration in the draw frames and their effect on draw frames. 14. Explain the effect of faulty automatic stopping devices on rovings or yarns produced. 15. State the differences between carded sliver, semi-drawn and full-drawn sliver. 16. Explain faults in sliver (irregularities) due to worn out roller, roller eccentric motion or roller lapping incorrect doubling, coiler faults, etc.
6.	**Speed Frame Operations** Understand the basic working principles of the speed frame, their parts and functions.	1. Functions of speed frame machine. i. reduction of weight/unit length ii. wind packages suitable for spinning. 2. Object of twist insertion and effects. 3. Types of Speed frames. 4. Parts and functions of speed frame machine. 5. Working conditions for speed frame operation.	1. Explain the functions of the speed frame e.g. to reduce weight/unit length and to wind on package suitable for spinning. 2. State the need for inserting twist into roving e.g. for strength. 3. Identify various types of speed frames and give a description of their workings. 4. Explain the functions of drafting rollers, spindle, the flyer, bobbin rail etc. 5. Discuss required atmospheric working conditions for optimum functioning of the speed frame. 6. Discuss safety hazards in the operation of the speed frame and list precautions against

		6. Safety precaution for speed frame operation. 7. Operating the speed frame. 8. Creeling and threading rovings. 9. Piecing of rovings. 10. Light indicators. 11. Maintenance of the speed frame. 12. Operating the speed frame.	them. 7. Explain correct procedures for starting and stopping the speed frame. 8. Study the right way of creeling sliver cans, threading roving through the flyer eyes and doffing of full bobbins. 9. Piecing correctly broken roving. 10. Learn to interprete different light indicators on the speed frame e.g. green, red, yellow. 11. Learn how to collect waste and clean speed frame in accordance with set safety precautions. 12. Man speed frame operations.
7.	**Principles of RingSpinning** **a.** Define spinning frame, explain its principles, creeling systems, drafting and types of machines used in spinning. **b.** Describe twist insertion methods, show the difference between S and Z twists. **c.** Yarn	1. Definition of spinning 2. Spinning of natural and man-made fibres 3. Types of creeling systems. 4. Object of drafting. 5. Drafting system.	1. Define and explain spinning and yarn formation. 2. Explain general spinning, jute, wool, synthetics – rayon (wet spinning), and nylon (melt spinning). 3. Explain the various forms of creeling systems. Explain the principle of roller drafting, apron drafting, combing roller drafting etc. 4. Explain the process of inserting twist in yarns by the use of spindle and the flyer. 5. Explain “Z” and “S” twists and show their

	numbering systems, cop building devices relative to ballooning and its effects.	6. Twist insertion. 7. "Z" and "S" Twists. 8. Yarn numbering. 9. Types of cop building. 10. Effect of ballooning	differences. 6. Discuss cotton yarn numbering systems e.g. tex, denier, cotton counts etc. 7. Explain cop building on spinning machines. 8. Explain what ballooning is and its effects in the spinning process.
8.	**Spinning Machines** **a.** List types of spinning machines and their major parts showing their functions and auxiliary equipment. **b.** Describe type of spindle drives, start and stop devices. Explain standard spinning atmospheric conditions, creel of the roving through the trumpet and correct threading through the traveler, balloon and piece up systems. Identify simple faults in spinning machines.	1. Types of spinning machines: ring spinning machine and rotor spinning machines 2. Parts and functions of the ring frame. 3. Functions of auxiliary equipment in spinning. 4. Types of spindle drives. 5. Safety devices and spinning machine. 6. Causes and remedies of spinning faults. 7. Operating a spinning machine.	1. Explain the operations of the conventional ring spinning machine and the break-end rotor spinning machine. 2. Explain the functions of the creel, trumpet, draft roller, lappet, balloon ring separator, traveller, ring rail spindle, etc on a typical ring spinning machine. 3. Identify auxiliary equipment used in spinning machines and explain the functions: pneumatic blowing machines, top roller cleaning equipment, automatic knotting machine etc. 4. Discuss spindle drives in spinning machines. 5. Discuss health and safety hazards and how to prevent them. 6. Explain the required standard atmospheric working conditions for spinning operations. 7. Identify causes and solutions to: - vibration of bottom

		8. Spinning process. 9. Piecing of broken ends. 10. Doffing. 2.1 Identification of faults in yarn.	drafting rollers; - spindle vibration; - continuous yarn breakage; - unusual noise; - yarn irregularity. 8. Learn how to start and stop spinning machines. 9. Learn to creel the roving, pass through the trumpet and to draft rollers. 10. Learn to thread yarn through the traveler, and balloon control, lappet and piece up. 11. Learn to piece broken ends correctly. 12. Learn to doff full cup on spinning machine. 13. Study causes and methods of controlling faults such as neps, slubs, knot, weak, thick thin places, and soft and hard places. 14. Man spinning operations.
9.	**Yarn Preparation** (a) Doubling Operations State object of yarn doubling and their types. Single, double and cable; and explain their end uses. Identify a typical doubling machine faults and control.	1. Object of doubling. 2. Types of yarn e.g textured, fancy, slub, etc 3. Use of different types of twisted yarns. 4. 'S' and 'Z' twist in double and cable yarn.	1. What is the objectives of doubling yarns. 2. Explain different types of yarns such as textured yarns, fancy, slub yarn, bulked yarn etc. 4. Explain and state the differences between these yarns – single, double and, cable yarns. Mention their end uses. 3. Using diagram, study

	Sketch diagram of S and Z twisting and describe different methods of winding. State functions of various components of winding machines.	5. Tensioning in doubling process. 6. Components and functions of doubling machines. 7. Faults in doubling and corrections. 8. Objects and methods of winding. 9. Types of packages e.g. cheese, cones, pirn. 10. Components of winding machine and their functions. 11. Types of tensioning devices. 12. Precision and rum winding. 13 Faults in winding and their correction. 14. Safety precautions in winding and doubling operations. 15. Operation of doubling and winding machines.	'S' and 'Z' twisting inserted in double and cable yarns. 5. Study tensioning in doubling process. 6. Identify the various doubling components in doubling machines and describe their functions. 7. Identify and correct faults in doubling. 8. Describe different methods of winding. 9. Illustrate the different yarn packages and state their advantages. 10. Identify the various components of winding machines and state their functions: babbin holder, tension devices, slub catcher, clearer, winding drums, traverse etc. 11. Describe types of tension devices and state their importance. 12. Describe precision and drum winding systems. 13. Discuss causes and methods of controlling faults in winding. 14. Explain safety hazards

			and remedies in doubling and winding operations.
		16. Methods of yarn clearing: electrical, mechanical	15. Operate doubling and winding machines.
		17. Doffing.	16. Mount bobbin correctly pass yarn through tension devices and to knot.
			17. Doff full cones and cheeses correctly.

CTE 01: INTRODUCTORY TEXTILE

S/N	Topic/Objective	Contents	Activities/Remarks
1.	**Textile Raw Materials: Fibres** a. Identification and classification of various types of Textile Raw Materials. b. Explain the difference between natural and man-made fibres, showing how their physical properties affects their reaction. **c.** Describe	1. Definition: Fibres 2. Fibre classification or classification of Textile Raw Materials: i) Natual (e.g. cotton, flax, jute, kapok, silk, asbestos etc. ii) Man-made: Regenerated (e.g. cellulose acetate etc) and synthetics (e.g. nylon, polyester, polyurethane etc) 3. Physical properties of textile fibres	1. Definition of a fibre 2. Classify fibre into natural and man-made fibres e.g. cotton, flax wool, silk, glass, asbestos, rayon, polyester, nylon etc. 3. Study the differences between natural and man-made fibres their structures, growth and production. 4. Study the physical properties explaining the following: (a) fibre length (b) maturity (c) tensile strength (d) weight (e) effect of heat (f) elasticity

	various methods of fibre identification, principles of carrying out the tests and instruments you can use.	4. Effect of fibre properties on quality. 5. Chemical properties of fibres. 6. Fibre identification. 7. Fibre testing. Fibre testing instruments.	(g) enlongation (h) effect of sunlight etc. 5. Study the effect of these physical properties, their effects and how they affect end-uses. 6. Study the chemical properties of fibres e.g their reaction to (a) acids (b) alkalines. 7. Study methods of fibre identification e.g. optical (visual inspection), physical (burning tests) and chemical identification. 8. Describe the principles and methods employed in fibre tests. Mention some testing instruments used for optical, physical and chemical tests. 9. Describe the test instruments used for optical, physical and chemical test for fibres. 10. Make a table showing fibres identified through the various tests.
2.	**Conversion of Fibre to Yarn: Spinning** a. Explain the history and principles of blowroom	1. (a) Cultivation of cotton . (b) Comparisons of different grades of cotton. SPINNING PROCESS: 2. (i) Flowchart of spinning	1. Trace the history of spinning as recorded in Asia (China, India etc. Europe and Africa). 2. Explain with a flowchart the

	carding, drafting etc. b. Identify types of combing, machines, silver conversion to rovings and difference between S and Z twists:	3. Blowroom process: Cleaning, mixing, blending etc COMBING FRAME: 4. Principle and object of Carding. 5. Types of Combing machines e.g. Nashmite. Reasons and effects of Combing. 6. Principle Object of Drafting. ii. Roller setting 7. Principle and objects of the Ring- spinning frame 8. Roller drafting system	principles of spinning cotton from blowroom to ring spinning. 3. Identify the following machines in the blowroom operation breaker/opener, hopper, scutcher machine and lap formation. 4. What are the reasons of carding? 4b. Briefly explain carding process: The objectives of carding and pre-combing activities. 5. What is combining? Why is it necessary to comb cotton? 6i. Study the object of drafting. Explain roller settings. 6ii. Explain the workings of the combing machines and study why combing is necessary in spinning. The students should know the processes of cylinder combing, piecing and detaching. 7. Explain the processes through the draw frames namely doubling, drawing and draftings. 8. Study twist factor and its calculations.

		9. Yarn Number systems: Direct and Indirect. RING SPINNING FRAME 10. Conversion of slivers to rovings. 11. Compare and contrast yarn counts.	E.g. Turns per ink (T.P.I) = CTn 9. Explain twist, twist direction using diagram. 10. Explain the direct systems (denier and tex) and the indirect systems (cotton count, worsted and wooling systems) and their conversions. 12. Explain with the knowledge of account systems, their relationship e.g. relationship between denier and tex and calculations of component yarn or counts.
3.	**Conversion of Yarn to Fabric** a. Explain the term weaving and differentiate between traditional and power loom. b. Show the primary motions and secondary motions of the loom. c. Define knitting and give a brief	1. Uses of yarn 2 Yarn preparation for weaving 3 Types of packages and their formations.	1. Use simple flow diagram to illustrate the end use of yarn. 2. Describe and explain the preparatory stages from sizing, warping, drawing in heading, read, explain also te general definition of weaving. 3. Explain the types of yarn packages (cone and cheese) and manner of winding on the winding machines. Study principle of

	history of knitting. Differentiate between weft and warp knitted fabric showing their basic structures and explain the elements of knitting.	4. Object of sizing. 5. Sizing process. 6. Principle of drawing in. 7. i) Principles of weaving. ii) Types of Looms 8. Differences between traditional and power looms. 9. Primary motion of the loom. 10. Secondary motions. 11. Simple weave structures. 12. Definition and History of knitting. 13. Warp and weft knitting.	winding and discussions on warp beams with creels mentioning sectional wrapping etc 4. Explain the meaning of sizing and the purpose for sizing yarns for weaving. 5. Describe the type of sizing process. 6. Explain the methods of drawing in via drop-wires, healds, reed for simple (plain, stain/sateen, twill) and compound weave structures. 7. Study the principles of inter-lacing yarns (threads) during weaving, design (point)paper and its use. 8. Explain types and scopes of traditional looms - horizontal and vertical. Explain conventional and modern power looms. 9. Explain the secondary motions of shedding, picking and beat-up. 10. Explain the secondary motions of let-off and take up. 11. Describe the weave structures – plain,

		14. Knitting machines 15. Knitted structures 16. Knitting elements 17. Non-wovens e.g. bonded, felted, flopping, needle, lace etc.	twill, matt (hopsack) showing diagrams of the structures. 12. Explain knitting and give historical account of knitting. 13. Explain the difference between a warp and weft knitted fabric. 14. Name and describe knitting machines e.g. circular, V-bed, flat knitting machines. 15. Draw and describe knitted structures - wales and courses; basic knit structures – plans, stitch, purl, rib etc. 16. Explain the knitting elements – types of needles (lach, spring bearded, compound) their operations, advantages and disadvantages. 17. Describe the process of these non-woven methods.
4.	**Fabric Purification, Colouration and Finishing** a. Describe shearing, singeing, desizing, scouring and	4.1 (i) Fabric Purificaton process. (ii) Purification machines, chemicals and processes. 1. History of Dyeing and methods. 2. Classification of dyes and	1. Explanation of shearing, singeing, desizing, scouring, bleaching, mercerization etc. 2. Study of purification machines and their operations. 3. Classify dyes

	bleaching. b. Define dyeing and show machines used in dyeing of yarn and fabrics	application. 3. Classification of colours 4. Colour application 5. Dyeing machines 6. Finishing processes 7. Finishing machines	according to their methods of application. 4. Study Primary and Secondary colours. 5. Direct application of colour to yarns and fabric. 6. Discuss the machines used in the dyeing of yarns and fabrics. 7. Explain finishing process, i.e. the needs to wash or steam or mill or modify handling and improve the appearance of the fabrics. Describe the machines for finishing e.g. the calendar etc.
5.	**Designing** Identify basic designing methods and list various types of machines and materials used in printing.	1. Basic Designing materials. 2. Idea Development 3. Types of repeat. 4. Transfer techniques.	1. Identify various design materials. 2. Discuss idea development using colours. 3. Explain repeat system half drops, full drops etc. 4. Explain colour seperation using tracing papers, koda trace and the cutting of stencils and profilm. (b) Explain photo emulsion methods using light indoor and outdoor. Explain chemicals and etching processes and

		5. Principle of Textile Printing 6. Printing machines and materials.	engraving. 5. Explain printing methods: block, stenciling, silk screen (flat and rotary), roller, transfer printing, discharge printing. 6. Briefly explain the workings of the various printing machines (single and multi-colours – their advantages and disadvantages.

372 – WEAVING OPTION: 3, 4, 5 & 6

S/N.	Topic/Objectives	Contents	Activities/Remarks
1.	**Drawing Operation** Explain principles of drawing-in types of shafts, heads frame, their arrangement relative to weaves. Fixing of heads by weave pattern, drafting warp ends through the head eyes and head shaft calculations.	1. Principles of drawing-in	1. Explain the principle of interlacing threads during weaving, study design paper and its uses; and the principle of drawing-in. ii. Explain the process of drawing-in.
		2. Types of shafts.	2. Explain the types of shaft arrangement e.g. two-shafts, four shafts, six shafts etc.
		3. Types of healds frames.	3. Describe the wooden and metal heald frames, their advantages and disadvantages.
		4. Types of heads.	4. Discuss twin type healds and metal type healds.
		5. Reeding operation.	5. Explain how to draw yarns through the healds according to weave drafts and lifting plans.
		6. Healds preparation.	6. Learn how to fix wires on the shafts.
		7.Principles of drafting in weaving.	7. Study how to use the square paper (design paper) and interpret drafts and lifting plans – the weaven plan, the draft or looming plans, the lifting or peg plan and study the general rules for drafting a pattern.
		8. Warping.	8. Learn to draw ends through heald eyes.
		9.Weaving Calculations.	9. Make calculation for number of ends required by knowing the reed size and width of fabric e.g. – length of wrap 01 meter - width of cloth/warp – 30cm - Reed size used – 24s No of ends required = 30 x 24 = 720 ends.
		10. Drawing-in Accuracy.	10. Learn how to check for mistakes in drawing-in and correcting them.

2.	**Denting Operations** Describe the process of denting, types of reeds and types of denting.	1. Denting. 2. Types of reed. 3. Types of Denting. 4. Calculation of ends/dents.	1. Describe the process and manner of denting (also called reeding) with the aid of reed hook, explaining the method adopted for the selvedges. 2. Describe types and sizes of reeds e.g. 16s reed, 24s reed, 30s reed etc, and explain the differences between one size from the other, e.g. for 16s reed there are 16 dents occupying a space of 1cm, and for 24s reed there are 24 dents occupying a space of 1cm. The difference being the number of dent occupying 1 cm. 3. Describe types of denting and calculate required ends of a given width. 4. Explain calculation made to determine the number of ends required for a given width by knowing reed size and width required for a fabric as explained above.
3.	**Gaiting Operations** Different between full and half gaiting.	1.Routine maintenance of the loom. 2. Difference between full and half gaiting. 3.Gaiting process.	1. Learn how to prepare the loom for gaiting. 2. Explain full and half gaiting and the differences between the two. a. Explain the process of full gaiting and practice make a successful gaiting. b. Explain the process of half gaiting and practice a successful half gaiting

S/N.	Topic/Objectives	Contents	Activities/Remarks
1.	**Weaving Process** Explain the basic loom mechanism and identify primary, secondary and auxiliary motions. State the principles of shedding, picking, beat-up let-off motion, take-off motion in weaving.	1. Primary motion of a loom. 2. Principles of shedding. 3. Principles of picking and beat-up. 4. Principles and functions of let-off motion. 5. Principles and functions of take-up motions. 6. Principles and functions of stop motions. 7. Principles of weaving.	1. Study and describe the primary motions of the loom. 2. Explain how shedding is achieved by tappets or cams mounted on the bottom shaft; and the reasons for shedding (passage of the shuttle). Discuss also the two types of shedding – negative and positive. 3. Explain how picking is achieved with the assistance of the pickers situated at the sides of the loom which strikes the shuttle from side to side. Explain also types of picking. 4. Explain the mechanism of a power driven loom. The crank shaft driven from the motor and making one revolution per pick or two picks. Illustrate this with the aids of diagram showing the connections of the shafts via gears and pulley to the motor. 5. Explain the principle of releasing war ends to the weave area, and the positive or negative let-off motions. 6. Explain the principle and process of withdrawing the cloth from the weaving area on to the cloth roller, and the positive and negative take up systems. 7. Explain the importance of other loom mechanism termed warp protector motions. 8. Explanation of the warp-stop motion weft-stop motion and the shuttle protector motion (swells) should be

			made. 9. Explain the use of the design paper and the manner of interlocking of warp and weft threads, and discussion of the weave plan, the draft and the lifting (peg) plan.
2.	**Loom Operation**	1. Weaving operation 2. Routine maintenance of loom 3. Loom timing	1. Explain and operate pirn and shuttle transfer by the box motion mechanism; check the protective motions; start and stop the loom correctly: plan and weave a fabric; mend yarn breaks by tising the weavers knot; learn how to repair faulty looms and removal of woven fabric from the loom.
3.	**Loom Maintenance** Outline safety precautions for loom operation. Carry out all operations from starting loom run through let-off to take up and stoping of the loom.	1. Safety precaution or loom operation.	1. Learn how to clean, oil and grease the loom. 2. Explain the method of indicating loom timing in order to set and turn loom. The numerous motions and mechanism of an automatic loom must be set in the correct timing in relationship to each other. The timings of most of the events in the loom cycle are governed by the position of the reed and the sley. 3. Learn how to observe safety precautions during weaving.
4.	**Fabric Faults** Enumerate fabric faults and remedies.	Common faults in woven fabrics.	Identify fabric faults and enumerate remedial methods.

S/N.	Topic/Objectives	Contents	Activities/Remarks
1.	**Types of Yarns** Identify different types of yarn, component, counts, counting system and yarn calculations by use of conversion tables. Describe various types of yarn packages, conditioning and show how yarn weight, relative humidity, and moisture regain content can be calculated.	1. Types of yarn. 2. Component yarns 3. Yarn counting system. 4. Yarn count calculation and conversion from one system to another. 5. Types of yarn packages. 6. Yarn conditioning. 7. Determining the correct invoice weight.	1. Discuss the different types of yarn from natural and man-made fibres. 2. Study yarn counts and numberingcounting systems – (tex and denier) (cotton count and worsted system). 3. Define the tex (weighs in grams of 1,000 metres of yarns) and the cotton count (as the number of hanks each 840 yards long which weight 1Ib) and worsted system (number of hanks each 560 yards which weigh 11b). Study the calculations in the direct system – the weight calculations in the direct system – the weight per unit length is directly proportional to the yarn number, a higher yarn number implies a coarse yarn and calculating a ply yarn is additive. In the indirect system the yarn number is indirectly proportional to the weight per unit length of the yarn and the higher the number implies a finer yarn. To calculate the resultant count of ply yarn, add the reciprocal of the component counts and take the reciprocal of the sum. 4. Study yarn winding and packaging systems, e.g. cone winding, cheese winding, pirn-winding etc.. 5. Study the principles of yarn conditioning. 6. Study formular for calculations involving yarn weight, relative humidity and moisture regain. Give specific examples.
2.	**Yarn Clearing** Explain methods of yarn clearing and identify simple yarn aults.	1. Yarn clearing devices. 2.1 Yarn faults.	1. Study methods of yarn clearing e.g. electrical, mechanical and electronic. 2. Explain various faults in yarn manufacture such as slubs, knots hairiness, neps, weak and thick

			places etc.
3.	**Winding** Explain winding principles winding relative to yarn tension, angle of wind and package diameter.	1. Principles of winding. 2. Types of winding operations. 3. Factors influencing yarn winding. 4. Routine maintenance of winding machine.	1. Study and explain the principles and reasons for yarn winding. ii. Explain yarn tension, angle of wind and package diameter 2. Study winding speeds, surface speeds, patterning and using diameters, circumferences, lengths in calculations. Knowledge of the relationship between the speed of the cheese and the diameter of the package is essential. Study also the coil angle and its calculations. 3. Learn how to man winding operations (a) Study yarn guide tension controlled by a mechanism called cam shaft; (b) Study angle of wind (coil angle), its importance and formular for calculations thus. Coil angle = $\frac{dn}{21n}$ $a = \frac{dk}{2L}$ (c) Study patterning, its importance and effects of bad packaging e.g. slugh, honey comb, mal-formed bad density, hard package and uneven dyeing. Also study calculation on packaging of average speed of cones. Average speed – $R_2+R_2=D_2$ $R_1+R_1=D_1$ $\frac{D_2+D_1}{2}$ 4. Study routine maintenance procedures on winding machines.
4.	**Warping Process** Explain warping	1. Principle of warping.	1. Study the principle and reasons for warping. Also study preparations

	principles and reasons for identifying warping machines and functions of creel used in warping operation and maintain warping machine.	2. Types of warping machine. 3. Types and functions of creeling. 4. Creeling. 5. Warp machines operation.	forwarding e.g. sizing and types of sizes. 2. Describe warping machines and their advantages and uses – ball warp, beam warping and sectional warping. 3. Identify the types of creels used in warping and explain their workings. 4. Carry out creel arrangement and alignment. 5. Operate warping machines.
5.	**Pirn Winding** Explain the principles of pirn winding. Identify types of pirn winding machines and state the importance of pirn size and length.	1. Principle of pirn winding. 2. Types of pirn winding machines. 3. Factors influencing pirn winding. 4. Pirn winding operations. 5. Routine maintenance of pirn machines.	1. Study the principles and reasons for pirn winding. 2. Identify the pirn winding machines: and explain how these machines operate. Automatic, semi, fully automatic and super speed automatic 3. Explain the importance of pirn size shape and length. 4. Learn how to operate winding machines. 5. Learn how to make maintenance procedures on the pirn winding machines.
6.	**Sizing Operations** Explain the principles of sizing. Identify types of sizing machine and state the functions of the various parts.	1. Principles of sizing. 2. Types of sizing machines and their components. 3. Sizing ingredient. 4. Size ingredient. 5. Size take ups. 6. Components and functions of sizing machines. 7. Sizing operations 8. Correction of laping. 9. Routine maintenance of	1. Explain the principles and reasons for sizing yarns. 2. Study and describe the operations of hot air chamber sizing machine, multi-cylinder sizing machine. 3. Discuss sizing ingredients and explain their uses. 4. Make a typical size mixture. 5. Assess the take ups in sizing. 6. Discuss components of sizing machines and explain the functions of warp beams, sow box, squeeze rollers, lease rods, dry range and combs. 7. Learn how to operate sizing machines and produce weavers' beams. 8. Learn how to correct lapping.

		sizing machine.	9. Learn maintenance work on sizing machines – oiling and adjusting, cleaning, greasing, setting.

373 – SURFACE DESIGN AND PRINTING OF TEXTILES OPTION: CTE: 01, 7, 8 & 9

S/N.	Topic/Objectives	Contents	Activities/Remarks
1.	**Drawing Tools** Equipment and Materials. Identify drawing tools equipment and materials.	1.1 Drawing equipment 1.2 Identification of paper quality. 1.3 Storage and maintenance of drawing tools and materials. 1.4 Routine maintenance of drawing equipment.	1. Explain the use of the listed instruments and equipment used for drawing. 2. Identify and master the use of catridge paper, sugar newsprint and card-board. 3. Learn how to maintain tolls and materials. 4. Learn how to maintain table lamps, compasses, drawing pen, tables etc.
2.	**Drawing For Textiles** Explain elements and principles of drawing in textiles.	2.1 Drawing as a medium of expression. 2.2 Application of lines. 2.3 Idea development. 2.4 Different forms of drawing. 2.5 Identification of colours. 2.6 Colour matching.	1. Explain the principle of drawing, as a tool or symbol for expressing ideas. 2. Explain the use of curves, straight lines thin and thick lines, zig-zag line, and short and long lines for developing shapes forms and motifs for textiles. 3. Develop and create motifs forms and shape for designing. 4. Make a study of life drawing and object drawing by studying life form and in-animate forms. Move further by making motifs out of these drawings. 5. Explain what a colour is and describe primary and secondary colours, and illustrate with colour wheel and mae

		2.7 Colour harmony.	monochrome and polychrome colouring. 6. Explain colour harmony, contrast and analoguous in colour, and with poster colours on catridge papers. 7. Explain how to achieve harmony in colour, the use of supplementary colours and colour content theory.
3.	**Textile Design** Explain how drawing materials is used to achieve the elements and principles of drawing.	3.1 Elements of design 3.2 Principles of design. 3.3 Design adaptation.	1. Explain design elements of lines, shapes, colours, size, direction and value. 2. Explain pigment theory of colour (colour harmony and harmony of contrast, successive contrast and simultaneous contrast. 3. Make practical works on designs. 4. Explain real wax, imitation wax and madras and explain how to identify by describing their differences. 5. Make designs from ideas gotten from various sources on standard size paper suitable for textile dyeing and printing. 6. Make further advance designs for dyeing and printing. 7. Explain simple, half drop, half slide, full drop and O-gec. 8. Make designs in repeat and non repeat forms. 9. Make various colours ways for various designs. 10. Explain traditional concepts of motifs and colours, and contemporary concepts of design. 11. Discuss the designers place in the textile industry and things to bear in mind when making a design.

			12. Make effective and successful design by tracing. 13. Prepare your board and paper for designing and painting. 14. Make paper designs suitable for wax print, using traditional or contemporary concepts.

TRANSFER TECHNIQUE 1 (CTE 8)
(SURFACE DESIGN AND PRINTING OPTION)

S/N.	Topic/Objectives	Contents	Activities/Remarks
1.	**Transfer Materials, Tools and Equipment** Dsicuss and practice transfer of paper design onto screen; and materials used; emphasis on registration camera used, and stencil types.	1. Principle of design transfer 2. Experiments for design transfer. 3. Types of mesh 4. Chemical and tools for impression. 5. Storage of printing materials. 6. Dark room condition. 7. Routine maintenance.	1. Explain the use and processes of transferring paper stencil, profilm and photo emulsion onto screen for flat screen printing; rotary printing and method of design transfer, and etching and engraving for roller printing 2. Explain the use of tracing papers, transparent films (pro-film and kodatrace), opaque colours, tracing box (light boxes for transferring designs into silk screens. 3. Explain the varioys synthetic and metal meshes used for silk screen printing, such as nylon, organdie, copper mesh. 4. Describe printing paste, ink and stencils. 5. Carry out proper storage for printing materials. 6. Repeat damages to tools and rollers. 7. Service cameras, tools and cutting knives.
2.	**Printing Chemical Tools.** Discuss block, screen and roller	1. Printing methods.	1. Discuss block printing and the process of preparing lino, wood stencil for the printing operation.

	printing. Practice usage of various block-out agents, setting and correction of poor registration/bloting.	2. Silk screen preparation. 3. Rotary screen preparations. 4. Printing rollers preparation. 1.1 Resist Agents. 1.2 Development of rotary screen and copper rollers. 1.3 Smoothing and polishing. 1.4 Printing faults and corrections. 1.5 Test print.	2. Explain and prepare material for screen printing. Explain the process of making the paper design, transfer on to the screen by light box and printing. 3. Explain and prepare materials for rotary screen printing. Explain the process of making the design, its transfer and printing. 4. Explain and prepare materials for roller printing. Explain the process of mechanical and manuall transfer of designs (etching and engravings) on the rollers. 5. Explain the use and procedure of blocking screen with gum, polish, shellac, lacquer, bichromate (light sensitive) opaque ink. 6. Explain the process employed in developing the rotary screen. Also explain the process employed in engraving design on the copper roller. 7. Explain the processes of smoothing polishing and measuring gauges usage. 8a. Explain methods of correcting inadequate registration and ink blotting. b. Enumerate the different faults in printing. 9. Explain method of test printing on table to ensure proper registration be the actual printing commences.
3.	**Tracing Methods and Colour Separation** Prduce accurate and neat copies of ideas to be printed, colour separation and enlargement of designs.	1.1 Screen development. 1.2 Colour separation. 1.3 Methods of colour separation in relation to	1. Show a practical work on a neatly and accurately developed screen ready for printing. 2. Make several colour separations for different coloured shapes in the design. 3. Explain/practice the methods of colour separation for:

	Practice colour separation by various printing techniques.	printing techniques.	(a) resist (b) silk screen (c) rotary (d) roller printing.
4.	**Design Registration** Practice registration of designs by chemical, manual and photographic methods.	1.1 Methods of design registration. 1.2 Accurate registration. 1.3 Colour matching	1. Explain the following methods of registering designs. (a) Chemical, (b) Manual and (c) photographic. 2. Explain methods of checking accurate registration of repeat units. 3. Explain the procedures of matching the design.

373– (SURFACE DESIGN AND PRINTING OPTION)
PRINTING OF TEXTILE 1 (CTE 9)

S/N.	Topic/Objectives	Contents	Activities/Remarks
1.	**Printing Chemical Tools and Equipment** Identify classes of dyes and their application techniques. Identify tools and equipment used in textile printing and their routine maintenance.	1. Classify dyes according to fabric type. 2. Dyeing auxiliaries 3. Features of Dyes and Dyeing Techniques. 4. Basic dyeing procedures/ processes	1. Classify all dyes direct, acid dyes and sulphur dyes; the solvents and chemical used as salts or mordants and their application to fibres and fabrics. 2. Discuss and select appropriate dyes, solvents and chemicals for selected fibrres and fabrics e.g. indanthrene dye for cotton fabrics. 3. Classify techniques of dyeing e.g. indanthene for cold dying (Batik). 4. Describe the tools and equipment used for printing e.g. screen frame, squeezee etc. 5. Learn to maintain dyeing equipment and tools.
2.	**Printing Procedure and Processes.** Setting and laying of table and screen for uniform printing. Operate roller and	1. Preparation for printing. 2. Flat screen printing. 3. Roller and rotary printing techniques.	1. Show the procedure of setting out materials and table for printing. 2. Show proper placement for good registration. 3. Explain the proper setting for rotary for good printing.

	determine resist agent thickness. Explain various drying methods and multi-colour technique.	4. Printing of blended fabrics. 5. Flat screen printing process. 6. Resist Printing process. 7. Drying methods. 8. Multi colour printing.	4. Prepare fabric on the table for printing. 5. Show printing skills with the flat screen. 6. Learn how to man or operate roller and rotary printing machines. 7. Study and explain the techniques of spraying and printing of fabrics of fibre blends. 8. Knowing the required number of squeegee pulls before raising the screen, carefully print on a fabric. 9. Explain the required thickness for the resist agent used for the print and the pressure necessary. 10. Describe the various drying chambers and their timing for good curing and drying. 11. Explain multi-colour printing techniques and equipment used, e.g. flat screen, rotary and multicolour roller printing machine like the Duplex printing machines.
3.	**Faults in Textile Printing** Identify printing faults and their correction.	1. Printing faults. 2. Causes of printing faults. 3. Rectification of textile printing faults..	1. Identify and explain blotting and proper registration and other faults in printing and find remedies against them. 2. Explain the causes of earlier listed 3. Discuss methods of rectifying printing faults.

374 - BLEACHING, DYEING AND FINISHING OPTION TEXTILE PREPARATION: CTE 01, 10, 11, 12 & 13

S/N.	Topic/Objectives	Contents	Activities/Remarks
1.	**Singeing** Understand singeing and describe its process, objectives singeing and safety precautions.	1. Singeing process. 2. Object of singeing. 3. Safety precaution of singeing	1. Define singeing and with the aid of diagram explain Gas singering, hot plate singeing and cylinder singeing. 2. Explain the aim of singeing i.e. burning off hairy surface from fabric prior to dyeing and printing. 3. Explain the cleaning procedure of the singeing machine for safety precaution.
2.	**Desizing** Describe desizing process. Testing of good desizing quality goods.	1. Desizing agents. 2. Properties of desizing agents. 3. Purpose of desizing. 4. Methods of desizing. 5. Desizing operation. 6. Testing desize yarns and fabrics.	1. Discuss desizing agents and their composition and uses 2. Explain the properties of sizes and their removals before dyeing (desizing). 3. Explain the reasons for desizing e.g. to prevent uneven dyeing. 4. Explain these methods of desizing; - alkaline desizing; - acid desizing, enzyme desizing. 5. Show capability of operating desizing equipment. 6. Conduc tests and experiments on desized fabrics.
3.	**Scouring** Explain principles of scouring and observe the importance of temperature time and chemical concentrations.	1. Principles of scouring. 2. Methods of scouring.	1. Explain scouring and the purpose of scouring fabrics, e.g. removal of soils and waxes for effective dyeing. 2. Describe the equipment and chemicals for scouring, and explain the following methods: - Rope form - Open width - Continuous method - Batch wise.

		3. Factors influencing scouring: i. temperature, ii. concentration of solution iii. time	3. Compare and contrast the scoring methods listed in 2 above. 4. Explain conditions required for effective scouring i.e. temperature, scouring time and solution content (chemical concentration) and conduct scouring experiments.
4.	**Textile Bleaching** Explain the chemistry of bleaching agents and bleaching process. Enumerate the functions of fluorescent Brightening Agents, and methods of applying FBA.	1. Bleaching of textile fabrics. 2. The chemistry of bleaching agents. 3. Common faults in bleaching. 4. The bleaching process. 5. Functions of FBA. 6. Methods of applying FBA. 7. Experiment on FBA application.	1. Explain the purpose of bleaching fabric and the required agents for vegetable and animal fibres – oxidizing and reducing agents. 2. Explain the reaction of the bleaching agents and uses i.e. the choice of ager depends on factors like the end-use fabric, required, handle, whether or not it is to be dyed, e.g. cotton bleached either cold dilute solutions of hypochorite or hot dilute solutions of hydrogen peroxide. 3. Describe bleaching errors in the use of some agents e.g. bleaching with low pochlorite can cause yellowing and weaken the fabric, chlorine can always damage wools. 4. Conduct bleaching with the agents discussed in 2 above. 5. Explain the functions of fluorescent brithtening agents (FBA) in bleaching. 6. Explain exhaustion and padding methods of applying FBA. 7. Conduct experiments on the application of FBA.
5.	**Mercerization** Understand mercerization and describe its effect on fabric and factors that	1. Mercerization. 2. Objects of mercerization.	1. Define mercerization and describe process of mercerization using diagram. 2. Explain the purpose and qualities impacted to fabric: elasticity, increase tensile strength, high affinity for dye

	affects its process.	3. Factors affecting mercerization.	stuffs and chemicals. 3. Explain the following factors that affect mercerization. - caustic soda concentration - impregnation temperature - dwell time - wetting agent - neutralization etc.
6.	**Setting of Wool and Thermoplastic Fibres.** 1. Explain the mechanism of heat setting thermoplastic fabrics. 2. Describe various method of heat setting with emphasis on crabbing	6.1 Heat setting principle. 6.2 Methods of Heating setting. 6.3 Heat setting methods for thermoplastic fibre. 6.4 Crabbing process.	1. Explain heat setting of thermoplastic fibre, fabric and its importance. 2. Explain the listed heat setting methods: below: - dry heat setting - steam heat setting - wet setting. 3. Discuss the methods of heat setting of the following synthetics e.g. steam heat setting: - Polyester - polyamide - acrylic. 4. Using diagram., explain the crabbing process of wool as a heat setting method.
7.	**Pre-treatment of Synthetic Fibre Fabrics** Describe pre-treatment process of polyester cellulose blends and synthetic fibre fabric.	1. Preparation of polyester cellulose Fabrics. 2. Preparation of synthetic fibre fabrics.	1. Explain the process for pre-treating blends of polyester/cellulose. 2. Explain the process for pre-treating synthetic fibre fabrics.
8.	**Carbonizing** Study carbonizing and explain the process and its objectives (emphasis should be made on wool).	1. Definition of carbonizing. 2. Carbonizing process. 3. Purpose of carbonizing.	1. Explain wool carbonizing 2. Describe carbonizing process of wool. 3. Discuss the aim of wool carbonizing.
9.	**Pre-Treatment of Fibres and Yarns**	9.1 Wool scouring process.	1. Explain the process of scouring wool in rope form in dolly machines by moving it through warm detergent

	Describe scouring bleaching and chlorination process.	9.2 Bleaching process of fibres and yarns. 9.3 Application of bleaching agents. 9.4 Chlorination of wool, process and effects.	solution in baths of diminishing strength. Discuss also the care that must be taken as wool is sensitive to the action of boiling water and not alkaline solutions. 2. Explain the processes used for the bleaching of vegetable and animal fibres and yarns. 3. Explain and apply bleaching agents to cotton and wool. Explain the normal process of bleaching wool by using sulfur dioxides gas and hydrogen peroxide and discuss the effects of chlorination of wool e.g. chlorine damages wool.
10.	**Washing Ranges** Draw and label a schematic diagram of washing range.	1. Essential components washing ranger 2. Washing process.	1. Make a well labeled diagram of the washing range showing the washing mangle, the steaming unit or box and the drying cylinder. 2. Conduct a washing run in a washing range.
11.	**Maintenance of Textile Equipment and Machinery** 1. Describe general routine maintenance and repairs carried out. 2. List spinning machines elements and state their functions.	1. Routine maintenance 2. Elements of spinning machines. 3. Functions of spinning machines.	1. Practice loosening and tightening with appropriate screw drivers. 2. Practice loosening and tightening of nuts with appropriate screw drivers. 3. Practice removing parts or whole machine employing the use of jacks and forklifts. 4. Practice aligning race board height using spirit levels. 5. Practice removal of wooden plastic and metallic parts using chisels. 6. Practical tidying work. 7. Identify different fuses used in the weaving shed. 8. Explain the uses and functions of

			fuses in equipment and appliances. 9. Practice engaging and disengaging motors from machines. 10. List common elements of spinning machines. 11. Explain the functions of the elements names in 10 above.

DYEING OF TEXTILE: CTE 12

S/N.	Topic/Objectives	Contents	Activities/Remarks
1.	**Principles of Light and Colour** Explain light composition and relationship between light and colour fan object.	1. Colour theory. 2. Colour and light. 3. Composition of light	1. Explain the nature of light and wave length and light energy. 2. Explain waves of wavelength and the visible spectrum, and discuss the effect of light on matter which reflect, transmit or absorb light. 3. Conduct experiments using prism to show effect on the spectrum.
2.	**Dyeing and Dyeing Machinery** State theory of dyeing and explain affinity in dyeing. Describe dye bath preparation, classification of dyes for different fabrics. Explain the working principles of dyeing machines, dye auxillaries and their objects. Explain these dyeing terms: electrolytes retarding agents etc.	1. Theory of dyeing. 2. Dyestuff and techniques finishing. 3. Variation principles of Dye Affinity. 4. Classification of Dyes by application. 5. Dyestuff auxiliaries and functions.	1. Explain colour mixing process, of superimposition of coloured materials referred to as subtractive process. Under this theory discuss absorption, diffusion and fixation. 2. Explain the swelling effect of alkali on cotton and the resultant affinity woards dyestuff it impacts to cotton fibre. 3. Dye different fabrics with suitable dyestuff and write out resultant degree of affinity. 4. Classify dyes according to their application. 5. Explain the use of the following auxiliaries in dyeing giving examples. (i) Electrolytes (ii) Retarding agents. (iii) Accelerants (iv) Levelling agents (v) Wetting agents

			(vi) Dispersing agents (vii) Carrier.
		6. Principle of Dyeing Machines.	6. Discuss the dyeing machineries: Continuous – (a) pad steam range, pad thermostolic (b) Batch-wise – jigger, winch, beam dyeing, package dyeing etc.
		7. Dyeing methods	7. Explain the workings of these dyeing machines. (a) continuous dyeing machines, pad steam range (pad mangle) pad thermostat. (b) Batch dyeing machine – jigger, winch, beam dyeing, package dyeing.
		8. Solid and Cross Dyeing	8. Explain padding and exhaustion dyeing methods.
		9. Dyeing fibre blends (with respect to polyester/cotton)	9. Explain the dyeing methods adopted for fibre blend fabrics; (i) Solid dyeing (ii) Cross Dyeing Explain also the reasons for these methods e.g. identifying the fibres in the blend.
		10. Stripping and redyeing.	10. Conduct a dyeing operation of polyester/cotton blend by using disperse/reactive and disperse/vat and note the results.
		11. Correcting faulty dyeing.	11. Explain the purpose of stripping and redyeing.
		12. Treatment process.	12. Study and explain the procedure for correcting faulty dyeing.
			13. Explain these after treatment methods on dyed fabrics. (i) Cationic fixing agent on direct dyeing. (ii) Sodium acetate on sulphur black dyeing. (iii) Oxidation

3.	**Test of Fastness Properties.** Carry out fastness test and show how it affects fabric and use.	1.1 Fastness properties and end use requirement. 1.2 Fastness Test.	1. Discuss the following fastness properties of dyed textiles; (a) Light fastness (b) Wash fastness, (c) Rubbing fastness (d) fastness to perspiration and (e) sublimation etc. 2. Explain the relationship between fabric end use and required fastness properties. 3. Conduct various tests to illustrate the fastness properties listed in 3.1 above.

374 - TEXTILE FINISHING: CTE 13

S/N.	Topic/Objectives	Contents	Activities/Remarks
1.	**Purposes and Effects of Finishing** 1. Understand finishing and common types of finishing in textile industries. 2. Compare and contrast chemical and mechanical finishing.	1. Definition of finishing. 2 .Types and Object s of finishing: impart aesthetics; improve serviceability of finished goods; impart other special properties as required by the end-use etc. 3. Types of finishing. 4. Effects of finishing.	1. Define finishing as it applies to textiles. 2. Explain mechanical finishing i.e. adjustment of dimensions of fabric (width and length) – stentering; stable dimension – heat setting of thermo plastic; thickness increased by raising and reduced by calendaring. Explain: Calendering and types of (Friction calendaring and schreiner) Brushing Embossing (similar to calendaring) samforizing, shearing, Milling for wool and wool blends. Beetling for linen fabric to close up spaces between threads to produce a flat effect and lustre. (ii) Explain Chemical finishing i.e. permanent or durable finishes to produce special effects. 3. Explain the use of - Resin - Softners - Water repellant - Flame resistants - Anti-static - Rot-proofing - Soil resistants.

		5. Mechanical finishing process: calendaring, brushing, embossing, raising, santor Bing, milling, etc 6. Chemical finishing process: Resin, softening, water-repellent, flame retardant, anti-static.	- Anti-shrink - Anti-crease 4. Describe the resultant effects produced by the finishing process listed in 3 above. 5. Use diagrams and drawings of the equipment to illustrate processes of the mechanical finishes listed in 3 above. 6. Use diagrams and drawings of equipment to illustrate the process of the chemical finishes listed in 3 above.
2.	**Purpose and Methods of Dehydration** 1. Describe the common methods of dehydration and their working principles. 2. Describe general methods of performing tests on finished goods.	1. Methods of dehydration. 2 .Purpose of dehydration. 3 Reasons for Finishing	1. Explain with the aid of diagrams: - spin drying - suction drying - cylinder - stenter etc. 2. Discuss the purpose of dehydration of textile fabrics. 3. Explain the purpose of dehydration e.g. get fabric ready for further processing; prevent possible damage of textile goods; get fabric ready for final packaging
3.	**Finishing Operation** Using sketches explain the working principles of finishing machines and finishing process.	1. Textile finishing machineries. 2. Principle of finishing machines. 3. Finishing process	1. Describe and explain the mechanisms of these finishing machines: - Stenter; - Calender machines; - Padding mangle; - Decatizing machine - Sanforizing range; - Raising machine; - Beetling machine; - Milling machine 2. Operate the appropriate machines for the following finishings: - brushing - raising

			- milling
4.	**Finished Textile Materials** Enumerate the procedure of carrying out test on finished textile goods.	1. Tests for finished textile goods. 1.1 Methods of testing finished goods. 1.2 Test finished goods.	1. Carry out the required tests for: - crease recovery angle e.g. the Shirley resistance recovery crease tester. - Tensile strength - Tear strength - Abrasion resistance - Water repellency - Shrinkage test with the Rigmel machine. 2. Conduct experiments and test on finished fabrics using the methods described in 4.2 above.