# Department of Textile Engineering

## Faculty of Mechanical Engineering


Dhaka University of Engineering & Technology, Gazipur

Curriculum of Outcome Based Education

for

Bachelor of Science in Textile Engineering

2021

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# Preface

Dhaka University of Engineering & Technology (DUET), Gazipur, is one of the reputed universities for engineering education in Bangladesh. The university is surrounded by scenic beauty and busy industrial area. Students having a four-year-long diploma engineering degree can compete to secure a position for four years long Bachelor degrees in different branches of Engineering. The University originated in 1980 as College of Engineering. Initially, the academic activities were operated at a temporary campus at Tejgaon, Dhaka, offering four years bachelor's degree in Civil Engineering; Electrical and Electronic Engineering; and Mechanical Engineering. All these degrees were awarded from the University of Dhaka, the most prestigious university in Bangladesh. After a short span of time, College of Engineering was renamed Dhaka Engineering College (DEC). The then DEC was shifted to its present permanent campus at Gazipur in 1983. DEC was converted to Bangladesh Institute of Technology (BIT), Dhaka, as a degree-awarding Institute by a government ordinance in 1986 to find solutions to various problems it had been facing since its inception. The journey of BIT, Dhaka, was not also so smooth. It faced many problems and could overcome some of the problems faced by DEC. To alleviate this situation, from September 2003, Dhaka University of Engineering & Technology (DUET), Gazipur, was created out of BIT, Dhaka. DUET has ultimately turned into a higher education institution. Since its journey, it has established a good reputation all over the world for the quality of its graduates. The curriculum and syllabus of DUET are continuously updated to cope with the recent technological development as well as in line with reputed universities all over the world. To offer students hands-on training, industrial attachment program is included in every program offered here at DUET. At present, there are four faculties in the university, these are, (a) The Faculty of Civil Engineering; this Faculty comprises the Department of Civil Engineering and Department of Architecture, (b) The Faculty of Electrical and Electronic Engineering; this Faculty comprises the Department of Electrical and Electronic Engineering and Department of Computer Science and Engineering, (c) The Faculty of Mechanical Engineering; this Faculty comprises the Department of Mechanical Engineering, Department of Textile Engineering, Department of Industrial and Production Engineering, Department of Chemical and Food Engineering and Department of Materials and Metallurgical Engineering (MME) and (d) The Faculty of Engineering; this Faculty comprises the Department of Chemistry, Department of Mathematics, Department of Physics and Department of Humanities and Social Sciences. DUET will continue to excel this university into a center of excellence to achieve national and international interest.

PART A

## Title of the Program

Bachelor of Science in Textile Engineering

## Name of the University

Dhaka University of Engineering & Technology, Gazipur

## Vision of the University

To be the center of excellence for quality education, research, and innovation.

## Mission of the University

- To provide a congenial environment for world-class education, research, and innovation.
- To produce highly efficient technical professionals endowed with practical knowledge, skills, and ethical values based on emerging demands.
- To promote multi-faceted academic collaboration across universities and industries for research and innovation.
- To contribute in national policy-making for sustainable socio-economic and industrial development of the country.
- To provide consultancy in solving technical problems at national and international levels.

# Name of the Degree

Bachelor of Science in Textile Engineering

# Name of the Faculty Offering the Program

Mechanical Engineering

# Name of the Department Offering the Program

Textile Engineering

# Vision of the Program

To become a center of excellence in textile engineering through quality, education, research, and innovation.

# Mission of the Program

| | |
|---|---|
| M1 | To provide a world-class teaching-learning environment and produce efficient graduates in textile engineering with problem-solving skills and ethical values. |
| M2 | To extend collaboration across the universities and industries for research, innovation, and training in textile engineering. |
| M3 | To contribute towards the national policy-making and resolving crisis in the related field. |
| M4 | To provide relevant consultancy services in the best interests of national and international communities. |

# Objectives of the Program

1. Produce graduates in textile engineering with excellent communicative and technical skills by developing teaching and learning environments where students will be able to acquire up-to-date knowledge and skill in design, analysis, mathematical computing, and engineering principles, which will also help them to adjust with evolving technology.
2. Prepare students for upcoming competitive professional careers and/or higher education by familiarizing them with real-life problems through internship, project, fieldwork, and collaborative research work with industry.
3. Promote leadership quality, professionalism, ethical attitude, and communication skills of students by engaging them with social activities, group work, and national and international competitive programs.
4. Develop a research environment in combination with students and faculties with the focus of resolving current national and international problems and dispersing the generated knowledge through publications and conferences.

# Description of the Program

Bachelor of Science in textile engineering (TE) is a 4-year full-time program consisting of 8 (eight) regular semesters. To complete the degree program, a student will require earning 162.25 credits. In the final academic year, students have to perform a thesis/capstone project under the guidance of a faculty supervisor. At present, the main focus of the TE program curriculum is on four major areas- yarn manufacturing, fabric manufacturing, wet processing, and apparel manufacturing. A student is expected to be specialized in any one of these groups without compromising the fundamental knowledge of textile processing engineering. Moreover, courses in basic science, mathematics, and relevant branch of engineering, including laboratory experience, will enable them to introduce modern equipment for measurement and design. In addition, education in humanities, social sciences, ethical principles, and management is provided with special attention to develop communication skills. Technical elective coursework, designed to encourage individual interests, provides the opportunity to gain in-depth knowledge in a particular discipline. This facilitates the development of special skills as well as problem solving, teamwork, and engineering design skills with the aid of latest tools. The courses on Bachelor of Science in textile engineering are designed to emphasize a strong foundation in physics, mathematics, and chemistry, followed by a thorough coverage of basic textile engineering courses such as fiber science and technology, polymer science, textile physics, testing, and quality analysis of various textile fibers, yarn manufacturing, and processing, fabric manufacturing, wet processing, operation and supply chain management, environmental pollution and control, etc. At the end of the programs, students are exposed to high performance textiles, advanced finishing technology, modern weaving and non-woven technology, instrumental analysis of textiles, advanced yarn manufacturing, etc. Upon successful completion of the program, the students will have the ability to deliver industry skills, leadership as well as corporate job responsibilities. Our graduates are serving with pride at various government agencies, national and international industries, multi-national companies, etc.

# Graduate Attributes

**a)** Engineering knowledge
**b)** Problem analysis
**c)** Design/development of solutions
**d)** Investigation
**e)** Modern tool usage
**f)** Engineer and society
**g)** Environment and sustainability
**h)** Ethics
**i)** Individual and team work
**j)** Communication
**k)** Project management and finance
**l)** Life-long learning

# Program Education Objectives

The Textile Engineering Undergraduate Program is designed to prepare students for continued learning and successful careers in industry, government, academia, and consulting. Our program education objectives (PEO) are:

| | |
|---|---|
| **PEO1** | To produce human resources having technical competencies so that they can excel in professional career and/or higher education by attaining knowledge and skill in design, development, analysis, and engineering principles. |
| **PEO2** | To instruct the students with real-life problems through internship, collaborative programs, research/project works to enable them to propose creative, sustainable, and economical solutions for real-life problems in their professional career. |
| **PEO3** | To prepare graduates who are adaptable and capable of adapting to new opportunities of emerging technology, leadership, and all affording sustainable engineering career. |
| **PEO4** | To enable students to acquire professionalism, ethical attitude, communication skills, team work in their profession, and adapt to current trends by engaging in lifelong learning. |

# Program Outcome (PO)

The B.Sc. in Textile Engineering program learning outcomes (POs) are aligned with the board of accreditation for engineering and technical education (BAETE) outcomes. These are stated as:

| | |
|---|---|
| **PO1** | **Engineering knowledge:** Apply knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems. |
| **PO2** | **Problem analysis:** Identify, formulate, research, and analyze complex engineering problems and reach substantiated conclusions using the principles of mathematics, the natural sciences, and the engineering sciences. |
| **PO3** | **Design/development of solutions:** Design solutions for complex engineering problems and design systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (K5) |
| **PO4** | **Investigation:** Conduct investigations of complex problems using research-based knowledge (K8) and research methods including design of experiments, analysis, and interpretation of data, and synthesis of information to provide valid conclusions. |
| **PO5** | **Modern tool usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems, with an understanding of the limitations. (K6) |
| **PO6** | **The engineer and society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice. (K7) |
| **PO7** | **Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development. (K7) |
| **PO8** | **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (K7) |
| **PO9** | **Individual work and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings. |
| **PO10** | **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. |
| **PO11** | **Project management and finance:** Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work as a member and leader in a team to manage projects and in multidisciplinary environments. |
| **PO12** | **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

# PEOs TO MISSION STATEMENT MAPPING

| M/PEO | PEO1 | PEO2 | PEO3 | PEO4 |
|---|---|---|---|---|
| **M1** | √ | √ | | √ |
| **M2** | | √ | | |
| **M3** | √ | √ | √ | |
| **M4** | √ | √ | √ | √ |

# Mapping of POs to PEOs

| PEO/ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PEO1** | √ | √ | | √ | | | | | √ | | √ | √ |
| **PEO2** | √ | √ | √ | √ | √ | √ | | | | | | |
| **PEO3** | | | √ | √ | √ | | √ | | | | | |
| **PEO4** | | | | | | √ | √ | √ | √ | √ | √ | |

# Mapping Courses with the POs

| | Courses | Program Outcomes (POs) (Cross marks indicate that the corresponding course fulfilled the particular PO) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
| | **1st year 1st semester** | | | | | | | | | | | | |
| | **TE 1601** | √ | √ | | | | | | | | | | |
| | **ME 1700** | √ | √ | | | | | | | | | | |
| | **TE 1603** | √ | | | | | | | | | | | |
| | **TE 1600** | √ | √ | | | | | | | √ | | | |
| | **TE 1607** | √ | √ | | | | | | | | | | |
| | **TE 1605** | √ | √ | | | | | | | | | | |
| | **TE 1606** | √ | √ | | | | | | | √ | | | |
| | **1st year 2nd semester** | | | | | | | | | | | | |
| | **TE 1609** | √ | √ | | | | | | | | | | |
| | **Math 1501** | √ | √ | √ | | | | | | | | | |
| | **Phy 1501** | | √ | √ | √ | | | | | | | | |
| | **Phy 1502** | √ | √ | | | | | | | √ | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Ch 1501** | √ | √ | √ | | √ | | | | | | | |
| | **Ch 1502** | √ | √ | | | | | | | √ | | | √ |
| | **HSS 1501** | | | | | | | | | | √ | | √ |
| | **HSS 1502** | | | | | | | | | | √ | | √ |
| | **2nd year 1st semester** | | | | | | | | | | | | |
| | **TE 2101** | √ | √ | √ | √ | | | | | | | | |
| | **TE 2102** | | | √ | √ | | | | | √ | | | √ |
| | **TE 2201** | √ | √ | √ | | | | | | | | | |
| | **TE 2202** | √ | √ | √ | | | | | | | | √ | |
| | **TE 2601** | √ | √ | | | | | | | | | | |
| | **CSE 2701** | √ | √ | | | √ | | | | | | | |
| | **CSE 2702** | √ | √ | √ | | √ | | | | | | | |
| | **Math 2501** | √ | √ | √ | | | | | | | | | |
| | **HSS 2500** | | | | | | | | | | √ | | √ |
| | **2nd year 2nd semester** | | | | | | | | | | | | |
| | **TE 2103** | √ | √ | | | | | | | | | | |
| | **TE 2104** | √ | | | | | | | | √ | | | √ |
| | **TE 2203** | √ | √ | | | | | | | | | | √ |
| | **TE 2204** | √ | √ | | | | | | | √ | | | √ |
| | **Math 2503** | √ | √ | √ | | | | | | | | | |
| | **TE 2600** | √ | √ | √ | | | | | | √ | | | |
| | **HSS 2501** | | | | | | √ | | | | | | √ |
| | **ME 2700** | √ | √ | √ | | | | | | √ | | | |
| | **TE 2603** | √ | | √ | √ | √ | | | | | | | |
| | **3rd year 1st semester** | | | | | | | | | | | | |
| | **TE 3301** | √ | √ | | √ | | | | | | | | |
| | **TE 3302** | | √ | | √ | | | | | √ | | | |
| | **TE 3401** | √ | √ | √ | | | | | | | | | |
| | **TE 3402** | | √ | √ | | | | | | √ | | | |
| | **TE 3600** | √ | √ | √ | | | | | | | | | |
| | **HSS 3501** | | √ | √ | √ | | | | | | | √ | √ |
| | **TE 3601** | √ | √ | | √ | √ | | | | | | | |
| | **ME 3701** | √ | √ | √ | | √ | | | | | | | |
| | **ME 3702** | √ | √ | | | | | | | √ | | | |
| | **3rd year 2nd semester** | | | | | | | | | | | | |
| | **TE 3303** | √ | √ | | √ | | | | | | | | |
| | **TE 3304** | | √ | | √ | | | | | √ | | | |
| | **TE 3403** | √ | √ | √ | | √ | | | | | | | |
| | **TE 3404** | | √ | √ | | √ | | | | √ | | | |
| | **TE 3603** | √ | √ | √ | | | | | | | | | |
| | **TE 3604** | √ | √ | | | | | | | | | | √ |
| | **TE 3801** | √ | √ | √ | | | | | | | | √ | |
| | **EEE 3711** | √ | √ | √ | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **EEE 3712** | √ | √ | √ | | | | | | | | | √ |
| | **4th year 1st semester** | | | | | | | | | | | | |
| | **TE 4601** | √ | √ | | | | | | | | | | |
| | **TE 4602** | | √ | √ | | | | | | | | | |
| | **TE 4603** | √ | √ | √ | | | | √ | | | | | √ |
| | **TE 4801** | √ | √ | √ | | | √ | | | | | √ | √ |
| | **TE 4803** | | √ | | | | √ | | √ | | | | √ |
| | **Optional (Choose any one set)** | | | | | | | | | | | | |
| **SET I** | **TE 4101** | √ | √ | √ | √ | √ | | | | | | | √ |
| | **TE 4102** | √ | √ | √ | | | | | | √ | | | √ |
| **SET II** | **TE 4201** | √ | √ | √ | | | | | | | | | √ |
| | **TE 4202** | | √ | √ | | | | | | | | | √ |
| **SET III** | **TE 4301** | √ | √ | | √ | | | | | | | | |
| | **TE 4302** | | √ | | √ | √ | | | | √ | | | |
| **SET IV** | **TE 4401** | √ | | √ | √ | √ | | √ | | | | | |
| | **TE 4402** | √ | √ | √ | | √ | | | | √ | | | |
| **SET V** | **TE 4805** | √ | √ | √ | √ | | | | | | | | √ |
| | **TE 4800** | | | √ | | √ | | | | √ | | | |
| **SET VI** | **TE 4901** | √ | √ | √ | √ | | | | | | | | |
| | **TE 4900** | √ | √ | √ | √ | | | | | | | | |
| | **4th year 2nd semester** | | | | | | | | | | | | |
| | **TE 4605** | √ | √ | | | | | | | | | | |
| | **TE 4606** | | √ | √ | | √ | | | | | | | |
| | **TE 4807** | √ | √ | √ | | √ | | | | | | √ | |
| | **TE 4002** | √ | | | | √ | | √ | | √ | √ | √ | √ |
| | Optional (Choose any one course from the following) | | | | | | | | | | | | |
| **Optional** | **TE 4000** | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | **TE 4004** | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | Optional (Choose any one course from the following) | | | | | | | | | | | | |
| **Optional** | **TE 4607** | √ | √ | | √ | √ | | | | | | | |
| | **TE 4609** | √ | √ | | √ | √ | | | | | | | |
| | Optional (Choose any one set) | | | | | | | | | | | | |
| **SET I** | **TE 4103** | √ | √ | √ | √ | | | | | | | | √ |
| | **TE 4104** | √ | √ | | | √ | | | | | | | √ |
| | **TE 4105** | √ | √ | √ | √ | | | | | | | | √ |
| | **TE 4106** | | √ | | √ | √ | | | | √ | | | |
| **SET II** | **TE 4203** | | √ | √ | | √ | | | | | | | |
| | **TE 4204** | √ | √ | √ | | | | | | √ | | | √ |
| | **TE 4205** | √ | √ | √ | √ | | | | | | | | |
| | **TE 4206** | | √ | | √ | √ | | | | √ | | | √ |
| **SET III** | **TE 4303** | √ | √ | | √ | √ | | | | | | | |
| | **TE 4304** | | √ | | √ | √ | | | | √ | | | |
| | **TE 4305** | √ | √ | √ | √ | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **TE 4306** | | √ | | √ | √ | | | | √ | | | |
| **SET IV** | **TE 4403** | √ | √ | | √ | √ | | | | | | | |
| | **TE 4404** | | √ | √ | √ | √ | | | | √ | | | |
| | **TE 4405** | √ | √ | √ | √ | | | | | | | | |
| | **TE 4406** | | √ | | √ | √ | | | | √ | | | |
| **SET V** | **TE 4809** | √ | √ | √ | √ | | | | | | | | |
| | **TE 4804** | | | √ | | √ | | | | √ | | √ | |
| | **TE 4811** | √ | | √ | √ | √ | | | | | | √ | √ |
| | **TE 4812** | | | √ | | √ | | | | √ | | √ | |
| **SET VI** | **TE 4903** | √ | √ | | √ | √ | | | | | | | |
| | **TE 4904** | | | √ | | √ | | | | √ | √ | √ | |
| | **TE 4905** | √ | √ | | √ | √ | | | | | | | |
| | **TE 4906** | √ | √ | | √ | √ | | | | | | | |

## Part-B

### Structure of the Curriculum

a) **Duration of the program:** Years: 04 (Four) Semester: 08 (Eight)
b) **Admission requirements:** A candidate for admission into the 1st year class must have passed Diploma in Textile Engineering/ Diploma in Textile Technology/ Diploma in Jute Technology/ Diploma in Garments Design and Pattern Making examination from Bangladesh Technical Education Board (after 10 years of schooling) or any examination recognized as equivalent there to and must also fulfill all other requirements as may be prescribed by the Admission Committee. In case of confusion regarding the equivalence, the case may be referred to the Degree Equivalence Committee.

The rules and conditions for admission into various departments shall be framed by the Academic Council on the recommendation of the Admission Committee each year.

All candidates for admission into B. Sc. Engineering programs must be citizens of Bangladesh unless the candidature is against the seats those are reserved for foreign students. Candidates for all seats except the reserved ones, if any, shall be selected on the basis of merit. The rules for admission into the reserved seats shall be framed by the Academic Council on the recommendation of the Admission Committee.
c) **Total minimum credit requirement to complete the program:** 162.25 (Earned credits: 148 + Exempted: 14.25)
d) **Total class weeks in a year/semester:** 14
e) **Minimum CGPA requirements for graduation:** 2.20
f) **Maximum academic years of completion:** 07 (Seven)
**g) Category of courses:**
**i. General Education Courses:**

| SL. No | Year/ Semester | Course Code and Title | Credit | Category |
|---|---|---|---|---|
| 1 | 1/2 | HSS 1501: English Language | 3 | Arts and Humanities |
| 2 | 1/2 | HSS 1502: English Language Sessional | 0.75 | |
| 3 | 2/1 | HSS 2500: Communicative English | 1.5 | |
| 4 | 2/2 | HSS 2501: Government and Bangladesh Studies | 3 | |
| 5 | 3/1 | HSS 3501: Accounting and Marketing | 3 | |
| 6 | 4/1 | TE 4801: Human Resource and Industrial Management | 3 | |
| 7 | 4/1 | TE 4803: Professional Ethics and Organizational Behavior | 3 | |
| | | **Total** | **17.25** | **10.63%** |
| 8 | 1/2 | Math 1503: Differential and Integral Calculus | 4 | Basic Science |
| 9 | 1/2 | Phy 1501: Physics | 4 | |
| 10 | 1/2 | Phy 1502: Physics Sessional | 0.75 | |
| 11 | 1/2 | Ch 1501: Chemistry | 4 | |
| 12 | 1/2 | Ch 1502: Chemistry Sessional | 0.75 | |
| 13 | 1/2 | TE 1609: Polymer Science | 3 | |

| | | | | |
|---|---|---|---|---|
| 14 | 2/1 | Math 2501: Differential Equations, Matrices, and Coordinate Geometry | 4 | |
| 15 | 2/2 | Math 2503: Vector Analysis, Fourier and Laplace Transform | 4 | |
| 16 | 2/2 | TE 2603: Statistics in Textiles | 3 | |
| 17 | 3/1 | TE 3601: Textile Physics | 4 | |
| | | **Total** | **31.5** | **19.42%** |
| 18 | 1/1 | ME 1700: Engineering Drawing Sessional | 0.75 | ICT and Other Engineering |
| 19 | 2/1 | CSE 2701: Computer Applications and Programming | 3 | |
| 19 | 2/1 | CSE 2702: Computer Applications and Programming Sessional | 0.75 | |
| 20 | 2/2 | ME 2700: Workshop Practice Sessional | 0.75 | |
| 21 | 3/1 | ME 3701: Basic Mechanical Engineering | 3 | |
| 22 | 3/1 | ME 3702: Basic Mechanical Engineering Sessional | 0.75 | |
| 23 | 3/2 | EEE 3711: Basic Electrical and Electronic Engineering | 3 | |
| 24 | 3/2 | EEE 3712: Basic Electrical and Electronic Engineering Sessional | 0.75 | |
| | | **Total** | **12.75** | **7.86%** |

### ii. Core Courses:

| SL. No | Year/ Semester | Course Code and Title | Credit | Category |
|---|---|---|---|---|
| 1 | 1/1 | TE 1601: Fundamentals of Yarn and Fabric Engineering | 3 | Core Courses |
| 2 | 1/1 | TE 1603: Fundamentals of Wet and Apparel Engineering | 3 | |
| 3 | 1/1 | TE 1600: Fundamentals of Textile Engineering Sessional | 0.75 | |
| 4 | 1/1 | TE 1605: Fundamentals of Textile Testing and Quality Control | 3 | |
| 5 | 1/1 | TE 1606: Fundamentals of Textile Testing and Quality Control Sessional | 0.75 | |
| 6 | 1/1 | TE 1607: Basic Textile Calculation | 3 | |
| 7 | 2/1 | TE 2101: Short Staple Spinning | 3 | |
| 8 | 2/1 | TE 2102: Short Staple Spinning Sessional | 1.5 | |
| 9 | 2/1 | TE 2201: Weaving Technology | 3 | |
| 10 | 2/1 | TE 2202: Weaving Technology Sessional | 1.5 | |
| 11 | 2/1 | TE 2601: Fiber Science and Technology | 4 | |
| 12 | 2/2 | TE 2103: Jute and Allied Fiber Spinning | 3 | |
| 13 | 2/2 | TE 2104: Jute and Allied Fiber Spinning Sessional | 1.5 | |
| 14 | 2/2 | TE 2203: Knitting Technology | 3 | |
| 15 | 2/2 | TE 2204: Knitting Technology Sessional | 1.5 | |
| 16 | 2/2 | TE 2600: Soft Computing in Textiles I Sessional | 1.5 | |
| 17 | 3/1 | TE 3301: Pretreatment and Coloration of Textiles | 3 | |
| 18 | 3/1 | TE 3302: Pretreatment and Coloration of Textiles Sessional | 1.5 | |
| 19 | 3/1 | TE 3401: Preparatory Process of Apparel Manufacturing | 3 | |
| 20 | 3/1 | TE 3402: Preparatory Process of Apparel Manufacturing Sessional | 1.5 | |
| 21 | 3/1 | TE 3600: Soft Computing in Textiles II Sessional | 1.5 | |

| | | | | |
|---|---|---|---|---|
| 22 | 3/2 | TE 3303: Textile Coloration and Finishing | 3 | |
| 23 | 3/2 | TE 3304: Textile Coloration and Finishing Sessional | 1.5 | |
| 24 | 3/2 | TE 3403: Apparel Production and Fashion Fundamentals | 3 | |
| 25 | 3/2 | TE 3404: Apparel Production and Fashion Fundamentals Sessional | 1.5 | |
| 26 | 3/2 | TE 3603: Fabric Structure and Design | 3 | |
| 27 | 3/2 | TE 3604: Fabric Structure and Design Sessional | 1.5 | |
| 28 | 3/2 | TE 3801: Engineering Economy | 3 | |
| 29 | 4/1 | TE 4601: Testing and Quality Evaluation of Fiber and Yarn | 3 | |
| 30 | 4/1 | TE 4602: Testing and Quality Evaluation of Fiber and Yarn Sessional | 1.5 | |
| 31 | 4/1 | TE 4603: Environmental Pollution and Control | 3 | |
| 33 | 4/2 | TE 4605: Testing and Quality Evaluation of Fabric and Apparel | 3 | |
| 34 | 4/2 | TE 4606: Testing and Quality Evaluation of Fabric and Apparel Sessional | 1.5 | |
| 35 | 4/2 | TE 4807: Supply Chain and Operations Management | 3 | |
| | | **Total** | **79** | **48.69%** |

### iii. Elective Courses:

| SL. No | Year/ Semester | Course Code and Title | Credit | Category |
|---|---|---|---|---|
| 1 | 4/1 | TE 4101: Process Control in Spinning and Special Yarns / TE 4201: Modern Weaving and Special Fabrics / TE 4301: Modern Pretreatment and Textile Finishing/ TE 4401: Apparel Washing and Finishing/ TE 4805: Textile Market Research and Product Development/ TE 4900: Fashion Distribution and Logistics | 3 | Elective Courses |
| 2 | 4/1 | TE 4102: Process Control in Spinning and Special Yarns Sessional/ TE 4202: Modern Weaving and Special Fabrics Sessional/TE 4302: Modern Pretreatment and Textile Finishing Sessional/TE 4402: Apparel Washing and Finishing Sessional/TE 4805: Management Tools and Engineering Graphics Sessional/ TE 4901: Fashion Illustration Sessional | 0.75 | |
| 3 | 4/2 | TE 4103: Modern Spinning / TE 4203: Modern Knitting and Non-woven / TE 4303: Advanced Textile Coloration and Measurement/ TE 4403: Apparel Production Planning and Merchandising / TE 4809: Economic Issue and International Marketing of Textile and Apparel Business / TE 4903: Trend Forecasting and Portfolio Development | 3 | |
| 4 | 4/2 | TE 4104: Modern Spinning Sessional/ TE 4204: Modern Knitting and Non-woven Sessional/ TE 4304: Advanced Textile Coloration and Measurement Sessional/ TE 4404: Apparel Production Planning and Merchandising Sessional/ TE 4804: CAD/CAM Sessional/ TE 4904: CAD/CAM in Fashion and Textiles Sessional | 0.75 | |

| | | | | |
|---|---|---|---|---|
| 5 | 4/2 | TE 4105: Maintenance and Management of Spinning Machinery/ TE 4205: Maintenance and Management of Fabric Machinery/ TE 4305: Maintenance and Management of Wet Machinery/ TE 4405: Maintenance and Management of Apparel Machinery/ TE 4811: Entrepreneurship and Business Project Development / TE 4905: Product Development and Marketing | 3 | |
| 6 | 4/2 | TE 4607: Advanced Technologies in Textiles/ TE 4609: Instrumental Analysis of Textiles | 3 | |
| 7 | 4/2 | TE 4100: Maintenance and Management of Spinning Machinery Sessional/ TE 4200: Maintenance and Management of Fabric Machinery Sessional/ TE 4300: Maintenance and Management of Wet Machinery Sessional/TE 4400: Maintenance and Management of Apparel Machinery Sessional/TE 4812: Entrepreneurship and Business Project Development Sessional/ TE 4906: Apparel Design Analysis Sessional | 0.75 | |
| | | **Total** | **14.25** | **8.78%** |

### iv. Capstone Course/ Internship/ Thesis/ Projects/ Portfolio

| SL. No. | Year / Semester | Course Code and Title | Credit | Category |
|---|---|---|---|---|
| 1 | 4/1 and 4/2 | TE 4000: Thesis | 6 | Capstone Course / Thesis and Internship/ |
| | | TE 4004: Capstone Project | | |
| 2 | 4/2 | TE 4002: Industrial Training | 1.5 | |
| | | **Total** | **7.5** | **4.62%** |

# Summary of Course Plan

| Year/ Semester | Theory | | Sessional | | Total Credit |
|---|---|---|---|---|---|
| | No. of Course | Credit | No. of Course | Credit | |
| 1st /1st * | 4 | 12.00 | 3 | 2.25 | 14.25 |
| 1st /2nd | 5 | 18.00 | 3 | 2.25 | 20.25 |
| 2nd /1st | 5 | 17.00 | 4 | 5.25 | 22.25 |
| 2nd /2nd | 5 | 16.00 | 4 | 5.25 | 21.25 |
| 3rd /1st | 5 | 16.00 | 4 | 5.25 | 21.25 |
| 3rd /2nd | 5 | 15.00 | 4 | 5.25 | 20.25 |
| 4th /1st | 5 | 15.00 | 3 | 5.25 | 20.25 |
| 4th /2nd | 5 | 15.00 | 4 | 7.50 | 22.50 |
| | **39** | **124** | **29** | **38.25** | **162.25** |

* 1st-year 1st-semester courses are exempted because of the candidates' 4 years' diploma in relevant branches of engineering after 10 years of schooling.

**Course Designation and Numbering System**

TE 2101

TE : Department identification code
2 : First digit signifies year number
1 : Second digit is reserved for departmental use to indicate the major branches
01 : Third and fourth digits signify course designation, of which the fourth digit will be odd for theoretical courses and even for sessional courses
00 : Sessional without Theory

**Major Branches**

| | | |
|---|---|---|
| 1- Yarn Manufacturing | 4- Apparel Manufacturing | 7- Other Engineering |
| 2- Fabric Manufacturing | 5– Basic Science, Language, Humanities, and General Education | 8- Textile Management |
| 3- Wet Processing | 6- Common Textile Courses | 9- Fashion Design |

# Year and Semester-wise Distribution of the Courses

## 1st Year 1st Semester (Exempted)

| Sl. No. | Course No. | Course Title | Contact hours/week | Credit |
|---|---|---|---|---|
| 1 | TE 1601 | Fundamentals of Yarn and Fabric Engineering | 3 | 3 |
| 2 | TE 1603 | Fundamentals of Wet and Apparel Engineering | 3 | 3 |
| 3 | TE 1605 | Fundamentals of Textile Testing and Quality Control | 3 | 3 |
| 4 | TE 1606 | Fundamentals of Textile Testing and Quality Control Sessional | 3/2 | 0.75 |
| 5 | TE 1607 | Basic Textile Calculation | 3 | 3 |
| 6 | TE 1600 | Fundamentals of Textile Engineering Sessional | 3/2 | 0.75 |
| 7 | ME 1700 | Engineering Drawing Sessional | 3/2 | 0.75 |
| | | **Total** | **16.5** | **14.25** |

Contact Hours: 12 (T) + 4.5 (S) = 16.5
Total Credits: 14.25

No. of Theory Courses: 04
No. of Seasonal Courses: 03

## 1st Year 2nd Semester

| Sl. No. | Course No. | Course Title | Contact hours/week | Credit |
|---|---|---|---|---|
| 1 | Math 1501 | Differential and Integral Calculus | 4 | 4 |
| 2 | Phy 1501 | Physics | 4 | 4 |
| 3 | Phy 1502 | Physics Sessional | 3/2 | 0.75 |
| 4 | Ch 1501 | Chemistry | 4 | 4 |
| 5 | Ch 1502 | Chemistry Sessional | 3/2 | 0.75 |
| 6 | HSS 1501 | English Language | 3 | 3 |
| 7 | HSS 1502 | English Language Sessional | 3/2 | 0.75 |
| 8 | TE 1609 | Polymer Science | 3 | 3 |
| | | Total | **22.5** | **20.25** |

Contact Hours: 18 (T) + 4.5 (S) = 22.5
Total Credits: 20.25

No. of Theory Courses: 05
No. of Seasonal Courses: 03

## 2nd Year 1st Semester

| Sl. No. | Course No. | Course Title | Contact hours/week | Credit |
|---|---|---|---|---|
| 1 | TE 2101 | Short Staple Spinning | 3 | 3 |
| 2 | TE 2102 | Short Staple Spinning Sessional | 3 | 1.5 |
| 3 | TE 2201 | Weaving Technology | 3 | 3 |
| 4 | TE 2202 | Weaving Technology Sessional | 3 | 1.5 |
| 5 | HSS 2500 | Communicative English Sessional | 3 | 1.5 |
| 6 | Math 2501 | Differential Equations, Matrices and Coordinate Geometry | 4 | 4 |
| 7 | TE 2601 | Fiber Science and Technology | 4 | 4 |
| 8 | CSE 2701 | Computer Applications and Programming | 3 | 3 |
| 9 | CSE 2702 | Computer Applications and Programming Sessional | 3/2 | 0.75 |
| | | **Total** | **27.5** | **22.25** |

Contact Hours: 17 (T) + 10.5 (S) = 27.5
Total Credits: 22.25

No. of Theory Courses: 05
No. of Seasonal Courses: 04

## 2nd Year 2nd Semester

| Sl. No. | Course No. | Course Title | Contact hours/week | Credit |
|---|---|---|---|---|
| 1 | TE 2103 | Jute and Allied Fiber Spinning | 3 | 3 |
| 2 | TE 2104 | Jute and Allied Fiber Spinning Sessional | 3 | 1.5 |
| 3 | TE 2203 | Knitting Technology | 3 | 3 |
| 4 | TE 2204 | Knitting Technology Sessional | 3 | 1.5 |
| 5 | HSS 2501 | Government and Bangladesh Studies | 3 | 3 |
| 6 | Math 2503 | Vector Analysis, Fourier and Laplace Transform | 4 | 4 |
| 7 | TE 2600 | Soft Computing in Textiles I Sessional | 3 | 1.5 |
| 8 | TE 2603 | Statistics in Textiles | 3 | 3 |
| 9 | ME 2700 | Workshop Practice Sessional | 3/2 | 0.75 |
| | | **Total** | **26.5** | **21.25** |

Contact Hours: 16 (T) + 10.5 (S) = 26.5
Total Credits: 21.25

No. of Theory Courses: 05
No. of Seasonal Courses: 04

## 3rd Year 1st Semester

| Sl. No. | Course No. | Course Title | Contact hours/week | Credit |
|---|---|---|---|---|
| 1 | TE 3301 | Pretreatment and Coloration of Textiles | 3 | 3 |
| 2 | TE 3302 | Pretreatment and Coloration of Textiles Sessional | 3 | 1.5 |
| 3 | TE 3401 | Preparatory Process of Apparel Manufacturing | 3 | 3 |
| 4 | TE 3402 | Preparatory Process of Apparel Manufacturing Sessional | 3 | 1.5 |
| 5 | HSS 3501 | Accounting and Marketing | 3 | 3 |
| 6 | TE 3600 | Soft Computing in Textiles II Sessional | 3 | 1.5 |
| 7 | TE 3601 | Textile Physics | 4 | 4 |
| 8 | ME 3701 | Basic Mechanical Engineering | 3 | 3 |
| 9 | ME 3702 | Basic Mechanical Engineering Sessional | 3/2 | 0.75 |
| | | **Total** | **26.5** | **21.25** |

Contact Hours: 16 (T) + 10.5 (S) = 26.5
Total Credits: 21.25

No. of Theory Courses: 05
No. of Seasonal Courses: 04

## 3rd Year 2nd Semester

| Sl. No. | Course No. | Course Title | Contact hours/week | Credit |
|---|---|---|---|---|
| 1 | TE 3303 | Textile Coloration and Finishing | 3 | 3 |
| 2 | TE 3304 | Textile Coloration and Finishing Sessional | 3 | 1.5 |
| 3 | TE 3403 | Apparel Production and Fashion Fundamentals | 3 | 3 |
| 4 | TE 3404 | Apparel Production and Fashion Fundamentals Sessional | 3 | 1.5 |
| 5 | TE 3603 | Fabric Structure and Design | 3 | 3 |
| 6 | TE 3604 | Fabric Structure and Design Sessional | 3 | 1.5 |
| 7 | EEE 3711 | Basic Electrical and Electronic Engineering | 3 | 3 |
| 8 | EEE 3712 | Basic Electrical and Electronic Engineering Sessional | 3/2 | 0.75 |
| 9 | TE 3801 | Engineering Economy | 3 | 3 |
| | | **Total** | **25.5** | **20.25** |

Contact Hours: 15 (T) + 10.5 (S) = 25.5
Total Credits: 20.25

No. of Theory Courses: 05
No. of Seasonal Courses: 04

## 4th Year 1st Semester

| Sl. No. | Course No. | Course Title | Contact hours/week | Credit |
|---|---|---|---|---|
| 1 | TE 4601 | Testing and Quality Evaluation of Fiber and Yarn | 3 | 3 |
| 2 | TE 4602 | Testing and Quality Evaluation of Fiber and Yarn Sessional | 3 | 1.5 |
| 3 | TE 4603 | Environmental Pollution and Control | 3 | 3 |
| 4 | TE 4801 | Human Resource and Industrial Management | 3 | 3 |
| 5 | TE 4803 | Professional Ethics and Organizational Behavior | 3 | 3 |
| **Program Courses (Choose any one course from the following)** | | | | |
| 6 | TE 4000 | Thesis | 6 | 3* |
| | TE 4004 | Capstone Project | 6 | 3* |
| **Optional (Choose any one set from the following)** | | | | |
| I | TE 4101 | Process Control in Spinning and Special Yarns | 3 | 3 |
| | TE 4102 | Process Control in Spinning and Special Yarns Sessional | 3/2 | 0.75 |
| II | TE 4201 | Modern Weaving and Special Fabrics | 3 | 3 |
| | TE 4202 | Modern Weaving and Special Fabrics Sessional | 3/2 | 0.75 |
| III | TE 4301 | Modern Pretreatment and Textile Finishing | 3 | 3 |
| | TE 4402 | Modern Pretreatment and Textile Finishing Sessional | 3/2 | 0.75 |
| IV | TE 4401 | Apparel Washing and Finishing | 3 | 3 |
| | TE 4402 | Apparel Washing and Finishing Sessional | 3/2 | 0.75 |
| V | TE 4805 | Textile Market Research and Product Development | 3 | 3 |
| | TE 4800 | Management Tools and Engineering Graphics Sessional | 3/2 | 0.75 |
| VI | TE 4901 | Fashion Distribution and Logistics | 3 | 3 |
| | TE 4900 | Fashion Illustration Sessional | 3/2 | 0.75 |
| | | **Total** | **25.5** | **20.25** |

* This 3 credit will be transferred to 4th Year 2nd Semester

Contact Hours: 15 (T) + 10.5 (S) = 25.5
Total Credits: 20.25

No. of Theory Courses: 05
No. of Seasonal Courses: 03

## 4th Year 2nd Semester

| Sl. No | Course No. | Course Title | Contact hours/week | Credit |
|---|---|---|---|---|
| 1 | TE 4605 | Testing and Quality Evaluation of Fabric and Apparel | 3 | 3 |
| 2 | TE 4606 | Testing and Quality Evaluation of Fabric and Apparel Sessional | 3 | 1.5 |
| 3 | TE 4807 | Supply Chain and Operations Management | 3 | 3 |
| 4 | TE 4002 | Industrial Training | 3 | 1.5 |
| **Program Courses (Choose any one course from the following)** | | | | |
| 5 | TE 4000 | Thesis | 6 | 6* |
| | TE 4004 | Capstone Project | 6 | 6* |
| **Optional (Choose any one course from the following)** | | | | |
| 6 | TE 4607 | Advanced Technologies in Textiles | 3 | 3 |
| | TE 4609 | Instrumental Analysis of Textiles | 3 | 3 |
| **Optional (Choose any one set from the following)** | | | | |
| I | TE 4103 | Modern Spinning | 3 | 3 |
| | TE 4104 | Modern Spinning Sessional | 3/2 | 0.75 |
| | TE 4105 | Maintenance and Management of Spinning Machinery | 3 | 3 |
| | TE 4106 | Maintenance and Management of Spinning Machinery Sessional | 3/2 | 0.75 |
| II | TE 4203 | Modern Knitting and Non-woven | 3 | 3 |
| | TE 4204 | Modern Knitting and Non-woven Sessional | 3/2 | 0.75 |
| | TE 4205 | Maintenance and Management of Fabric Machinery | 3 | 3 |
| | TE 4206 | Maintenance and Management of Fabric Machinery Sessional | 3/2 | 0.75 |
| III | TE 4303 | Advanced Textile Coloration and Measurement | 3 | 3 |
| | TE 4304 | Advanced Textile Coloration and Measurement Sessional | 3/2 | 0.75 |
| | TE 4305 | Maintenance and Management of Wet Machinery | 3 | 3 |
| | TE 4306 | Maintenance and Management of Wet Machinery Sessional | 3/2 | 0.75 |
| IV | TE 4403 | Apparel Production Planning and Merchandising | 3 | 3 |
| | TE 4404 | Apparel Production Planning and Merchandising Sessional | 3/2 | 0.75 |
| | TE 4405 | Maintenance and Management of Apparel Machinery | 3 | 3 |
| | TE 4406 | Maintenance and Management of Apparel Machinery Sessional | 3/2 | 0.75 |
| V | TE 4809 | Economic Issue and International Marketing of Textile and Apparel Business | 3 | 3 |
| | TE 4804 | CAD/CAM Sessional | 3/2 | 0.75 |
| | TE 4811 | Entrepreneurship and Business Project Development | 3 | 3 |
| | TE 4812 | Entrepreneurship and Business Project Development Sessional | 3/2 | 0.75 |
| VI | TE 4903 | Trend Forecasting and Portfolio Development | 3 | 3 |
| | TE 4904 | CAD/CAM in Fashion and Textiles Sessional | 3/2 | 0.75 |
| | TE 4905 | Product Development and Marketing | 3 | 3 |
| | TE 4906 | Apparel Design Analysis Sessional | 3/2 | 0.75 |
| | | **Total** | **30** | **22.5** |

*Here 3 credit is transferred from 4th Year 1st Semester

Contact Hours: 15 (T) + 15 (S) = 30
Total Credits: 22.5

No. of Theory Courses: 05
No. of Seasonal Courses: 04

# DETAILED OUTCOME BASED EDUCATION (OBE) COURSE OUTLINE

## 1ST YEAR 1ST SEMESTER

DUET is a specialized Engineering university where only the students who completed diploma in engineering (after 10-years of regular schooling) are eligible to be admitted for subsequent 4-years of bachelor in engineering. During their diploma in engineering, candidates already cover the first semester courses thoroughly, and corresponding assessments are done following standard evaluation system. Furthermore, the candidate's capability on the first semester course contents is re-evaluated through a rigorous, extensive, and highly competitive entrance exam (admission test). After that, only a limited number (the number of student allotment per year) of qualified candidates are selected based on their merit score on the entrance exam. Therefore, it is logical to exempt the first semester courses for the admitted students. Accordingly, the OBE course profiles of 1st year 1st semester are partially done due to the exemption and presented below-

### TE 1601: Fundamentals of Yarn and Fabric Engineering

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 1601<br>**COURSE TITLE:** Fundamentals of Yarn and Fabric Engineering | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED: 1**st Year **1**st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** N/A | **SEE Marks:** N/A |

**Rationale of the Course:** Yarn is the first value-added product in the textile industry made from fiber, followed by fabric. Basic knowledge of flowcharts, machine layouts, mixing, and blending is required for fresh students of this program. Furthermore, basic terms of weaving, preparatory process of weaving, working principle weaving machinery are also required to understand yarn and fabric engineering. Consequently, fresh students of this program should have a solid understanding of yarn and fabric basics.

**COURSE CONTENT**

**Short Staple Spinning**: Quality characteristics of fiber; Classification of fiber on the basis of staple length; Flow chart of yarn manufacturing; Machine layout for short-staple spinning and their function; Ginning: definition, importance, impact on subsequent process; Mixing and blending: definition, importance; Basic yarn counting system.

**Long Staple Spinning:** Flow chart of jute manufacturing process; Batch and batching; Batch selection techniques; Piecing; Bale selection: pucca bale, kutcha bale, bale cuttings; Batch composition; Emulsion and its applications.

**Weaving:** History of weaving; Definition of weaving; Flow chart of weaving; Basic terms of weaving; Preparatory process of weaving; Working principle of weaving machineries; Elements of fabric structure and design; Drafting and lifting plan; Quality parameters of woven fabric.

**Knitting:** Definition of knitting; Knitting process; Weft knitting; Warp knitting; Elements of knitted structure; Basic terms of knitting; Knitting machineries; Classification of weft knit structure.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of spinning and weaving. |
| **CLO2** | **Understand** flowcharts, machine layout of spinning, and weaving. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**TE 1603: Fundamentals of Wet Processing and Apparel Engineering**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 1603<br>**COURSE TITLE:** Fundamentals of Wet Processing and Apparel Engineering | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED: 1**st Year **1**st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** N/A | **SEE Marks:** N/A |

**Rationale of the Course:** Wet processing and apparel are two significant stages in textile manufacturing. Pre-treatment processes, functions of dyes, and auxiliaries involved in wet processing are required for fresh students of this program. In addition, introductory content, including global scenario of apparel market, Quota, and category number for different garment items, are also required for fresh students. Thus, this course has been included in this program.

**COURSE CONTENT**

**Wet Processing:** Terms related to textile wet processing; Pre-treatment of natural and synthetic fiber processes; Functions of chemicals used in pre-treatment process; Functions and working principles of different pre-treatment machineries; Basic concepts of dyes; Flow chart of different fabric dyeing process; Dyeing process for different types of fabric; Printing; Finishing; Different types of finishing.
**Apparel Engineering:** Brief history of the development of garments industries in Bangladesh; Global scenario of apparel market; Challenges in apparel production; Fashion trends in different countries; Nomenclature of different types of garments; Quota and category number for different garment items; Flow chart of garments manufacturing.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** Basic terminology of wet processing and apparel. |
| **CLO2** | **Understand** Basic preparatory processes of wet processing and apparel. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |

(Tick mark indicates relationship)

**TE 1605: Fundamentals of Textile Testing and Quality Control**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 1605<br>**COURSE TITLE:** Fundamentals of Textile Testing and Quality Control | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED: 1**st Year **1**st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** N/A | **SEE Marks:** N/A |

**Rationale of the Course:** Textile testing is essential as it ensures quality and is able to detect any faults ahead of manufacturing. As clothing develops and becomes more innovative, textile testing becomes more and more important. The introductory content includes sampling, testing machineries, moisture measurement, fiber, yarn, fabric tests is necessitated. This course is required to provide an overview of textile testing to the fresh students of this program.

**COURSE CONTENT**

Textile testing and quality control: Introduction, types, objectives, functions, importance; Factors affecting test results; List of different testing machineries for different tests; Moisture in textiles: moisture regain, moisture content; Relation between moisture regain and moisture content; Hysteresis effect; Factors affecting regain; Instrument of humidity measurement; Machines used to measure the humidity of textile materials; Sampling for textile testing: techniques of fiber, yarn, and fabric sampling method. Different yarn numbering system: direct system, indirect system; Relation between yarn count and yarn diameter; Relation between yarn count and yarn twist; Fabric dimensional and specification test: fabric length, width, GSM, EPI, PPI, etc.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** Basic terminology of Textile Testing and Quality Control. |
| **CLO2** | **Understand** Basic processes of Textile Testing and Quality Control. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | √ | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**TE 1606: Fundamentals of Textile Testing and Quality Control Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 1606<br>**COURSE TITLE:** Fundamentals of Textile Testing and Quality Control Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 1st year 1st semester | |
| **Exam Hours:** N/A | **CIE Marks:** N/A | **SEE Marks:** N/A |

**Rationale of the Course:** Understanding a topic in-depth can only be achieved by learning it practically. This sessional course is designed to provide hands-on experience to the fresh textile students on the standard testing conditions of a textile testing lab, implementation of different testing principles

for various textile products, analyze the results of different testing methods, and compare the results. Thus, this course has been included in this program.

**COURSE CONTENT**

Measurement of standard testing condition of a textile testing lab and its controlling process; Different types of machinery and layout of a testing lab; Parameters considering for fiber, yarn, and fabric testing; Fiber sampling by zoning technique; Yarn sampling process; Lea preparation by wrap reel; Yarn count measurement; Fabric sampling process; Fabric length and width measurement; Fabric cutting process by template for yarn count testing; EPI, PPI Test; Warp and weft yarn crimp% measurement from different fabric sample.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understanding** the explanation of standard testing conditions of a textile testing lab. |
| **CLO2** | **Apply** the concept of different testing principles for different textile products. |
| **CLO3** | **Analyze** by comparing the result of different testing found from different testing methods. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | √ | | | |
| **CLO3** | | √ | | | | | | | √ | | | |

(Tick mark indicates relationship)

**TE 1607: Basic Textile Calculation**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 1607<br>**COURSE TITLE: Basic Textile Calculation** | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 1st Year 1stSemester | |
| **Exam Hours:** N/A | **CIE Marks:** N/A | **SEE Marks:** N/A |

**Rationale of the Course:** Application of the mathematical formula in textile engineering as well as analyzing the production information of various textile machineries are very significant for textile graduates. Calculation in textile manufacturing includes production data, processing parameters, material testing, consumption and costing of the products, etc. Therefore, this course has been included in this program.

**COURSE CONTENT**

Different terms related to textile calculation; Sliver, roving and yarn counting system; Cleaning efficiency of blow room; Production calculation of different spinning machineries; Batch and batching calculation; Calculation related to jute spinning; Calculation in weaving preparatory process; Production calculation in weaving; Woven fabric GSM and weight calculation; Needle number calculation for knitting process; Production calculation in knitting; GSM calculation of knitted fabric; Stock solution calculation of dyes and chemicals; Marker efficiency calculation; Basic garments consumption calculation.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** the mathematical formula in textile engineering. |
| **CLO2** | **Analyze** the production calculation of various types of textile machinery. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**TE 1600: Fundamentals of Textile Engineering Sessional**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 1600<br>**COURSE TITLE:** Fundamentals of Textile Engineering Sessional | | |
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 1st year 1st semester | |
| **Exam Hours:** N/A | **CIE Marks:** N/A | **SEE Marks:** N/A |

**Rationale of the Course:** This sessional course is designed to provide hands-on experience to the textile graduates on basic types of machinery and parts of the major textile processing stages, i.e., spinning, weaving, knitting, wet processing, and apparel manufacturing.

**COURSE CONTENT**

**Yarn Manufacturing:** Ginning of cotton fiber by different ginning processes; Mixing and blending of cotton with cotton and different fiber with cotton fiber; Emulsion preparation for jute fiber.
**Fabric Manufacturing:** Identification of different parts of hand loom; Pirn changing in shuttle; Identification of different types of basic knitting elements.
**Wet Processing:** Stock solution preparation for different chemicals and dyes; Basic apparatuses need for basic pre-treatment, dyeing, and finishing process.
**Apparel Manufacturing:** Measurement of different tops and bottoms item; Measurement taken from dummy.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the discussion of basic types of machinery and parts of spinning, weaving, knitting, wet processing, and apparel manufacturing. |
| **CLO2** | **Apply** the concept of different principles with different machine parts. |
| **CLO3** | **Analyze** by organizing the different parts for different types of machinery. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | √ | | | |
| **CLO3** | √ | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**ME 1700: Engineering Drawing Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** ME 1700<br>**COURSE TITLE: Engineering Drawing Sessional** | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 1st Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** N/A | **SEE Marks:** N/A |

**Rationale of the Course:** Engineering Drawing is referred to as the fundamental language of engineers, which strengthens the foundation block of the engineering & technological structure. Moreover, it helps convey ideas and convert concepts into reality. This course aims at developing the fundamental understanding and application of engineering drawing in the context of textile engineering. It helps learners get acquainted with various types of drawing instruments along with their applications, drawing standards, and conventions which develops the ability of the learners to draw and read various sketches, curves & projections for the purpose of textile design and manufacturing. That's why; a concrete insight regarding engineering drawing is required for the graduates of textile engineering to a great extent.

**COURSE CONTENT**

Instruments and their uses; Planning of drawing sheet, lettering, dimensioning, projection and its types; First and third angle- projection of elementary machine parts, models or pictorial, orthographic drawings; Isometric views, auxiliary views; Assembly drawing and sectional views; Specifications for manufacture, working drawings, plan and elevation of building; Drawing of gear tooth profile, cam profile, fasteners, key, and springs; Free hand drawing of textile floor; Drawing of assemblies of textile machinery parts from given details; Computer graphics.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the various types of instruments that are used in drawing, projection, and lettering. |
| **CLO2** | **Apply** the various tools for drawing, dimensioning, projection, and free-hand drawing. |
| **CLO3** | **Analyze** the graphics design, cam profile, and fasteners. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**1ST YEAR 2ND SEMESTER**

**Math 1501: Differential and Integral Calculus**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** Math 1501<br>**COURSE TITLE:** Differential and Integral Calculus | | |
|---|---|---|
| **CREDIT:** 4.0 (Theory) | **TERMS OFFERED:** 1st Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The course is designed to provide students with the concept of the rate of change of one quantity with respect to another quantity and finding the area are the fundamental problems in the branch of mathematics which is studied in the name of Calculus. Calculus is divided into two main streams; one is Differential calculus, and the other is Integral calculus. Generally, the part of calculus concerned with finding tangent lines and rates of change is called differential calculus, and that part concerned with finding areas, arc lengths, and volumes is called integral calculus.

**COURSE CONTENT**

**Differential calculus:** Function, domain, range, inverse and graphs of functions; Limit of a function; Continuity and differentiability, significance of derivatives, indeterminate forms; L'Hospital's rule; Rules of differentiation of various functions, the chain rules, techniques of differentiations of explicit and implicit functions and parametric equations; Successive differentiations; Leibnitz theorem and its applications; Expansions of functions; Rolle's theorem; Mean value theorem; Taylor's and Maclaurin's theorems; Lagrange's remainder theorem; Increasing and Decreasing functions; Concavity and finding Maxima and Minima of a function of one and two variables; Partial differentiation; Euler's theorem on homogeneous function, tangent and normal, curvature, asymptotes, curve tracing.

**Integral calculus:** Introduction to indefinite integrals as anti-derivative; Standard formulae; Integration by the method of substitutions; Integration by parts; Integration by the method of successive reduction: Integration of special trigonometric functions and rational fractions; Concept of definite integration; Definite integration as the limit of a sum; Interpretation of a definite integral geometrically and analytically; Properties of definite integrals and their applications; Fundamental theorem of integral calculus; Evaluations of definite integrals; Gamma and beta functions; Area of plane curves; Length of plane curves; Volume and surface areas of solids of revolution.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic concepts and principles of differential and integral calculus of real functions, sequence, and series. |
| **CLO2** | **Understand** the basic concept of the term limit, continuity, differentiability, integration, and their applications to real-life situations |
| **CLO3** | **Apply** the rate of change, the area in plane curves, the arc length, the volume, and the surface areas of solids of revolution and examine the maxima and minima of a function. |
| **CLO4** | **Analyze** fundamental theorem of calculus and techniques of integration to calculate the area of regions, the volume, and surface area of solids of revolutions. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | | √ | | | | | | | | | | |
| **CLO4** | √ | | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, Power point presentation, reading, showing videos)

**Phy 1501: Physics**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** Phy 1501<br>**COURSE TITLE:** Physics | | |
|---|---|---|
| **CREDIT:** 4.0 (Theory) | **TERMS OFFERED:** 1st Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** This Physics course covers the detailed phenomena of waves, electricity & magnetism, optics (interference, diffraction, and polarization), and modern Physics. These topics form an essential foundation for all other elective courses in physics and Textile Engineering. The basic concepts are required for a mathematical description of the mentioned contents. Students are introduced to the course to teach them its foundations, simple applications, and utility.

**COURSE CONTENT**

**Calorimetry:** Newton's law of cooling; Specific heat of solid and liquid; Interference: Huygen's principle, Young's experiment, analytical treatment of interference, kinetic theory of gases, coherent sources and its production methods, Interference due to thin films.

**Thermal conductivity:** Rectilinear, cylindrical and spherical flow of heat; Newton's rings; Diffraction: Fresnel and Fraunhofer diffraction, heat flow through compound walls, accretion of ice on ponds; Fraunhoffer diffraction by single and double slit.

**Oscillations:** The simple harmonic wave equation and its solution; Plane diffraction grating; Resolving and dispersive power of a grating; Polarization: Polarization by reflection, composition of simple harmonic motion- Lissajou's figures, polarization by refraction and double refraction, Brewster's law, and Malus law, elliptical and circular polarization of light.

**Wave motion:** Types of wave motion; Expression for plane progressive wave; Energy calculation of stationary and progressive wave; Classification of solids: Crystalline, amorphous, ceramics and polymer, different types of bonds in crystal and cohesive energy; Interference of sound wave, Beats;

Doppler effect; Crystal structure: Different types of crystal structure, simple cubic, body centered cubic and face centered cubic crystal structure, packing fraction.
**Electrostatics:** Electric charge; Electric force; Electric field; Coulomb's law; Gauss' law; Miller indices and crystal plane; Defects in solids; Band theory of solids; Electric potential and their applications due to continuous charge distribution; Electric dipole and quadruple; Capacitance and capacitors; Particle properties of wave: Quantum theory of light, photoelectric effect, Compton effect.
**Magnetism:** The magnetic field and flux; Magnetic force on a current carrying conductor; Hall effect; Pair production; X-rays diffraction; de Broglie waves; Biot-Savart law and Ampere's law and their applications; Atom model and hydrogen spectrum.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** various terms of optics, thermal physics, waves, electricity and magnetism. |
| **CLO2** | **Understanding** various terms and equations of optics, thermal physics, waves, electricity and magnetism to solve simple problems. |
| **CLO3** | **Apply** the basic theory and principles of thermodynamics, oscillations, waves, optics, and electricity to solve a range of problems. |
| **CLO4** | **Analyze** electric and magnetic force and field, electric charge, electric potential, current, voltage and resistance, capacitance using basic laws of electricity and magnetism. |
| **CLO5** | **Evaluate** the performance of a photocell using the basic theory of photoelectric effect. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | √ | | | | | | | | | | |
| **CLO2** | | √ | √ | | | | | | | | | |
| **CLO3** | | | | √ | | | | | | | | |
| **CLO4** | | | | √ | | | | | | | | |
| **CLO5** | √ | | | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, Power point presentation, reading, showing videos)

**Phy 1502: Physics Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** Phy 1502<br>**COURSE TITLE:** Physics Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 1st Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks: 100**% | **SEE Marks:** 00% |

**Rationale of the Course:** Physics is a fundamental science that endeavors' to explain all the natural phenomena that occur in the universe. Physics-II Sessional is essential for B.Sc. in engineering and technology to develop in them proper understanding of physical phenomenon, scientific temper, and engineering aptitude. This course has opportunity to study physical properties through an understanding of properties of matter, thermal physics, waves, and electricity.

**COURSE CONTENT**

Introduction; Determination of thermal conductivity of copper by Searle's apparatus; Determination of the value of acceleration due to gravity "g" by compound pendulum; Determination of the value of unknown resistance and verify the laws of series and parallel resistances by means of a P.O. box; Determination of the specific resistance of a given wire by meter bridge.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** thermal, vibrational, optical, and electrical properties of matter by designing a simple experimental set-up |
| **CLO2** | **Apply** achieved skill for professional sector as well as for higher study. |
| **CLO3** | **Analyze** and write effective reports, prepare documentation, make effective presentations, give and receive clear instructions |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | √ | | | |
| **CLO2** | | √ | | | | | | | √ | | | |
| **CLO3** | √ | | | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Ch 1501: Chemistry**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** Ch 1501<br>**COURSE TITLE:** Chemistry | | |
|---|---|---|
| **CREDIT:** 4.0 (Theory) | **TERMS OFFERED:** 1st Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Chemistry is the fundamental course in science that includes the bonding of compounds, properties, preparation, and reaction of organic compounds. The organic compounds contain in clothes, dyes, soap, detergent as well as leather products. Wastewater from the textile industry is also a significant environmental pollution source of organic pollutants. Not only textile wastewater but also textile products often contain chemicals such as formaldehyde, azo-dyes, dioxins, pesticides, and heavy metals that might pose a risk to humans and the environment. After learning this course, students will have a deep understanding of organic chemistry, including the properties of fiber, dye, and west water contamination. They will also be able to identify and solve the associated tasks.

**COURSE CONTENT**

Hybridization of aliphatic carbon orbitals; Different types of isomerism: Structural isomerism, chain isomerism, positional isomerism, functional isomerism, stereoisomerism, geometrical isomerism, and optical isomerism; Derivatives of aliphatic hydrocarbons and their important reactions; Mono-carboxylic acids and their Halides; Esters; Anhydrides and Amides; Structures, theories, and nomenclatures of aromatic hydrocarbons; Preparation and major reactions of aromatic hydrocarbons; Significant reactions and properties of heterocyclic aromatic hydrocarbons; Essential properties and reactions of carbohydrates and proteins.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** hybridization and isomerism of aliphatic hydrocarbons |
| **CLO2** | **Understand** the properties of polysaccharides and major reactions of amino acids |
| **CLO3** | **Apply** fundamental aliphatic hydrocarbons reactions knowledge in reaction design |
| **CLO4** | **Analyze** aromatic and heterocyclic aromatic compounds structure and important reactions |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | √ | | | | | | | | | | |
| **CLO2** | √ | | √ | | √ | | | | | | | |
| **CLO3** | √ | | √ | | | | | | | | | |
| **CLO4** | √ | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**Ch 1502: Chemistry Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** Ch 1502<br>**COURSE TITLE:** Chemistry Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 1st Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Chemistry Sessional offers the student experimental knowledge with reaction design and development. This course includes elemental analysis and detection of functional groups, and outcomes are confirmed by changing color. The student can gain hands-on experience of an ideal laboratory setup, safety, and experimental technique, which will be beneficial for the future endeavor and, therefore, for their job in the textile sector.

**COURSE CONTENT**

Proper instructions about fundamental safety rules and basic laboratory skills and instruments; Determination of elements and functional groups present in a known organic sample; Determination physical properties, solubility, elements and functional groups of an unknown organic sample; Determination physical properties, solubility, elements and functional groups of an unknown organic sample; determination physical properties, solubility, elements and functional groups of an unknown organic sample; Determination physical properties, solubility, elements and functional groups of an unknown organic sample.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the foundation of chemistry and sufficient breadth and depth to enable them to critically interpret the experimental results**.** |
| **CLO2** | **Understand** the laboratory skills needed to design chemical reactions and safely execute them. |
| **CLO3** | **Apply** basic ethical principles to improve professionalism, including the ability to work in teams. |
| **CLO4** | **Design** scientific methods to write up scientific information. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | √ | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | √ | √ | | | | | | | √ | | | |
| **CLO4** | √ | √ | | | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos, showing instruments)

**HSS 1501: English Language**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** HSS 1501<br>**COURSE TITLE:** English Language | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 1st Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Communicative competence in English language is fundamental for academic and professional purposes. This course incorporates topics that focus on the necessary English language skills, especially reading and writing. With contextualized grammatical and communicative lessons, this course will foster students' ability to think critically and communicate effectively in different academic and professional situations. An important aspect of the course is to enable students to translate their acquired language skills into their study of textile engineering.

**COURSE CONTENT**

Functions of words; Word Classification; Technical and engineering vocabulary: Techniques of enriching stock of words, formation of words (affixation and conversion of words, etymology), explanation of homonyms, homophones, homographs, and heteronyms); English phonetics: The places and manners of articulating English sounds, IPA symbols (vowel and Consonant), phonemic transcription, phonetic transcription (word & sentence level); Structure of syntax; Joining sentences; Tense (structure & real-life application); Right form of verbs; Subject verb concord; Clauses and conditional sentences; Infinitive; Gerund; Participles; Phrases; Questions making (yes/no, WH, tag, polite request, direct & indirect); Transformation of sentences (assertive, interrogative, imperative, optative, exclamatory) (simple, complex, compound), (positive, comparative, superlative) & voice change (active to passive & passive to active); Articles; Determiners; Preposition (types of preposition & basic rules of preposition, usage of time preposition, place preposition & general preposition); Verb patterns; Adjective patterns; Adverb patterns and correcting mistakes in sentence; Error correction

(right forms of verbs, subject verb agreement, preposition, punctuation and capitalization); Cohesion & coherence; Writing short composition: Paragraph writing (topic sentence, supporting details, concluding sentence); Long composition: Techniques of essay writing (narrative, descriptive, process analysis, comparative & contrastive); Academic letter/ application writing; Writing Email; Business correspondence: i) CV and cover letter writing, ii) technical report writing for textile engineering students; Amplification (textile contextualized); Information transfer (textile contextualized); usage of transitional words; Paraphrasing; Précis writing; Writing dialogue /conversation.

**Course Learning Outcomes (CLOs):** at the end of the Course, the student will be able to

| | |
|---|---|
| **CLO1** | **Understand** the features of target language to meet various communication needs |
| **CLO2** | **Apply** grammatical and communicative knowledge in other related courses and areas for effective communication individually and in groups |
| **CLO3** | **Analyze** the linguistic and grammatical aspects of contextual source materials in target language |
| **CLO4** | **Create** various practical samples following criteria and apply knowledge of the target language |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | | | | | | √ | | |
| **CLO2** | | | | | | | | | | √ | | √ |
| **CLO3** | | | | | | | | | | √ | | |
| **CLO4** | | | | | | | | | | √ | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**HSS 1502: English Language Sessional**

| **DEGREE PROGRAM:** Textile Engineering<br>**COURSE CODE:** HSS 1502<br>**COURSE TITLE:** English Language Sessional II | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 1st Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Pragmatic use of language gives students the opportunity to access the understanding, knowledge, and skills to promote their communicative competence and effective participation in society. The study of English language in lab sessional enables students to nurture their LSRW and study skills based on the assigned English theory course. The most important part of this course is that the students will be able to improve, extend and consolidate their command of four basic skills of English. Therefore, they can impart their linguistic performance in both academic parts of Textile Engineering and social part of their life.

**COURSE CONTENT**

Ice breaking with introducing self; Key words & phrases in natural conversations; Extempore speech on general topics; Listening to relevant audio texts to supply missing information; Mechanics of writing: planning, organizing; Rearranging ideas: short composition; Macro and Micro skills of reading: understanding text with skimming, & scanning; Dialogue practice in pair work on different work places and daily life; Asking and answering questions; Talking about multiple subjects; Telling stories; Supplying verb forms & fill-ins from listening drills; Reading comprehension; Inferring the meaning of unfamiliar words; Identifying same words but different meaning and words frequently confused; Short story writing/ completing story; Techniques of power point presentation; Individual and collaborative presentations; Poster presentation; Public speech focusing on stress and intonations; Responding to news reports & reviews from video clipping; Academic and general essays with cohesion and clarity; Drawing inferences from text clues; Text mapping; Flow-charting; Anaphora and cataphora; Interpreting tables and bar charts; Note taking; Annotation; Identifying main ideas and supporting details.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** fundamental features of target language in a range of real-life communication skills |
| **CLO2** | **Apply** the concepts of basic linguistic communication techniques to be used in Textile Engineering related areas facilitating learning |
| **CLO3** | **Analyze** the contextual clues, texts, and other resources related to receptive & productive language in the context of usage for Textile Professionals |
| **CLO4** | **Evaluate** discourse markers to identify notable information while listening to thematic and structural components of conversational transcriptions & use them in various fields of Textile Engineering |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | | | | | | √ | | |
| **CLO2** | | | | | | | | | | √ | | √ |
| **CLO3** | | | | | | | | | | √ | | √ |
| **CLO4** | | | | | | | | | | √ | | |

(Tick mark or level of correlation)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing videos)

**TE 1609: Polymer Science**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 1609<br>**COURSE TITLE:** Polymer Science | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 1st Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The main textile raw materials used in the textile industry starts with fiber which is basically a natural or synthetic polymeric material. Spinnability of fiber to yarn, dye affinity of fiber, and physical, mechanical, and thermal properties of fiber can be maintained by tuning the state of the polymer. Therefore, knowledge of chemistry and engineering mechanics of polymer is essential for the textile graduate in this program.

**COURSE CONTENT**

**Introduction to Fiber Polymers:** Basic terminology of polymer; History and classification of polymer; Importance of polymer science in textile field.

**Chemistry and Techniques of Polymerization:** Introduction; Classification; Mechanism of different polymerization processes; Polymerization of different textile fibers; Factors and conditions of polymerization techniques; Features and techniques of liquid, gas and solid phase polymerization.

**Kinetics of Polymerization:** Introduction; Kinetics of free radical, cationic, and anionic polymerization; Kinetics of non-catalyzed and acid catalyzed polycondensation; Extent of reaction and degree of polymerization.

**Molecular Weight and Size:** Definition; Classification; Practical significance; Concept on number average & weight average molecular weight; Polydispersity and molecular weight distribution in polymers.

**Geometrical structure and crystallinity of polymer molecules:** Polymer microstructure based on chemical and geometrical structure; Tacticity; Configuration and conformation of polymer chains; Polymer orientation; Degree of crystallinity, cristallisability and crystallization of polymer; Factors affecting crystallisability; Crystalllites; Spherulites; Effect of Crystallinity.

**Glass transition temperature:** Introduction; Importance; Glass solids and glass transition; Transition and associated properties; Associated factors; Crystalline melting temperature; Glass transition temperature and molecular weight; Plasticizers.

**Polymer degradation:** Introduction; Types of degradation; Physical and chemical factors of polymer degradation; Thermal degradation; Photo degradation, Mechanical degradation; Oxidative degradation etc.

**Processing of fiber forming polymers:** Criteria of fiber forming polymers; Processing of textile fibers; Basic concepts of melt, wet and spinning process; Requirements of polymers for various spinning; Intra polymer bonding; Inter polymer forces of attraction and its effect; Individual polymers- Polypropylene, Polyethylene, Polyester, PU, PVA, PVC etc.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of polymers, polymerization reactions. |
| **CLO2** | **Understand** polymers, polymerization reactions, polymerization techniques, polymer processing, structure of polymers, crystallinity of polymer, glass transition temperature, polymer degradation, etc. |
| **CLO3** | **Apply** spinning process for different polymer, polymer average molecular weight and estimate the kinetics of polymerizations. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | √ | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**2ND YEAR 1ST SEMESTER**

**TE 2101: Short Staple Spinning**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2101<br>**COURSE TITLE:** Short Staple Spinning | | |
|---|---|---|
| **CREDIT:** 4.0 (Theory) | **TERMS OFFERED:** 2nd Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** This course offers students a theoretical understanding of cotton fiber properties, bale management system and design, constructional features with working principles of yarn production machineries from blow room to winding. It will cover the knowledge on the processing of different types of fibers and their blends according to the specifications and needs of the customers.

**COURSE CONTENT**

**Bale Management:** Mixing and blending; Fiber properties and their influence on process and product.
**Blow room:** Functions; Basic operations; Machine sequence; Process parameter; Technological points.
**Carding:** Operating principles; Process parameters; Card setting and their importance; Card clothing and grinding; Coiling mechanism; Sliver quality and its evaluation; Production calculation; Recent developments.
**Drawing:** Operating principle; Drafting system; Roller setting; Coiling; Effects of draft and doubling on sliver quality; Auto leveling; Mixing and blending of sliver; Defects and remedies; Recent developments; Calculations.
**Lap Former:** Function; Features; Roller setting of modern lap former machine; Lap quality and its influencing factors; Calculations.
**Combing:** Benefits of combing; Sequences of combing operations; Feeding system; Index wheel; Machine components and their setting parameters; Automation; Faults and remedies; Calculations; Recent developments.
**Roving Frame:** Main components and processing parameters; Drafting systems; Principle of twist insertion and winding; Calculations; Faults and remedies; Recent developments.
**Ring Frame:** Functions and mode of operation; Drafting system; Spinning geometry; Spinning triangle; Important spare parts and their impact on quality and operations; Twisting and winding mechanism; Automation; Causes and remedies of end breakage; Limitations; Calculations; Recent developments.
**Winding:** Operational procedure; Yarn faults and clearing; Yarn clearers; Fault channels and fault classification; Waxing; Splicing; Package defects and their remedy; Yarn conditioning.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terms and concepts related to the short staple spinning process. |
| **CLO2** | **Understand** the basic quality characteristics of short staple fibers and their manufacturing process to yarn, with mechanism of related machineries. |
| **CLO3** | **Apply** the machine setting and process parameters for production of particular materials. |
| **CLO4** | **Analyze** the appropriate parameters in various stages of the spinning process for the production of required quality yarn. |
| **CLO5** | **Evaluate** the product quality, wastage generation, and process efficiency of each machine involved in the production process. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | √ | | | | | | | | | |
| **CLO3** | | √ | | | | | | | | | | |
| **CLO4** | | √ | √ | | | | | | | | | |
| **CLO5** | √ | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 2102: Short Staple Spinning Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2102<br>**COURSE TITLE:** Short Staple Spinning Sessional | | |
|---|---|---|
| **CREDIT:** 1.50 (Sessional) | **TERMS OFFERED:** 2nd Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** This course offers students a practical understanding of design, constructional features with material passage diagram of yarn production machineries from blow room to winding.

**COURSE CONTENT**

To study the different machineries involved in Blow-Room line and their wastage percentage; To study the working mechanism, wastage calculation, and setting parameters of a carding machine; to study the gearing diagram, draft constant, draft, and production constant of a carding machine; To study the working mechanism of a drawing frame machine; to study the schematic/material passage/gearing /motion transmission diagram of lap former and comber machine; to study the schematic/gearing diagram with working mechanism of various operations involved in simplex machine; To study the schematic/gearing diagram with working mechanism of various operations involved in ring frame machine; To study the schematic/gearing diagram with working mechanism of various operations involved in winding machine.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** optimum machine setting parameters for processing of particular materials in the production line. |
| **CLO2** | **Analyze** wastage percentage of spinning machineries. |
| **CLO3** | **Evaluate** the material preparation efficiency, surface speed, and product quality in all stages of processing. |
| **CLO4** | **Create** material passage/gearing/motion transmission system of all types of spinning machinery. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | √ | | | | | | √ | | | |
| **CLO2** | | | | | | | | | | | | |
| **CLO3** | | | | √ | | | | | √ | | | |
| **CLO4** | | | √ | | | | | | √ | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 2201: Weaving Technology**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2201<br>**COURSE TITLE:** Weaving Technology | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 2nd Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** This course covers the foundation knowledge about weaving preparatory procedures and basic loom mechanism. This knowledge will further facilitate students' understanding of the latest development in modern weaving. This course has been designed in such a way that the upcoming textile graduates can be adopted with the up-to-date woven fabric manufacturing technique.

**COURSE CONTENT**

**Winding:** Requirements; Classification; Tensioning devices; Withdrawal process; Winding efficiency; Winding machine; Faults and remedies; Related calculation.

**Warping:** Techniques of warping; Essential parts and their functions; Faults and remedies; Related calculation.
**Sizing:** Objectives; Size ingredients; Sizing methods; Sizing machine; Controlling points; Faults and remedies; Related calculation.
**Preparation of Weaving Machines:** Drawing-in; Denting; Tying-in and gaiting.
**Weaving Mechanism:** Chronological development of loom; Basic principle of weaving; Classification of loom; Types of loom; Basic loom motion; Loom drive and brakes.
**Shedding:** Geometry of shed; Shed characteristics; Different types of shed; Types of shedding mechanism; Crank shedding; Negative and positive tappet shedding; Construction of shedding tappet.
**Dobby Shedding:** Scope and classification of dobby; Conventional dobby mechanism; Electronic dobby and electronic shedding mechanism; Limitation of tappet and dobby shedding.
**Jacquard Shedding:** Scope; Types and basic principle of jacquard shedding.
**Picking:** Types of conventional picking; Over picking and under picking; Calculation the velocity of weft inserting element, energy of picking, picking force and time for picking; Picking faults.
**A Brief Ideas about Modern Loom:** An elementary idea on Projectile, air jet, water jet, rapier weaving machine; Special features of these machines.
**Beating:** Principle of crank and crank arm beating; Effect of crank arm and crank length; Sley eccentricity and its effects; Mechanism of cam beat-up, link beat-up and special beat-up; Forces involved in beating action.
**Take-up and Let-off:** Classifications of Take-up and let-off; Calculation of take-up constant from 5-wheel and 7-wheel take-up; Picks/cm and rate of let off; Electronic take-up and electronic let-off mechanism; Necessary calculation.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the terminology of weaving preparation and loom motion. |
| **CLO2** | **Understand** the basic mechanisms and principles of preparatory process of weaving |
| **CLO3** | **Analyze** the production and efficiency of each weaving process |
| **CLO4** | **Evaluate** the process variables during weaving preparatory and weaving |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | √ | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | |
| **CLO4** | √ | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 2202: Weaving Technology Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2202<br>**COURSE TITLE:** Weaving Technology Sessional | | |
|---|---|---|
| **CREDIT:** 1.5 (Sessional) | **TERMS OFFERED:** 2nd Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Students will have opportunities to experience laboratory demonstrations as well as real-life practical knowledge about weaving preparatory procedures and loom mechanisms. This sessional course has been designed in such a way that the textile graduates can be adopted with the latest woven fabric manufacturing technique that will further help them understand modern weaving techniques.

**COURSE CONTENT**

**Weaving Preparation:** Working principle and production of cone winding machine; Pirn winding machine; Direct warping machine; Sectional warping machine and modern sizing machine; Preparation of size solution and performance analysis.

**Weaving Operation:** Mechanism of loom drive; Tappet shedding; Dobby shedding; Jacquard shedding; Crank beat-up; Cam beat-up; Let-off and take-up: conventional, electronic.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the basic mechanism and principles of preparatory process and weaving |
| **CLO2** | **Analyze** the production and efficiency of each weaving stage |
| **CLO3** | **Design** a shedding tappet |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | √ | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**HSS 2500: Communicative English Sessional**

| **DEGREE PROGRAM**: B.Sc. in Textile Engineering<br>**COURSE CODE**: HSS 2500<br>**COURSE TITLE**: Communicative English Sessional | | |
|---|---|---|
| **CREDIT**: 1.5 (Sessional) | **TERMS OFFERED**: 2nd Year 1st Semester | |
| **Exam Hours**: N/A | **CIE Marks**: 100% | **SEE Marks**: 00% |

**Rationale of the Course:** This course aims at developing students' communicative competence in English. It incorporates particularly analytical reading and critical expository writing covering personalized, subjective and persuasive aspects. The purpose of this course is to foster better communication skills by sensitizing the learners' dynamics of transactional and interactional functions of language in the contextualized aspects of Textile Engineering. The goal of this course is to prepare students to be confident communicators in the target language in both professional and academic context.

**COURSE CONTENT**

Listening to authentic audio texts to supply the vocabulary short, social interactive English, polite and formal expression polite dis/agreement on high route speaking; Practicing turns, using hedges from great orators; Applying different approaches to writing in different genres; Writing styles; Writing for specific audience; Reading: for main, supporting and elaborating ideas in text; General and academic texts for identifying opinions, facts, tone and author's biasness; Listening to sample interview & natural conversation to supply filling in with missing information; Asking & answering questions; Using colloquial and formal expressions in speaking; Simulating mock professional interview; Steps of writing; Using transitions for cohesion and coherence; Creating flowchart for process; Identifying implied and inferential information; Critical reviews (academic & general); Listening to inspiring speeches, record of online classes to make notes; Practicing Received Pronunciation (RP); Conversation on field-specific themes; Developing justifications and reasoning in argumentative compare and contrast, cause-effect; Vocabulary practices including analogy, collocation, cloze test, signal words, synonyms and antonyms; Listening to: Sports commentary; Audios and videos on Global Biodiversity, global warming, climate change and recent trends to develop awareness and express concerns; Professional Group Discussion (GD) and debate on contemporary issues; Professional correspondence; pros and cons of emerging issues, press release; Recognizing elements in persuasion, argumentation, cause-effects; Paraphrasing and summarizing of longer texts; Listening to mock interview to understand the zest, extracting & decoding information from tape scripts, supplying verb forms & fill-ins with worksheets; Dynamics of public speaking; Professional presentation practice. Reporting on a contemporary issue; Describing table, graphs, figures and charts; Comprehension: Q/A, matching tables and paragraph headings, identifying cohesive ties; Listening to ideal presentations based on compare-contrast, cause-effect, process analysis & argumentative issues; Stating advantages and disadvantages of multiple contexts/subjects; Extempore speech; Writing Statement of Purpose (SOP), writing proposal; Reading news editorials- annotate, highlight and take notes.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| CLO1 | **Understand** and use English expressions in a range of real-life interaction skills |
| CLO2 | **Apply** advanced discourse markers to identify notable information while listening to thematic and structural components of transcriptions and conversation |
| CLO3 | **Analyze** contextualized critical reading materials to reformulate information and use creative and analytical language to identify and clarify issues and solve problems in their core courses in written form |
| CLO4 | **Evaluate** communicative competence in both academic and professional milieu and interpret data through the target language |

**Mapping of Course Learning Outcomes (CLOs) to Program learning Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLO1 | | | | | | | | | | √ | | |
| CLO2 | | | | | | | | | | √ | | √ |
| CLO3 | | | | | | | | | | √ | | |
| CLO4 | | | | | | | | | | √ | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing videos)

**Math 2501: Differential Equations, Matrices and Co-ordinate Geometry**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** Math 2501<br>**COURSE TITLE:** Differential Equations, Matrices and Co-ordinate Geometry | | |
|---|---|---|
| **CREDIT:** 4.0 (Theory) | **TERMS OFFERED:** 2nd Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** This course is designed to provide students the basic concept of the functions generally represents physical quantities, the derivatives represent their rates of change, and the differential equation defines a relationship between the two. It helps students to describe the natural phenomenon and design models with the help of valid differential equations. Another part of the course provides students with the basic concepts of matrices and application of matrices to solve a homogeneous and non-homogeneous system of equations. Geometry offers visual structure to abstract concepts of mathematics, and in certain cases offers insight into the logic of various sects of mathematics such as the calculus, group theory, or abstract algebra and modeling of real-world applications to offer a sort of predictability to concepts applied to structures we find in our everyday lives.

**COURSE CONTENT**

**Differential Equation:** Ordinary and partial differential equations (DEs), order of a DE, linear and nonlinear DEs, solution of an ordinary differential equation (ODE), formation of DE, initial-value problems, existence and Uniqueness of a solution; Solve first-order DEs in the forms of separable variables, linear equations, exact equations, Clairaut's form, one variable absent; Solution by substitution in a DE, homogenous DEs, Bernoulli's equation; Solving second order DEs in the form: Homogenous linear equation with constant coefficients (superposition approach, annihilator approach), variation of parameter; A linear DE with variable coefficients, auxiliary equations, forms of the general

solution of a homogenous linear second order Cauchy-Euler DE; Series solutions of linear equations: Solving about ordinary points, solving about singular points, special functions (Bessel's equation, Legendre's equation).
**Metrics:** Definition of matrix, addition and scalar multiplication of matrices, system of linear equations; Matrix multiplication, transpose of matrix, some theorems on the basic properties of matrices; Inverse and rank of matrices, solution of simultaneous equation by matrix method.
**Co-ordinate Geometry:** System of coordinates, projection, direction ratios and direction cosines and some related problems; Equation of planes and lines, angle between lines and planes, distance from a point to a plane; Co-planar, shortest distance between two given straight lines.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** to recall common matrix operations such as addition, scalar multiplication, matrix multiplication and transposition; principle and concepts of coordinate geometry. |
| **CLO2** | **Understand** to carry out matrix operations, including inverses and determinants; to describe the points in the plane, understand coordinates as distances; to classify the differential equations with respect to their order and linearity. |
| **CLO3** | **Apply** to solve systems of linear equations using matrix method; many problems related to a line and plane in space; linear first order ordinary differential equations; the higher order linear differential equations. |
| **CLO4** | **Evaluate** the formation, solving, applying and interpreting the properties of linear systems; demonstrate their understanding of how physical phenomena are modeled by differential equations and dynamic systems. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | √ | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | |
| **CLO4** | | | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 2601: Fiber Science and Technology**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2601<br>**COURSE TITLE:** Fiber Science and Technology | | |
|---|---|---|
| **CREDIT:** 4.0 (Theory) | **TERMS OFFERED:** 2nd Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** This course is associated with the manufacturing process, production quality control parameters, physical, mechanical and thermal properties of natural, regenerated and made fibres used in manufacturing of basic and high-performance apparels. Besides this this course also discusses the engineered mechanics of fibre, yarn and fabric which are necessary determining the comfort and formability of an apparel. For these reasons, this course is selected for the student of undergraduate of this department.

**COURSE CONTENT**

**Introduction to Textile Fibers:** Concept on textile fiber, fibril, textile fiber, raw material, filament, staple fiber etc.; Classification and properties of textile fibers; Source and types of different fibers; Comparative study among natural fibers in terms of characteristics.

**Natural Fibers:** Geographical area of producing countries; Extraction/collection process; Chemical composition; Polymeric system; Fiber morphology: micro and macro structure, microscopic appearance; Physical and chemical structure and properties with explanation; Grading system; Special varieties; Defects; End uses of natural fibers.

**Manmade Fibers:** History; Classification and generic name of man-made fibers; General principles of production processes; Types of different orientation system and their typical spinning speed; Typical twist values for different single yarn continuous filament; World manmade fiber production volume and consumption; Points to be considered before going to produce a new commercial manmade fiber; Raw materials, production process, modification, physical properties, chemical properties and uses of regenerated, polyester, polyamide, acrylic fibers, polyurethane fibers, polypropylenes; PVA; PVC and elastomeric fibers etc.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** terminology related to fibers and textile fibers |
| **CLO2** | **Understand** the detailed fiber properties |
| **CLO3** | **Analyze** the techniques for fiber modification |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**CSE 2701: Computer Applications and Programming**

| **DEGREE PROGRAM: B.Sc. in Textile Engineering**<br>**COURSE CODE: CSE 2701**<br>**COURSE TITLE:** Computer Applications and Programming | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 2nd Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The advancement of any industry mainly depends on automation. Similarly, automation has a great impact on the textile industry too. The main driving force of automation is the personal computer and computer programming. If students are familiar with the various components of the personal computer and basic development blocks of the programming, they can contribute to the advancement of the textile field.

**COURSE CONTENT**

**Computer Application:** Introduction to computer basics; Types and generation of computers; Basic organization and functional units; Describe basic units of computer, hardware, processor, input, output, and memory device; Familiar with keyboard, mouse etc. The CPU, RAM, buses, input and output devices, disk drives, power supply and fans, more on peripheral devices, hardware ports; Describe the types of software; Familiar with various operating systems (Windows, DOS, UNIX, Android, IOS etc.); Familiar with text processing and spreadsheet software.

**Programming:** Programming concepts; Structured programming language; Data types; Variables; Constants; Operators; Type of expressions; Data input and output; Conditional statements; Control structures; Functions and program structures: function basics, parameter passing conventions, iteration, recursion; Input and output: standard input and output, formatted input and output; Arrays, String and Pointers; User defined data type: structures, unions; file access: reading, writing text and binary files.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology for computer programming. |
| **CLO2** | **Understand** the key software and hardware components in a modern computer system and how software is mapped to the HW**.** |
| **CLO3** | **Apply** an appropriate basic data structure (e.g., arrays) and access methods (e.g. pointers) |
| **CLO4** | **Analyze** problems, and designing and implementing algorithmic solutions. |
| **CLO5** | **Create** computer programs in C language using conditional and iterative structures, functional decomposition, and basic parallelization techniques. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | √ | | | √ | | | | | | | |
| **CLO4** | | √ | | | | | | | | | | |
| **CLO5** | √ | | | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**CSE 2702: Computer Applications and Programming Sessional**

| **DEGREE PROGRAM: B.Sc. in Textile Engineering**<br>**COURSE CODE: CSE 2702**<br>**COURSE TITLE:** Computer Applications and Programming Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 2nd Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** The advancement of any industry in mainly depends on automation. Similarly, the automation has great impact on textile industry too. The main driving force of the automation is the computer programming. If students can master basic development blocks of the programming, they can contribute in the advancement of the textile field.

**COURSE CONTENT**

Identifying the key components of a computer system; Assemble, disassemble, and configure a computer system; Introduction to different C compilers, how to compile, debug and run a program; Basics C program using variables and mathematical operators; Solving different problem using if, else-if and nested if-else statements in C language; Solving some loop-based problem (using for, while and do-while loop) in C language; Solving some problem using User defined function and file in C language.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** computer systems technical specifications, assemble, disassemble, and configure a computer system |
| **CLO2** | **Apply** an appropriate basic data structure (e.g. arrays) and access methods (e.g. pointers) |
| **CLO3** | **Analyze**, compile and debug programs in C language and use different data types for writing the programs. |
| **CLO4** | **Design** programs connecting decision structures, loops and functions. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | √ | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | |
| **CLO4** | | √ | | | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**2ND YEAR 2ND SEMESTER**

**TE 2103: Jute and Allied Fiber Spinning**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2103<br>**COURSE TITLE:** Jute and Allied Fiber Spinning | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 2nd Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** This course offers students a theoretical understanding of different long staple fiber processing particularly jute batching, emulsion preparation and the design, constructional features, working principles of jute fiber spinning machines (carding, draw frame, roving frame) and to teach the woolen, worsted, flax and silk fiber spinning process.

**COURSE CONTENT**

**Jute Batching Oils and Emulsions:** Requirements; Problems; Defects; Equipment's of emulsification; Usages for special yarn production.
**Jute Batching:** Objects; Preparation and application of emulsion; Batch mixer machine; Softener machine; Spreader machine; Piling/Conditioning; Recent developments; Calculations.
**Carding:** Types of cards and their operational procedure; Process parameters and their influence; Changeable gear/pinion; Wire gauge and density; Roller setting; Responsible factors for effective carding; Tendem card; Calculations.
**Drawing Frame:** Drafting system; Different types of draw frame; Arrangement of drawing and doubling; Faller bar propelling mechanism; Calculation.
**Roving Frame:** Essential features; Drafting; Twisting; Winding; Differential motion of roving frame; Twist/strength relationship; Calculation.
**Spinning Frame:** Drafting system; Twisting and winding; Slip draft, gill and apron draft spinning machine; Bobbin building mechanisms; Wastages in the system; Latest developments and yarn faults; Calculations.
**Woolen Spinning:** Introduction; objectives; Theory of spinning; Application.
**Worsted Spinning:** Carding; Gilling and combing; Drawing; Roving formation; Spinning
**Flax Fiber Spinning**: Introduction; Degumming; hackling; cottonization; spinning; Market demand.
**Silk**: Introduction; Cultivation of Cocoons; Types of silk reeling machines; Stages in silk filament production; Global demand.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the jute and other allied fiber properties. |
| **CLO2** | **Understand** the features and working principle of long staple fiber spinning machineries. |
| **CLO3** | **Apply** the required machine parameters for processing of jute and other long staple fibers. |
| **CLO4** | **Analyze** the product faults, their causes and remedies in each stage of processing. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | √ | | | | | | | | | | | |
| **CLO4** | √ | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 2104: Jute and Allied Fiber Spinning Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2104<br>**COURSE TITLE:** Jute and Allied Fiber Spinning Sessional | | |
|---|---|---|
| **CREDIT:** 1.50 (Sessional) | **TERMS OFFERED:** 2nd Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** This course will help to acquire practical knowledge on all types of jute processing machineries, suitable machine setting parameter and material passage diagram also.

**COURSE CONTENT**

Material passage of jute softener machine; Schematic/material passage/gearing/motion transmission diagram of jute spreader machine; Schematic/material passage/gearing/motion transmission diagram of different jute draw frame machine; Material passages, bobbin building and twisting mechanism of roving frame; Schematic and main gearing diagram of jute spinning frame and calculate draft constant and twist constant; Material passage/gearing diagram, drafting arrangement, draft calculation and coiling mechanism of jute draw frame; Schematic/motion transmission diagram, drafting arrangement, draft calculation, winding mechanism of spool & cop winding machine; Material passage diagram, production, product quality evaluation of woolen and worsted spinning process.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** optimum machine setting parameters and production speed for processing of particular type of materials in production line. |
| **CLO2** | **Evaluate** the output materials quality parameters and takes necessary measures as required. |
| **CLO3** | **Create** material passage/gearing/motion transmission diagram of jute and other long staple spinning machine. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | √ | | | |
| **CLO2** | √ | | | | | | | | √ | | | |
| **CLO3** | | | | | | | | | √ | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 2203: Knitting Technology**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2203<br>**COURSE TITLE:** Knitting Technology | | |
| **CREDIT: 3**.0 (Theory) | **TERMS OFFERED:** 2nd Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Knitting technology and basic mechanism of knitting is very essential for a textile graduate. Many knitting factories are currently using this technology and the basic concept is very important to understand the latest development of knitting technology. This, course has been designed in such a way that the upcoming textile graduates can be adopted with conventional and the up-to-date knitting fabric manufacturing technique like single jersey, rib, interlock, purl, warp knitting etc.

**COURSE CONTENT**

**Knitting:** Principles of knitting technology; Knitting needles and their actions during loop formation; Basic mechanical principles of knitting technology (knitting needles, knitting cams, sinkers, jack etc.); Needle loops formation techniques; Yarn feeding; Cam system, Circular and flatbed knitting machines; Basic weft knitted structures (plain, rib, interlock, purl), respective characteristics and machine arrangements; Held, Tuck, Miss/Drop stitch formation technique & their uses; Single jersey derivatives and their knitting arrangements; Hosiery technologies.

**Straight Bar Frame:** Features, knitting elements, operations, knitting actions, advantage & disadvantage.
**Warp Knitting:** Components of warp knitting machine and their role; Guide bar lapping movements; Basic stitches and their characteristics; Mechanism and classes of warp knitting machineries; Knitting cycles; Fully threaded warp knit structures and their characteristics.
**Aspects of Knitting Science**: Loop shape and loop length control; Yarn let-off; Weft knitted fabric relaxation; Knitted fabric geometry; Tightness factor; Robbing back.
**Knitting Calculation:** Calculations related to weft and warp knitting.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the knitting terminology and machine specifications. |
| **CLO2** | **Understand** basic concepts and principles of weft and warp knitting, function of primary and secondary elements of knitting machine. |
| **CLO3** | **Apply** the requirements for basic weft knitted and warp knitted fabric production and be able to develop various basic weft and warp knitted fabric with needle and cam arrangement. |
| **CLO4** | **Analyze** the requirement of raw materials for knitting and different basic weft and warp knitted fabric. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | √ | | | | | | | | | | | |
| **CLO4** | | √ | | | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 2204: Knitting Technology Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2204<br>**COURSE TITLE:** Knitting Technology Sessional | | |
|---|---|---|
| **CREDIT:** 1.5 (Sessional) | **TERMS OFFERED:** 2nd Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** The applied knowledge about knitting technology and basic mechanism of knitting is very essential for a textile graduate. Many knitting factories are currently using this technology and the basic concept is very important to understand the latest development of knitting technology. This, sessional course has been designed in such a way that the upcoming textile graduates can be adopted with conventional and the up-to-date knitting fabric manufacturing technique like single jersey, rib, interlock, purl, warp knitting etc.`

**COURSE CONTENT**

**Weft Knitting:** Different knitted loops, knitting element-needle, sinker and cam; Knitting action. Study of plain, rib, interlock, purl knitting machines: circular and flatbed. Held, Tuck, Miss/Drop stitch formation techniques; Notation diagram; Cam and needle arrangement for single jersey derivatives.
**Hosiery Machines:** Hosiery machine drive, control mechanism, mechanism for welts, heel and toe production; Hosiery stitch control mechanism.
**Straight Bar Frame:** Knitting elements, operations and knitting actions.
**Warp Knitting**: Study on guides, guide bar, lapping movement, pattern mechanism and chain links; Machine parts, knitting element and knitting action of tricot, raschel, and crochet warp knitting machine; Let-off mechanism of warp knitting machine.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** the working principle of different knitting processes (weft and warp knitting machine for the derivatives of weft knitted fabric. |
| **CLO2** | **Analyze** the efficiency and requirement of raw material of different knit fabric during production processes |
| **CLO3** | **Design** the knitting floor plan for an export-oriented industry |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (Pos)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | √ |
| **CLO3** | √ | √ | | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping CLOs with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**HSS 2501: Government and Bangladesh Studies**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** HSS 2501<br>**COURSE TITLE:** Government and Bangladesh Studies | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 2nd Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** As an essential component, government plays a significant role in the economic and cultural development process of Bangladesh. Government usually takes a policy following the heritage, cultural influences, economic resources, and subsequent events across the globe. Therefore, a better understanding of the interaction among government and other influencing factors will improve the decision-making ability of textile graduates.

**COURSE CONTENT**

**Basic concepts of government and politics:** Form and structure of government, organs of government-legislature, executive, judiciary; Theory of democracy, socialism, bureaucracy state, government, nation and nationality etc.; Political views on government structure, cabinet form and presidential form of government, unitary form and federal form of government, main organs of government, characteristics and functions of Government and good governance, Public Administration in Bangladesh, E-government; Government and Politics of Bangladesh; Constitution and laws for Government, local government, NGOs, public law, principal, rule and policies for Administration and Government; Public Opinion and foreign policy of Bangladesh, Major Administrative Systems of Developed Counties; **Introduction to Bangladesh:** Geo-political and socio-economic history of Ancient Bengal, origin and development of Bengal Civilization from early and medieval periods to pre-Bangladesh period; Important places and sculptures, socioeconomic and political contexts in the period of Liberation War;

**Backgrounds of Independence:** Six points demands, agartala conspiracy, general election 1970, operation searchlight; Economic development and its transformation, economic and social inequality, social and cultural transformation; Industrial development from the first industrial to the fourth industrial revolution; Bangladesh and its Vision 2021 and Vision 2041, fifth year economic plan; Progress to the Sustainable Development Goals (SDGs), Bangladesh Delta Plan 2100 (BDP 2100).

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the organogram of the Bangladesh government and its functions and national historical and economic evolvement |
| **CLO2** | **Understand** the alignment in ancient, medieval, colonial, and post-colonial periods and structure of national development. |
| **CLO3** | **Apply** the way of different constitutional bodies and socio-political government organs rolling their behavior on governance and people in Bangladesh. |
| **CLO4** | **Analyze** the structural features of Bangladeshi history, economic development processes, and administrative challenges for good governance. |
| **CLO5** | **Evaluate** the different perspectives in socioeconomic and political culture and the governmental role and administrational body |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | | √ | | | | | | √ |
| **CLO2** | | | | | | √ | | | | | | |
| **CLO3** | | | | | | | | | | | | √ |
| **CLO4** | | | | | | √ | | | | | | √ |
| **CLO5** | | | | | | √ | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**Math 2503: Vector Analysis, Fourier and Laplace Transform**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** Math 2503<br>**COURSE TITLE:** Vector Analysis, Fourier and Laplace Transform | | |
|---|---|---|
| **CREDIT:** 4.0 (Theory) | **TERMS OFFERED:** 2nd Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** This course is designed to provide the students the basic concepts of vector analysis in the 3-dimensional space and helps to study integral and differential calculus for vector fields. It also provides about a variety of mathematical methods which are used in modelling through their application to solving real world problems.

**COURSE CONTENT**

**Fourier series:** Fourier series and its properties, Dirichlet's condition and Fourier expansion. Exponential form of Fourier series; Change of interval, Half range series; Fourier integral; Fourier transforms and their applications in solving boundary value problems.

**Laplace transformation:** Laplace transforms of some elementary functions, sufficient conditions for existence of Laplace transforms; Inverse Laplace transforms; Laplace transforms of derivatives; Periodic function; Some special theorems on Laplace transforms, partial fraction; Solutions of differential equations by Laplace transforms.

**Vector analysis:** Definition of scalar and vectors; Vector algebra; Cross product; Triple product and multiple products; Angle between planes and line of intersection; Differentiation and integration of vectors together with elementary applications; Definitions of line; Surface and volume integrals; Gradient of a scalar function; Divergence and curl of a vector functions; Various formulae; Green's theorem; Stoke's theorem and Gauss's theorem and their applications.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the core ideas and concepts of Laplace transforms, Fourier Series & Transforms, scalars, vectors and parametric equation of curves and surfaces. |
| **CLO2** | **Understand** different formulas of vector & transform tactics with appropriate examples. |
| **CLO3** | **Apply** the Laplace and Inverse Laplace transforms & Fourier transforms to solve differential equations in the engineering field. |
| **CLO4** | **Evaluate** real problems by using analytical vector and transform approaches. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | √ | | √ | | | | | | | | | |
| **CLO4** | | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 2600: Soft Computing in Textiles I Sessional**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2600<br>**COURSE TITLE:** Soft Computing in Textiles I Sessional | | |
| **CREDIT:** 1.5 (Sessional) | **TERMS OFFERED:** 2nd Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** The application of computer controlling system in every branch of textile engineering is increasing dramatically. Its proper application increases the quality and productivity of the processing material. Hence the practical knowledge of computer controlling system in fabric manufacturing engineering is essential in this program.

**COURSE CONTENT**

Basic elements of IT in spinning industry, weaving and knitting industry; Understand basic use of Production Database Management and Excel software; Understand basic use of bale management software, MATLAB software, SPSS and fuzzy tool box software; Automation in weaving and knitting

industry; Develop basic Computer Aided Design (CAD) skills with application of dobby and jacquard design.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** different tools, software to make the production process efficient and effective assuring better product quality |
| **CLO2** | **Analyze** the parameters based on buyer demand and solving problems during manufacturing |
| **CLO3** | **Evaluate** the design/effect, performances and productivity of the running processes and tools |
| **CLO4** | **Create** new tools and software for easy processing, characterization and value addition to the products. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | √ | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | √ | | | | | | | | | | | |
| **CLO4** | | | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 2603: Statistics in Textiles**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 2603<br>**COURSE TITLE: Statistics in Textiles** | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 2nd Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Variations in processing parameters and materials quality in various sectors like yarn manufacturing, fabric manufacturing, wet processing; apparel manufacturing, etc. can be monitored, analyzed and controlled using statistical tools. Thus, the knowledge of statistics should be an integral part of textile graduates.

**COURSE CONTENT**

**Introduction:** Historical development of the subject; Collection of data – primary data and secondary data; Presentation of data – tabular and diagrammatic.

**Frequency Distribution:** Grouped frequency distribution and their presentation in the form of frequency polygon and histogram.

**Measures of Central Tendency:** Mean: Arithmetic mean, geometric mean, harmonic mean; Median and mode: Definition, computation, advantage; disadvantage and uses.

**Measures of Dispersion:** Absolute measure; Range; Mean deviation; Quartile deviation; Standard deviation; Relative measure; Co-efficient of variation; Definition; Computation and uses.

**Moment, Skewness and Kurtosis:** Definition, computation and uses.

**Correlation and Regression:** Correlation – Ideas of correlation; Measurement of correlation; Pearsonian correlation co-efficient and spearman's Rank correlation co-efficient; Multiple correlation; Regression–Ideas about simple regression; Equation of the regression line; Estimation of the parameters of the regression line.

**Time Series:** Definition; Characteristics and components.

**Sampling:** Definition of population; Sample; Parameter; Census etc.; Simple random sampling; Stratified random sampling; Their definition; Computation; Use; Advantage and disadvantage.

**Probability:** Simple idea of probability; Different definitions related to probability; Addition law of probability for mutually exclusive and not mutually exclusive events; Multiplication law of probabilities for dependent and independent events; Calculation of successive probabilities using addition law and multiplication law of probability; Probability distribution: Binomial, Poisson; Simple idea about normal distribution and its probability curve.

**Estimation of parameters:** Introduction; Properties of a good estimator; Method of maximum likelihood; Confidence limit for population mean; Confidence limit for population proportion; Confidence limit for difference of two means; Confidence limit for difference of two proportions; Determination of a proper sample size.

**Tests of Hypothesis:** Introduction- procedure of hypothesis testing; Type of I and type of II errors; One-tailed and two-tailed test; Tests of hypothesis concerning large samples; Testing hypothesis about the difference between two means; Test of hypothesis concerning attributes; Testing hypothesis about a population proportion; Testing hypothesis about the difference between two proportions; Miscellaneous illustration; Problems.

**Chi-square test:** Introduction, chi-square distribution, important properties of chi-square distribution, chi-square test, use of chi-square test and table.

**Analysis of Variance:** Introduction- Assumption in analysis of variance; Computation of analysis of variance; One way classification- i) calculate the variance between samples ii) Calculate the variance within samples, iii) calculate the F-ratio, iv) compare the calculated value of F; Analysis of variance table; Coding of table; Two way classification; Miscellaneous illustration; Problems.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the terminology of statistics |
| **CLO2** | **Understand** principles of various statistical tools |
| **CLO3** | **Apply** statistical tools and techniques to solve various problems. |
| **CLO4** | **Analyze** statistical results for different applications. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | | √ | | √ | | | | | | | |
| **CLO3** | | | | √ | | | | | | | | |
| **CLO4** | √ | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**ME 2700: Workshop Practice Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** ME 2700<br>**COURSE TITLE:** Workshop Practice Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 2nd Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** A variety of techniques are needed to produce the things we use every day. The course's main goal is to empower students with the fundamental skills and knowledge needed to choose the right material and processing method for a component or assembly's production. The interrelationships between material structure and qualities, design, and processing are explored in this course.

**COURSE CONTENT**

Practice the preparation of molding sand and castings; Preparation of a wood pattern according to the supplied drawing of a mechanical part; Practice arc welding and gas welding to join flat bar as lap, butt and Tee joint; Make a machine part as per given dimension using lathe and drill; Manufacture gear using knee type horizontal milling machine; Finishing of a surface and cutting a slot using hydraulic shaper; Heat treatment of steel.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the manufacturing processes like casting, welding, machining, and forming. |
| **CLO2** | **Apply** the concepts of manufacturing processes to manufacture products by castings, machining or forming for practical applications. |
| **CLO3** | **Analyze** manufacturing processes and select the appropriate processes from them for the solution of practical problems. |
| **CLO4** | **Evaluate** the quality of the castings, welded joints, machined products, forming and heat-treated products |
| **CLO5** | **Create** patterns for machine elements and dies for forming process |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | √ | | | |
| **CLO3** | | √ | | | | | | | | | | |
| **CLO4** | | | √ | | | | | | √ | | | |
| **CLO5** | | | √ | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**3RD YEAR 1ST SEMESTER**

**TE 3301: Pretreatment and Coloration of Textiles**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3301<br>**COURSE TITLE:** Pretreatment and Coloration of Textiles | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 3rd Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The wet processing of textiles includes several processes, such as the preparatory and coloration of fiber, yarn, and fabric materials. A detailed understanding of pretreatment and dyeing is essential for the students in the textile engineering program for suitable application of dyes and chemicals during these processes. Hence, this course is designed to explain the basic chemistry and functions of dyes and different chemicals, as well as appropriate techniques for the application of dyes or coloring materials on textiles.

**COURSE CONTENT**

**Water, Soap and Detergent:** Water and its importance in wet processing; Water hardness; Properties of hard water; Consequences of using hard water; Estimation of water hardness; General concepts on soap and detergent; Properties and classification of detergent.

**Pretreatment:** Importance and scope of singeing; Plate, roller and gas singeing; Concept on enzyme application for chemical singeing; Comparison between mechanical and chemical singing; Necessity of desizing; Mechanism of removal of sizing materials; Hydrolytic and oxidative; Enzymatic desizing and its optimum conditions; Mechanism of removal of impurities by scouring; Comparison of conventional scouring and bio-scouring; Scouring of natural and manmade fibers; Importance of bleaching; Bleaching agents and their actions on textile materials; Bleaching of natural and manmade fibers.

**Technology of Dyeing:** Definition, properties and classification of dyestuffs; Nomenclature and selection of dyes; Pigments and their classification; Preliminary concepts on color; Primary, secondary and tertiary color; Dimension of color- hue, value and chroma; Chromophore and auxochrome theory of color.

**Application of Dyes:** Properties and classification of direct dye; Methods of direct dyeing with chemistry; Problems in direct dyeing; General description of acid dye; Application of acid dyes on wool, silk and nylon; Mechanism of dyeing wool and nylon fiber with acid dye; Chemical structures of basic dyes; Dyeing of acrylic and jute fiber with basic dyes; Nature of affinity to cotton and wool fibers; Effects of varying the retarder concentration on dyeing of acrylic fibers; Problems in dyeing acrylic fibers with basic dyes; Properties of vat dye; Principles of application of vat dyes- vatting and dyeing; Dyeing cotton with leuco vat dyes; After treatment of vat dyeing; General properties of solubilized vat dye; Fastness properties of vat and solubilized vat dye; Stripping of vat dye.

**Technology of Printing:** Flow chart of Printing; Type of thickeners; Concept on thickener rheology; Methods and styles of printing; Machinery used for printing; Printing processes for different fibers with direct, acid, basic and vat dyes; Ingredients used in printing operations and their functions.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology relevant to pretreatment, dyeing and printing of textile materials. |
| **CLO2** | **Understand** the basic chemistry and functions of different auxiliaries used in preparatory, dyeing and printing processes. |
| **CLO3** | **Apply** different dyes, auxiliaries and appropriate techniques for pretreatment, dyeing and printing of specific fibrous materials. |
| **CLO4** | **Analyze** the effect of different process parameters and used chemicals that influence the preparatory, dyeing and printing of textiles. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | | √ | | | | | | | | |
| **CLO4** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 3302: Pretreatment and Coloration of Textiles Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3302<br>**COURSE TITLE:** Pretreatment and Coloration of Textiles Sessional | | |
|---|---|---|
| **CREDIT:** 1.50 (Sessional) | **TERMS OFFERED:** 3rd Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** The students in this program must have sufficient technical information and skills for practical applications of dyes and auxiliary chemicals in pretreatment and dyeing of textile materials. Hence, this course is designed to enhance the knowledge and skill for the application of dyes and chemicals on textile materials using the appropriate techniques through practical demonstration.

**COURSE CONTENT**

Mechanical and chemical singeing of textile materials; Enzymatic desizing of cotton fabrics, Conventional scouring and bio-scouring of textile materials; Bleaching of textile materials with convenient bleaching agents; Dyeing of cotton, jute and wool fabric with relevant dyes; Printing of cotton, jute and wool fabric with relevant dyes.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the functions of different auxiliaries used in preparatory, dyeing and printing processes. |
| **CLO2** | **Apply** different dyes, auxiliaries and appropriate techniques for pretreatment, dyeing and printing of specific fibrous materials. |
| **CLO3** | **Analyze** the effect of different process parameters and used chemicals that influence the preparatory, dyeing and printing of textiles. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | √ | | | | | | | | | | |
| **CLO2** | | | | √ | | | | | √ | | | |
| **CLO3** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 3401: Preparatory Process of Apparel Manufacturing**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3401<br>**COURSE TITLE:** Preparatory Process of Apparel Manufacturing | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 3rd Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** By taking this course student will be able learn the development of a particular style of garment by utilizing the knowledge of pattering engineering, marker making related with standard body measurement, fusing and coating techniques. This course offers the student to learn different techniques and responsibilities consider for the maximum utilization of fabric during spreading and cutting operations.

**COURSE CONTENT**

**Pattern Drafting and Cutting:** Principles of pattern construction; Style development; Pattern cutting: Fit and measurement of body shape related to age; Standard body measurement.

**Block Preparation:** Preparation of block: skirt, trouser, bodice etc.; Manipulation of block through different techniques; Development of toile from flat pattern.

**Style Preparation**: Shapes and types; Necklines; Collar reveres; Opening and fastening; Styles of dress and shirt; Styles of jackets and coats: Casual and tailored; Cutting for different fabrics; Tolerances.

**Marker Making, Fabric Spreading and Cutting:** Marker efficiency; Objectives; Constraints; Methods; Drawing; Duplicating and wastage in marker making; Marker utilization variation; Control of material wastage; Fabric loss inside & outside of marker; Fabric spreading: requirements, fabric packages; methods; Machines and splices; Fabric cutting: requirements, methods, cut plan preparation, machineries; Factors considered for choice of cutting; Quality control during cutting**.**

**Interlining:** Types; Advantages of fusible interlining; Conditions of fusing; Properties of fusible interlining; Methods of coating; Fusing machineries; Types of fusible interlining; Quality control in fusing; Fusing performance analysis.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of apparel preparatory process |
| **CLO2** | **Understand** the preparatory steps of apparel manufacturing |
| **CLO3** | **Apply** various techniques to calculate marker efficiency and cut plan order |
| **CLO4** | **Analyze** the ways of pattern construction, marker making, fabric spreading and cutting for various portion of human body |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | | √ | | | | | | | | | |
| **CLO4** | | √ | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 3402: Preparatory Process of Apparel Manufacturing Sessional**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3402<br>**COURSE TITLE:** Preparatory Process of Apparel Manufacturing Sessional | | |
| **CREDIT:** 1.5 (Sessional) | **TERMS OFFERED:** 3rd Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** This course offers intensive practical classes related with the development of different pattern preparation of a particular style of garments. Sharpening the knowledge of enhancing marker efficiency to minimize the wastage of fabrics. Provide hands on training on cutting operation technique can be used for cutting section of garment.

**COURSE CONTENT**

Study on standard body measurement (women, man & children) and practice for taking measurement on dress form (T-shirt, Shirt, Pants etc.); Development of pattern based on anthropometric data along with pattern grading for different components of garments; Calculation of manual marker efficiency for

different garments; Study on Attaching different types of interlinings (sewn, fusible); Cutting operation of fabric using different cutting machines-straight knife, round knife.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** different tools and methods to make pattern, marker and fabric cutting. |
| **CLO2** | **Evaluate** the pattern shape and marker efficiency based on size chart |
| **CLO3** | **Design** new pattern and marker for different styles |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | √ | | | | | | | |
| **CLO2** | | √ | | | | | | | √ | | | |
| **CLO3** | | | √ | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**HSS 3501: Accounting and Marketing**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** HSS 3501<br>**COURSE TITLE:** Accounting and Marketing | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 3rd Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** A course on Marketing and Accounting will provide the opportunity for engineering graduates to enable them to understand, analyze, assess and forecast various phenomena involving the promising potentials for products' promotion and take the best marketing decision based on the analysis of the contemporary pros and cons prevalent in the market. This course will also enable engineering graduates to prepare accounts report based on financial statement analysis, cost accounting, preparation of cost sheet and management accounting and more to lead industrial activities towards a predictable company growth.

**COURSE CONTENT**

**Accounting:** Accounting theory; Principles and practices; The basic accounting equation; The accounting cycle; Accounts: Journals, ledgers and trial balance; Basis of accounting; Adjusting entries; Closing entries; Final accounts and worksheet; Consignments; Merchandise inventory and capacity

analysis; Basics of cost accounting; Cost behavior and cost statements; Material costing; Labor costing; Overheads costing; Operating costing; Process costing; Job order costing and contract costing; Activity based costing; Cost volume profit analysis; Segment reporting; Breakeven point analysis; Financial statement analysis.

**Marketing:** Market; Marketing & marketing management; Marketing tasks; Marketing concepts and tools; Marketing management philosophies; Marketing planning; Marketing environment; Consumer market and buyer behavior; Business markets and business buying behavior; Market segmentation, targeting and positioning; Product and services strategy; New product development and product life cycle strategies; Products pricing strategies; Promotional activities and products distributions system; Salesmanship management; Direct and online marketing; New marketing model; Brand and brand management; Customer based brand equity; Brand positioning and values; Designing marketing programs; Marketing information system; Marketing research; Social responsibility and marketing ethics.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** about basic elements, types, natures and scope of marketing and accounting as well as explain the users' interest in accounting and marketing information for business and industrial decisions. |
| **CLO2** | **Apply** how marketing strategy and policy affect the others within the industry and accounting for financial decision of an organization |
| **CLO3** | **Analyze** the theory of product Planning, marketing mix, buyer's behavior and the cost behavior, financial statements. |
| **CLO4** | **Evaluate** the organization's marketing function and strategy along with accounting systems regarding cost behavior regarding production and distribution |
| **CLO5** | **Create** a plan for the cost of a product, budgeting of a company, analyzing financial statements, new product, brand, distribution strategy and policy. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | √ | | | | | | | | | | |
| **CLO2** | | | | √ | | | | | | | √ | |
| **CLO3** | | √ | √ | | | | | | | | | |
| **CLO4** | | | √ | | | | | | | | | |
| **CLO5** | | | | | | | | | | | √ | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 3600: Soft Computing in Textiles II Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3600<br>**COURSE TITLE:** Soft Computing in Textiles II Sessional | | |
|---|---|---|
| **CREDIT:** 1.5 (Sessional) | **TERMS OFFERED:** 3rd Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** The application of computer controlling system in every branches of textile engineering is increasing dramatically. Its proper application increases the quality and productivity of the processing material. Hence, the practical knowledge of computer controlling system in wet processing and apparel manufacturing engineering is essential in this program.

**COURSE CONTENT**

Basic elements of IT in textile mill; Basic use of computer applications as used by Textiles & Clothing industry specifically Adobe Photoshop; Basic use of computer applications as used by Textiles & Clothing industry specifically Illustrator; Understand basic use of Production Database Management and Excel software; Understand basic use of Microsoft power point, word software; Use of computer in textile processing (machine/process control; Use of data color software in textiles; Dye recipe formulation, quality control, color matching, mixing ratio formulation etc.); Digitizing process; Develop basic Computer Aided Design (CAD) skills with application of pattern making; Apply basic CAD skills to creating a marker for garments; Understand basic use of origin software; Understand basic use of Endnote software; Understand basic use of SPSS software; Use of computer in textile processing (machine/ process control – evenness tester and winding machine).

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** different tools, software to make the production process efficient and effective assuring better product quality |
| **CLO2** | **Analyze** the parameters based on buyer demand and solving problems during manufacturing |
| **CLO3** | **Evaluate** the design/effect, performances and productivity of the running processes and tools |
| **CLO4** | **Create** new tools and software for easy processing, characterization and value addition to the products. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | √ | | | | | | | | | |
| **CLO4** | | | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping CLOs with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 3601: Textile Physics**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3601<br>**COURSE TITLE:** Textile Physics | | |
|---|---|---|
| **CREDIT:** 4.0 (Theory) | **TERMS OFFERED:** 3rd Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The study of structure & physical properties of textile materials (fiber, yarn & fabric) is necessary to understand the behaviors and suitability for their application. Therefore, textile graduates should have knowledge on structure & physical properties of fiber, yarn & fabric.

**COURSE CONTENT**

**Physical Structure of Fibers:** Crystallinity and orientation; Approaches to polymer fiber structure; Basic concepts of methods for investigating fiber structure; Relations between fiber properties and structure of fiber.

**Properties of Textile Materials:** Mechanical Properties: tensile (fiber, yarn and fabric), flexural, torsional, frictional, moisture absorption; Optical properties: reflection and luster, general effect of fiber cross-sectional shape upon luster, influencing factors on luster; Thermal properties: thermal expansion and contraction, effect of heat on fiber properties; Electrical properties: measurement of di-electric constants of textile materials, measurement of static charge, static electrification in textiles, effect and remedies of static electricity in textile processes.

**Yarn Geometry:** Interrelations between the structure and properties of fibers, yarns and fabrics; Yarn designation; Idealized yarn geometry; Geometry of twisted yarn; Derivation of equation for yarn count, twist angle and twist factor from idealized yarn geometry; Twist contraction, Determination of limits of twist; fiber packing in the yarns; Deviations from ideal forms; Concentrating factors; Disturbing factors; Packing density; Specific volume of yarn; Derivation of yarn diameter for staple and filament yarn; Relation of yarn twist, diameter and twist angle. Defects of idealized helical yarn geometry; Fiber migration, Measurement of migration; Effect of fiber migration on ring and rotor yarn.

**Fabric Geometry:** Geometry of plain woven fabrics; Calculation knowing crimp ratio and thread spacing; Geometry of jumped conditions; Crimp interchange; Effect of yarn flattening; Deformation of fabric; Application of cloth geometry; Fabric buckling, shear and drape; Geometry of plain knitted structure; Engineering design of fabric to meet specific mechanical properties; Prediction of tensile properties of fabrics; Cover factor; Fractional cover; Total cover.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the terminology related to structure and properties of textile materials. |
| **CLO2** | **Understand** the structure and properties of fiber, yarn and fabric geometry. |
| **CLO3** | **Apply** mathematical equations to solve the problems relevant to structure and geometrical configuration of fabric |
| **CLO4** | **Analyze** the effect of structural properties of fiber, yarn and fabric |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | √ | | | | | | | | |
| **CLO3** | | | | | √ | | | | | | | |
| **CLO4** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**ME 3701: Basic Mechanical Engineering**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** ME 3701<br>**COURSE TITLE:** Basic Mechanical Engineering | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 3rd Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Textile engineers use engineering principles to design and create fiber-based products and processes. They must have a deep understanding of mechanical engineering to develop and enhance manufacturing processes. Mechanical engineering is the study of the design, manufacture, and operation of machines. It combines engineering physics, mathematics, and materials science to design, build, and maintain mechanical systems. In Basic Manufacturing Engineering, students will learn about thermodynamics, heat transfer, fluid mechanics, machinery, machine theory, and design, among other things. As a result, graduates of this curriculum must have a solid knowledge of Basic Mechanical Engineering.

**COURSE CONTENT**

**Thermodynamics:** Fundamental concepts and definitions; Revision of gas laws; Properties of perfect gas and steam; Thermodynamic process and cycles; Laws of thermodynamics: zeroth law of thermodynamics; First law of thermodynamics and corollaries; Thermodynamics of steam generation, boilers; Energy analysis of control mass and control volume system, non-flow and flow processes; Second law of thermodynamics and corollaries; Internal combustion engines: diesel and petrol engine.
**Refrigeration and Air Conditioning:** Basic concepts of refrigeration & air conditioning; Vapor compression & absorption refrigeration; Cooling load calculation.
**Hydraulics:** Properties of fluids; Pressure head of a liquid; Pressure gauges; Flow of fluids; Bernoulli's equation; General energy equation for steady flow; Head loss due to friction in a pipe.
**Turbo Machineries:** Fan; Compressor; Pump; Transmission of motion and power: belt, ropes, chains, gears and gear trains; Conversion of motion: shedding; Tappets and cams; Types & application: keys and couplings; Journal; Ball and roller bearings.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** various processes and laws of thermodynamics and basic concepts of Refrigeration & Air Conditioning, basic properties of fluids and working principle of different types of pressure gauges and fluid machineries and different mechanisms for the transmission and conversion of motion and power. |
| **CLO2** | **Apply** Bernoulli's equation and general equation for steady flow in the context of Textile Engineering. |
| **CLO3** | **Analyze** the laws of perfect gas for the IC Engines and differentiate between vapor compression and vapor absorption refrigeration, frictional resistance to the flow of fluid through pipes. |
| **CLO4** | **Create** the cooling load for the selection of proper Refrigeration and Air Conditioning System. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | √ | | | | | | | | | |
| **CLO3** | | √ | | | | | | | | | | |
| **CLO4** | | | √ | | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**ME 3702: Basic Mechanical Engineering Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** ME 3702<br>**COURSE TITLE:** Basic Mechanical Engineering Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 3rd Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Textile engineers use engineering principles to design and create fiber-based products and processes. They must have a deep understanding of mechanical engineering to develop and enhance manufacturing processes. Basic Mechanical Engineering covers thermodynamics, heat transfer, fluid mechanics, machinery, machine theory and design, and other topics. To apply theoretical knowledge to real-world problems, testing is essential. Laboratory work is also used to develop and improve goods and processes, validate designs, and learn how materials, parts, components, and systems work under various conditions. As a result, graduates of this program must know about the Basic Mechanical Engineering Sessional course.

**COURSE CONTENT**

Determination of Heating Value of Natural Gas by Gas Calorimeter and Flash Point and Fire Point of Diesel; Determination of the viscosity of different oils using Saybolt Viscosimeter; Performance evaluation and effects of different parameters on the performance of the Vapor Compression Refrigeration System (VCRS); Experimental verification of Bernoulli's equation; Performance test of a Centrifugal Pump; Performance test of a Reciprocating Pump.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Analyz**e the performance parameters of centrifugal and reciprocating pumps. |
| **CLO2** | **Evaluate** the Heating Value of Natural Gas by Gas Calorimeter, Flash Point and the Fire Point of Diesel, viscosity of different oils using Saybolt Viscosimeter, effects of different parameters on the performance of Vapor Compression Refrigeration System (VCRS), the Bernoulli's theorem with practical applications. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | √ | | | | | | | √ | | | |
| **CLO2** | √ | √ | | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**3RD YEAR 2ND SEMESTER**

**TE 3303: Textile Coloration and Finishing**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3303<br>**COURSE TITLE:** Textile Coloration and Finishing | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 3rd Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The students in Textile engineering must have the requisite knowledge and skills about chemical processing of textiles such as dyeing, printing and finishing etc. Hence, this subject is designed to teach students about the various processes and chemicals function involved in textile dyeing, printing and finishing.

**COURSE CONTENT**

**Technology of Dyeing:** Classification of reactive dye on different aspects; Reactive system–neucleophilic substitution, neucleophilic addition; Factors governing dye uptake; Preparation and application; Hydrolysis of reactive dye; Dispersing system; Theory of dyeing in high temperature method; Difference between high temperature, carrier and thermosol method; Application of disperse dye on different synthetic fibers; Dyeing of microfiber with disperse dye; Concepts on EDP and CDP system of disperse dyeing; Reduction cleaning; Solubilization of sulphur dye; Classification of water insoluble, leuco, solubilized and condensed sulphur dye; Theory of azoic dyeing; Classification according to chemical structure; Different ways of naptholation; Concept of fast base for azoic dye; Principle of diazotization; Developing/coupling reaction.

**Blended Dyeing:** Types of fiber-blends and blend dyeing; Dyeing of polyester-cotton fabric with disperse-vat, disperse-reactive dyes; Two baths and single bath dyeing of blend; Typical application of blend dyeing.

**Pigment Dyeing:** Chemical classification of pigments; Requirements of white pigment; Steps in pigment dyeing process; Application of pigments in textiles.

**Printing:** Printing processes for different fibers with Reactive, Azoic and Disperse dyestuff; Pigment printing; Special types of thickeners (Synthetic Polymers, Emulsion thickeners).

**Physical and Mechanical Finishing:** Mechanism of raising /brushing and sueding; Scope of shearing and cropping for different fibers; Calendering; Engineering aspects of calenders; Different calendering techniques; Basic mechanism of shrinkage; Control parameters for shrinkage, GSM and spirality; Basic operation of sanforizer, stenter and compactor; Effect of knitting parameters on dimensional stability of knit fabrics; Diversified application of stenter.

**Chemical Finishing:** Mercerization and causticization; Structural modification of cellulose due to mercerization; Mercerization of blended fabrics; Mercerization of ramie and flax fibers; Mercerizing wetting agents; Mercerizing machinery- woven, knit and yarn mercerizing machines; Liquid ammonia mercerization; Hot mercerization; Mechanism of softening effect; Cationic, anionic and non-ionic softeners; Silicone softeners; Suitability of softeners for different fabrics; Important softener characteristics; Compatibility; Troubleshooting.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the terminology relevant dyeing, printing and finishing of textiles. |
| **CLO2** | **Understand** the basic chemistry and functions of different chemicals used in dyeing, printing and finishing processes. |
| **CLO3** | **Apply** different dyes, auxiliaries and appropriate techniques for dyeing, printing and finishing of specific fibrous materials. |
| **CLO4** | **Analyze** the effect of different process parameters and used chemicals that influence the dyeing, printing and finishing of textiles. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | | √ | | | | | | | | |
| **CLO4** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 3304: Textile Coloration and Finishing Sessional**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3304<br>**COURSE TITLE:** Textile Coloration and Finishing Sessional | | |
| **CREDIT:** 1.50 (Sessional) | **TERMS OFFERED:** 3rd Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** The Textile engineering students must have practical knowledge and skills about chemical processing of textiles such as dyeing, printing and finishing etc. Hence, this course is designed to enhance the knowledge and skill for the application of dyes and pigment on textile materials using the appropriate techniques through practical demonstration.

**COURSE CONTENT**

Dyeing of cotton, polyester with related dyes; Stripping of reactive dyed textiles; Dyeing of PET-cotton fabrics (Reactive–disperse and vat-disperse dyes); Dyeing of textiles with pigments; Printing of cotton,

polyester with related dyes; Physical finishing of textiles using different techniques; Application of softeners on textiles.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the basic chemistry and functions of different chemicals used in dyeing, printing and finishing processes. |
| **CLO2** | **Apply** different dyes, auxiliaries and appropriate techniques for dyeing, printing and finishing of specific fibrous materials. |
| **CLO3** | **Analyze** the effect of different process parameters and used chemicals that influence the dyeing, printing and finishing of textiles |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | √ | | | | | | | | | | |
| **CLO2** | | | | √ | | | | | √ | | | |
| **CLO3** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 3403: Apparel Production and Fashion Fundamentals**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3403<br>**COURSE TITLE:** Apparel Production and Fashion Fundamentals | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 3rd Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** This course has designed for the undergraduate students of this department to acquire basic and advanced knowledge on different sewing operation such as seaming and stitching formation technique, alternative method of joining fabric, trimmings and accessories used in apparel manufacturing, pressing and finishing process utilized in the industry etc. Fashion fundamentals, fashion forecast, elements of design study sharpen student knowledge about their creativity to apply in manufacturing apparels.

**COURSE CONTENT**

**Seam:** Seam and its properties, types and usage, factorial study of seam strength, mechanism of seam slippage, seam strength prediction, seam strength testing.
**Stitch:** Definition of stitch and stitch types, properties and usage, principle of lock stitch and chain stitch; Sewing machine-feed mechanism.
**Sewing:** Sewing Needles; Sewing thread; Sewing problem and remedies; Sewing machines; Work aids in sewing; Automation in sewing machines.
**Alternative Methods of Joining Fabrics:** Welding and adhesives; Fusing; Moulding and their comparison.
**Trimmings:** Discussion on label and motifs; Chain; Buttons; Zipper; Lining; Hood and loop fastening; Shoulder pad; Velcro tape; Lace braid and elastic; Performance of trimmings.
**Pressing and Finishing:** Objects; Types; Methods; Various pressing machineries.
**Label:** International care labeling codes; Brief study on various labels (size label; main label; functional label).
**Folding and Packing:** Types; Methods; Equipment's; Symbol and markings; Materials and attachment details for various packaging for apparel.
**Fundamentals of Fashion:** Fashion; Fad; Classic; Style; Design; Trends.
**Trend Forecasting:** Fashion forecasting process; Trade shows.
**Element of Design:** Shape; Form; Value; Line; Color; Texture; Space.
**Principles of Design:** Balance; Proportion; Rhythm; Emphasis; Harmony.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of apparel manufacturing and fashion design |
| **CLO2** | **Understand** elements and principles of fashion design, alternative methods of fabric joining and various accessories for garments production. |
| **CLO3** | **Apply** fashion elements and principles to make desire like. |
| **CLO4** | **Analyze** the various seam and stitch, feed mechanism and different accessories for apparel production. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | √ | | | | | | | |
| **CLO3** | | | √ | | | | | | | | | |
| **CLO4** | | √ | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 3404: Apparel Production and Fashion Fundamentals Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3404<br>**COURSE TITLE:** Apparel Production and Fashion Fundamentals Sessional | | |
|---|---|---|
| **CREDIT:** 1.5 (Sessional) | **TERMS OFFERED:** 3rd Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** This practical course particularly emphasizes the practical production of different seam, stitch types, feeding mechanism practiced in the industry. Moreover, a practical case study on determining the seam quality of garments is conducted among the students. Provide hands on practical training on the preparation of fancy fashioned mood boards.

**COURSE CONTENT**

Stitching practices with paper exercises: Pedal control at maximum velocity; Precise stops at maximum velocity; Straight stitches at maximum velocity; Sewing curves; Over lock sewing straight line; Threading of single needle lock stitch machine; Fabric exercises ( sewing 6″× 6″ sewing off the material, sewing 6″× 6″ staying within material, sewing 6″× 6″ back tack.); Stitch classifications (seams & stitches of different tops and bottom items); Preparation of swatch card and trim card for different tops and bottom items.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** apparel tools and fashion elements for product development. |
| **CLO2** | **Evaluate** the performance of garments developed by different techniques. |
| **CLO3** | **Design** new fabric joining techniques and apparel products. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | √ | | | | | | | |
| **CLO2** | | √ | | | | | | | √ | | | |
| **CLO3** | | | √ | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 3603: Fabric Structure and Design**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3603<br>**COURSE TITLE:** Fabric Structure and Design | | |
|---|---|---|
| **CREDIT: 3**.0 (Theory) | **TERMS OFFERED:** 3rd Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Fabric is the principal material to produce various types of apparel. The apparel fashion has changed very rapidly with time. The concept of fabric structure and design is so helpful to develop innovative and fashionable cloth to satisfy the current market demand. This course has been designed in such a way that the upcoming textile graduates will gain detailed knowledge about fabric structure and will be able to design an innovative and demandable fabric.

**COURSE CONTENT**

**Introduction:** Classification of woven fabrics; Identification of warp and weft; Terminology to fabric structure and design; Fabric weight and GSM calculation from given particulars; Classification or parts of a complete design for a woven fabric; Methods of fabric representation; Systems of drafting; Point paper diagram in textile design; Factors affecting the fabric structure.

**Plain Weave Fabrics:** Main features of plain weave; Classification of plain cloth; Derivatives of plain weave and their characteristic (rib weave, warp rib, weft rib, matt weave, regular, irregular, fancy and stitched matt weave); Ornamentation of plain weave fabrics by varying set; Yarn linear density; Crimp; Twist and material; Different commercial examples of plain weave and their applications.

**Twill Weaves:** Main features of twill weave; Classification of twill weave; Derivatives of twill weave (zig-zag, herringbone, diamond, diaper, broken, re-arranged, stepped, elongated, combined, shaded, curved twill); Relative firmness of twill weave; Angle of inclination of twill weaves; Commercial examples of twill weave and their applications.

**Satin and Sateen Weaves:** Main features of satin and sateen weave; Concept of move number and move number selection criteria; Uses of satin and sateen weave; Commercial examples of satin and sateen weave and their applications.

**Fancy Designs of Fabrics:** Introduction; Classification, Construction principle, Commercial examples and end use.

**Color and Weave Effect:** Introduction; Classification, Construction principle, Commercial examples and end use.

**Double Cloths:** Introduction; Classification, Construction principle, Commercial examples and end use; Compound Fabric, Designs of fabrics figured with extra weft and extra warp and weft.

**Knitted Fabric Structure:** Notation Diagram, Graphical Notation and looping diagram of plain, rib, interlock and purl. Half-cardigan; Full-cardigan, Structures of simple, tuck and miss stitches.

**Course Learning Outcomes (CLOs): at the end of the course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the terminology of fabric structure and design |
| **CLO2** | **Understand** the various types of woven and knit fabric structures (basic, fancy and compound) |
| **CLO3** | **Analyze** different types of woven and knit fabric structure and design |
| **CLO5** | **Evaluate** different types of woven and knit fabric on the basis of fabric structure and design |
| **CLO6** | **Create** a new design of woven and knit fabric |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | √ | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | |
| **CLO4** | | √ | | | | | | | | | | |
| **CLO5** | | | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 3604: Fabric Structure and Design Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3604<br>**COURSE TITLE:** Fabric Structure and Design | | |
|---|---|---|
| **CREDIT:** 1.5 (Sessional) | **TERMS OFFERED:** 3rd Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Fabric is the principal material to produce various types of apparel. The apparel fashion is changed very rapidly with time. The concept on fabric structure and design is so helpful to develop innovative and fashionable cloth to satisfy the current market demand. This, sessional course has been designed in such a way that the upcoming textile graduates can be able to analyse, identify and reproduce innovative and demandable fabric.

**COURSE CONTENT**

Reproduction of sample: Plain weave derivatives; Twill weave derivatives; Fancy design; Color and Weave effect; Double cloth; Knit samples.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Analyze** different types of woven and knit fabric structure and design |
| **CLO2** | **Evaluate** different types of woven and knit fabric on the basis of fabric structure and design |
| **CLO3** | **Create a** new design of woven and knit fabric |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | √ | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | √ |
| **CLO3** | | √ | | | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**EEE 3711: Basic Electrical and Electronic Engineering**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** EEE 3711<br>**COURSE TITLE:** Basic Electrical & Electronic Engineering | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 3rd Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** A basic idea about the proper use and maintenance of textile machineries is crucial for a textile graduate to run the textile industry smoothly and seamlessly. In this course, a comprehensive knowledge of various components, devices, circuits and systems used in the textile industry, including various laws and formulas related to electrical and electronic engineering, can be acquired.

**COURSE CONTENT**

**DC & AC:** DC fundamentals; Generators and their characteristics motors and their characteristics; Speed control process; Flow of A.C. through coils; Inductance and resistance in series and in parallel; Power in A.C. Circuits; Power Factor and Power Factor Improvement; Resonance circuit; Transformer; Poly phase circuits; Induction motors.

**Sub-station:** Its purpose; Substation equipment's (HT. LT Switch gear etc.); Distribution board and sub-distribution board. System network: Typical distribution circuits; Cables and wiring systems and their selection.

**System protection:** Types of faults (transformer and motor); Principles of protection; Protective devices: circuit breaker, switches and starter.

**Electrical hazards:** Protection against shock and fire; Earthing and its importance; Procedure to be adopted when a person is in contact with a live contact.

**Amplifier, Rectifier and Transistor:** Amplifiers; Rectifiers and transistors diodes and their uses voltage amplification; Power amplification; Photo sensor and transducer; Integrated Circuits (I.C.).

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of electrical and electronics engineering. |
| **CLO2** | **Understand** appropriate SI units, prefixes and symbols as well as conventional notation and significant figures for electrical and electronic quantities. |
| **CLO3** | **Apply** electrical energy conversion to analyze DC and AC electrical machines to determine their performance characteristics, amplifiers, rectifiers, photo sensor, transducer and Integrated Circuits |
| **CLO4** | **Analyze** steady-state DC circuits of resistors, current and voltage sources, capacitors and inductors, simple diode, single field-effect transistor amplifier and operational amplifier circuits. |
| **CLO5** | **Evaluate** earthing and its importance; procedure to be adopted when a person is in contact with a live contact, protection against shock and fire, amplifiers, rectifiers, photo sensor, transducer and Integrated Circuits |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | √ | | | | | | | | | |
| **CLO2** | √ | | √ | | | | | | | | | |
| **CLO3** | √ | √ | √ | | | | | | | | | |
| **CLO4** | √ | √ | √ | | | | | | | | | |
| **CLO5** | √ | √ | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**EEE 3712: Basic Electrical and Electronic Engineering Sessional**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** EEE 3712<br>**COURSE TITLE:** Basic Electrical and Electronic Engineering Sessional | | |
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 3rd Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Practical idea about the proper use and maintenance of textile machineries is crucial for a textile graduate to run the textile industry smoothly and seamlessly. In this course, a practical knowledge of various components, devices, circuits and systems used in the textile industry, including various laws and formulas related to electrical and electronic engineering, can be acquired.

**COURSE CONTENT**

Current; Voltage; Resistance in series and in parallel; Ohm's law, KCL, KVL; Generators and their characteristics; Motors and their characteristics; Rectifiers, transistors, diodes and their uses; Transformer.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the use of appropriate SI units, prefixes and symbols as well as conventional notation and significant figures for electrical and electronic quantities. |
| **CLO2** | **Apply** the principles of electrical energy conversion to analyze AC electrical machines |
| **CLO3** | **Analyze** simple steady-state DC circuits of resistors, current and voltage sources. |
| **CLO4** | **Evaluate** current and voltage characteristics in electrical and electronic circuits. |
| **CLO5** | **Create** amplifiers and rectifiers. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | √ | | | | | | | | | | |
| **CLO2** | | √ | √ | | | | | | | | | |
| **CLO3** | √ | √ | | | | | | | | | | |
| **CLO4** | √ | | √ | | | | | | | | | |
| **CLO5** | | | √ | | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 3801: Engineering Economy**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 3801<br>**COURSE TITLE: Engineering Economy** | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 3rd Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Engineering economics is a field that addresses the dynamic environment of economic calculations and principles through the prism of engineering. It is a fundamental skill that all successful textile engineering firms employ in order to retain competitive advantage and greater market share. This course have been integrated for the students to providing them with the tools to optimize profits, minimize costs, analyze various scenarios, forecast fluctuations in business cycles, and more.

**COURSE CONTENT**

**Introduction:** Economics; Microeconomics and Macroeconomics; Engineering Economy; Inflation, Deflation, GDP, NDP, NI, GNP, NNP, DI etc.; Demand and supply; Individual demand curve and consumer behavior; Market equivalence.

**Theory of Production in Textile Engineering Economy:** Production function; Iso-cost and iso-quant; Returns to scale; Law of returns; Law of diminishing marginal returns; Least cost combination of factors; Producers equilibrium; Linear programming for cost minimization and profit maximization.

**Cost-driver Design Optimization for Textile Products:** Different types of cost; Break even analysis; Marginal cost; Real cost; Opportunity cost; Cost function.

**Market Structure of Textile:** Market and kinds of market; Average and marginal revenue; Decision making under different types of market; Pricing under various market structures.

**Time Value of Money**: Definition and application; Simple and compound interest; Concepts of equivalence; Notation and cash flow diagram; Present and future equivalent values of cash flows; Annuity; Nominal and effective interest rates; Application in textile decision.

**Comparison and Selection of Alternatives:** Cost of capital; Capital financing; Internal rate of return (IRR); NPV; Profitability Index (PI); Legal and social investment considerations in textile sector; Benefit/ cost ratio method.

**Depreciation of Textile Equipment:** Depreciation; Income taxes; Relationship; Depreciation methods and calculation; Appropriate method for textiles; After tax economic analysis.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the definition of the basic terminology of economics and engineering economics. |
| **CLO2** | **Understand** the explanation of the demand and supply behavior for the textile market and its influencing factors; equivalence rules. |
| **CLO3** | **Apply** the calculation of the time value of money under simple and compounding interest rate for finding present and future equivalence values of cash flow to make a smooth decision in textile project selection. |
| **CLO4** | **Analyze** the textile market structure for product pricing and decision making under different conditions. |
| **CLO5** | **Evaluate** the alternatives of capital financing after making comparisons by different method in context of textiles. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | |
| **CLO4** | √ | | | | | | | | | | | |
| **CLO5** | | | √ | | | | | | | | √ | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

## 4TH YEAR 1ST SEMESTER

### TE 4601: Testing and Quality Evaluation of Fiber and Yarn

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4601<br>**COURSE TITLE:** Testing and Quality Evaluation of Fiber and Yarn | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Basic aspects of textile testing, humidity, moisture in textiles, sampling, identification of textile fibers, fiber length & its measurement, fiber strength & its measurement, fiber fineness & its measurement, micronaire value, fiber maturity. To teach the working principle and standard test procedures of various testing instruments for measuring the properties of yarn, analysis and the interpretation of test results.

**Pre-requisite course**: TE 2601 (Fiber Science and Technology)

**COURSE CONTENT**

**Introduction**: Definition, purpose of quality control, quality assurance; Standard testing atmosphere; Concept on calibration; Effect of moisture; Standard moisture regain of different fibers; Importance of moisture regain; Instrument and method for measurement of moisture, relative humidity; Invoice weight.

**Fiber Testing:** Fiber properties: Length, Strength, Color, SCI, Neps, Fiber grading, Moisture, Fineness and maturity. Fiber testing equipment and report analysis: HVI, AFIS, Neps tester, Bundle strength tester etc.

**Yarn Testing:** Linear density, twist and strength: Measurement of linear density of lap, sliver, roving and yarn; Counting systems; Types; Measurement, level, amount of twist in roving and yarn; Influence of twist on process and product. Measurement of tensile strength of yarn: single thread, skein or lea strength test; Comparison of results; CRT, CRE and CRL methods. Instrument: Wrap reel, Wrap drum, strength tester.

**Yarn/sliver/roving Evenness and Hairiness:** Method, Principles of yarn evenness measurements; Irregularity; Yarn hairiness measurement and its influence; Uster statistics; Uster classimat; Yarn testing equipment and report analysis: Uster Evenness Tester, Hairiness tester, Uster tensojet, Uster tenso rapid, Zwigle & USTER hairiness tester etc.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of fiber and yarn testing. |
| **CLO2** | **Understand** techniques and testing principles used to characterize textile materials (fiber and yarn) |
| **CLO3** | **Analyze** the material behaviors and influencing factors during testing |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4602: Testing and Quality Evaluation of Fiber and Yarn Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4602<br>**COURSE TITLE:** Testing and Quality Evaluation of Fiber and Yarn | | |
|---|---|---|
| **CREDIT:** 1.50 (Sessional) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** This course offers students a practical understanding on different types of fiber properties testing equipment, moisture measurement, humidity measurement and yarn testing machineries.

**COURSE CONTENT**

Measurement of relative humidity using Wet-and-Dry Bulb Hygrometer; Determination of moisture regain by digital moisture meter; Determination of sliver count; Determination of count of cotton yarn in Ne (from yarn package) using Wrap Reel & Electronic balance; Determination of the amount of twist (TPI) in cotton yarn by digital twist tester; Determination of percentage of trash content in cotton fiber by trash analyzer; Identification of various types of textile fibers; Single & bundle fiber strength, length, finness identification.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** testing methods, principles and statistical tools to determine different properties of fabric and apparels |
| **CLO2** | **Analyze** the behavior fabric based on machine setting, test requirements and buyer demand |
| **CLO3** | **Evaluate** the testing results with respect to predetermined requirements and standards |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | √ | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 4603: Environmental Pollution and Control**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4603<br>**COURSE TITLE:** Environmental Pollution and Control | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Textile industry, specially the dyeing, washing, and printing section releases large amounts of toxic waste into the environment; causing air, water, and soil pollution. These impacts can be controlled by appropriate waste management and treatment. Textile engineering graduates must learn about environmental pollution and control in order to protect the environment and promote sustainable development. Therefore, this course has been included in this program.

**COURSE CONTENT**

**Environmental Challenges:** Definition of environment; Soil erosion; Desertification; Biodiversity loss; Deforestation; Water pollution; Fisheries resources; Large dam projects; Climate change; Urbanization; Greenhouse effects and global warming; Acid rain; Green chemistry; Carbon footprint; Effluents and their effects on environment; Related health issues.

**Pollution and its effects:** Definition of pollution; The atmosphere and its structure; Types of pollution and pollutants; Toxicity of textile dyes and chemicals.

**Air Pollution:** Definition; Emission and control technology; Criteria setting.

**Noise Pollution:** General consideration; Evaluation of industrial noise sources; Methods and techniques to control and reduce noise level.

**Water Pollution:** Water quality parameters (pH, color, turbidity, dissolved solids, BOD, COD etc.); Textile wet processing effluents and their characteristics; Various types of effluent treatment methods (physical, chemical and biological) and disposal systems; Electrochemical technology for textile effluents treatment; Wastewater quality standard for disposal to environment; Reduction of textile wastewater using automatic process control; Reclamation and reuse; Filtration; Effects of textile waste on environment; Heavy metal contamination.

**Solid Waste Management:** Composition of solid wastes; Sludge management; Collection systems and alternatives for treatment and re-use.

**Environmental Policy and Law:** Environmental law of Bangladesh; Role of the governmental and non-governmental organizations in the protection and conservation of environment in Bangladesh; International treaties (Health and industrial safety; Environmental regulatory affairs for dyes and pigments; Risk vs Hazard communication, Penalties and compliance).

**Environmental Compliance:** ISO 14000; WRAP certification; OKEO-Tex 100; GOTS; REACH; SA-8000.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology related to environmental pollution. |
| **CLO2** | **Understand** the causes of environmental pollution (air, water, noise etc.) and their impact on human health and ecosystem. |
| **CLO3** | **Apply** fundamental concepts and methodologies to control pollution in textile industries and apply strategies to achieve environment friendly processes. |
| **CLO4** | **Create** an environmental problem solving skill in the field of textile industries. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | √ | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | | | √ | | | | √ | | | | | |
| **CLO4** | | | √ | | | | √ | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4801: Human Resource and Industrial Management**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4801<br>**COURSE TITLE:** Human Resource and Industrial Management | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The knowledge of this subject is required of all textile engineers who wish to choose textile/garments industry as a career. This course is designed to develop understanding of various functions of management, role of employee and engineers and providing knowledge about safety and labor, industrial laws, financing, product costing and management in different areas.

**COURSE CONTENT**

**Management and Organization:** Management and industrial management; Evolution of management; Level of managers; Development of modern industrial organization; Scientific management.

**Personnel Management:** Human resource management; Job evaluation; Recruiting and selection; Socializing the new employee; Employee training; Career development; Work compensation; Safety; Trade unions; Collective bargaining.
**Compliance in Textile Industry:** Compliance; Social compliance; Compliance and productivity; ISO code of conduct and compliance; Comparison among different buyer's standard/code of conduct.
**Cost Management**: Cost accounting and financial accounting; Cost accounting system; Cost unit; Costing for materials, labor and overhead; Standard costing; Costing by products and joint products; Direct costing.
**Financial Management**: Financial management; Value maximization; Agency problem; Financial decisions; Risk uncertainty and return; Probability distribution and expected return; Total risk analysis.
**Corporate Social Responsibility for RMG Sector**: Sustainable development, Definition of CSR; Dimensions of CSR; CSR application in Bangladesh; CSR throughout the value chain and global supply chain, Sustainability analysis of textile product; SRHR; Innovative leadership; Implementing CSR.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the definition of basic terminology of human resource and industrial management. |
| **CLO2** | **Understand** the basic function of human resource management, compliance management, cost management and financial management. |
| **CLO3** | **Apply** the cost calculation procedure of textile finished goods. |
| **CLO4** | **Analyze** the recruitment and selection procedure for internal and external recruitment. |
| **CLO5** | **Evaluate** a textile business project by calculating its return and risk. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | |
| **CLO4** | | | | | | √ | | | | | | |
| **CLO5** | | √ | | | | | | | | | √ | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4803: Professional Ethics and Organizational Behavior**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4803<br>**COURSE TITLE:** Professional Ethics and Organizational Behavior | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** It is essential for textile professionals have an understanding of the ethical problem, principles and behavior in the textile organization. Part of professional ethics is the understanding of the ethics of other professions, how they interact and what can be expected from them as correct ethical behavior. This course is included to ensure textile engineers are behaving in a manner that is acceptable in the organization and respectful of one to another.

**COURSE CONTENT**

**Professional Ethics:** Definition and scopes of ethics; Different branches of ethics; Social change and the emergence of new technologies; History and development of engineering ethics; Study of ethics in engineering; Human qualities of an engineer; Obligation of an engineer to the clients; Attitude of an engineer; Measure to be taken to improve the quality of an engineer; Ethical expectations; Employers and employees relationship; Inter-professional relationship; Institutionalization of ethical conduct.

**Organizational Behavior:** Introduction; Goal and purposes of organizational behavior; Models of organizational behavior; Motivation; Theories of motivation; Leadership; Leadership styles; Leadership skills; Communication; Personality; Values; Attitude; Job satisfaction; Conflict and conflict management; Stress and stress management; Organizational culture; Team work.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of ethics and organizational behavior. |
| **CLO2** | **Understand** the explanation of the motivational rules for achieving the goals of organizational behavior. |
| **CLO3** | **Apply** institutional ethical conduct to develop better inter-professional relationships among the organizational employee. |
| **CLO4** | **Analyze** the human qualities of an engineer with improving rules and ethical expectations from engineers. |
| **CLO5** | **Evaluate** the reason for stress and conflict with suitable resolution procedures to manage it. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | | √ | | √ | | | | |
| **CLO2** | | √ | | | | √ | | | | | | |
| **CLO3** | | | | | | √ | | √ | | | | |
| **CLO4** | | √ | | | | | | √ | | | | |
| **CLO5** | | √ | | | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**Optional Courses (Choose any one set)**

**Set-I**

**TE 4101: Process Control in Spinning and Special Yarns**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4101<br>**COURSE TITLE:** Process Control in Spinning and Special Yarns | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** In-depth study of ring spinning frame will be discussed in this course. Modern concepts and development related to spinning machineries, costing, automation and waste control on the different stages of ring spinning process will be focused. Apart from these different types of fancy yarn, slub, core, twisted and textured yarn will also be taught in this course.

**COURSE CONTENT**

**Introduction:** Mixing cost; Optimization of mixing cost; Modern trends and development in a ring spinning mill from blow room to packing; Technological points from blow room to ring frame; Sliver data; Ring data and Winding data; Limitation of ring spinning.

**Process Parameters and Their Impacts:** Processing parameters of blow room, carding, drawing, lap former, combing, roving, ring frame and winding. Measuring, optimizing and evaluating of process parameters; Impact of process variables on quality of delivered materials; Report analysis of evenness tester; Fault analysis; Uster statistics; Yarn conditioning.

**Automation in Spinning Mill:** Automation in all sections of spinning industries for Creeling, Doffing, Piecing, Cleaning, Materials handling and linking of machines, Data processing; Application of on-line instrumentation for consistent yarn quality.

**Waste control and optimization:** Yarn realization; Standard waste% and efficiency of all manufacturing stages, Waste control, Centralized waste collection, Dust filtration bags and setting chambers; Processing of soft waste and hard waste.

**Blended Yarn:** Processing of cotton and man-made fibers; Types of blending operations; Machine sequence in blow room; Machine elements; General settings; Ambient condition from blow room to ring frame.

**Slub Spinning**: Types of slub yarn; Manufacturing methods; Effect of process variables; Yarn characteristics and their uses.

**Core Spun Yarn:** Different types of core yarn; Manufacturing methods; Effect of process variables; Quality of spandex; Yarn characteristics and their uses.
**Twisted and Textured Yarn:** Working procedure; Process optimization; Application of twisted yarn; Recent development of twisting machine; Different types of textured yarn; Texturing methods and their description; Characteristics of textured yarn and their applications.
**Fancy Yarn:** Melange; Neppy yarn; Boucle; Grimp and loop yarn; Snarl yarn; Knop yarn; Corkscrew yarn; Popcorn yarn; Chenille yarn; Ribbon yarn; Self twisted yarn; Network yarn; Mosaic yarn; Filigree yarn; Lurex (metallic) yarn; Multi twist and multi count yarn; Intermingle yarn; Recent developments of diversified yarn.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic concept of modern development of spinning machineries. |
| **CLO2** | **Understand** the working principle of slub, core, textured and twisted yarn with their automation. |
| **CLO3** | **Apply** process variables, setting parameter and suitable raw material for production of blended and specialized yarn. |
| **CLO4** | **Analyze** the cost effective raw materials, economic process parameters in all stages of spinning process for production different types of yarn. |
| **CLO5** | **Evaluate**: the mixing cost, delivered material quality, process waste, spare parts life time of each machines involved in various production process. |
| **CLO6** | **Design** different machineries layout for new product development. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | √ | | | | | | | |
| **CLO3** | √ | | | | √ | | | | | | | |
| **CLO4** | | √ | √ | | | | | | | | | |
| **CLO5** | | √ | | √ | | | | | | | | |
| **CLO6** | | | √ | | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO6 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4102: Process Control in Spinning and Special Yarns Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4102<br>**COURSE TITLE:** Process Control in Spinning and Special Yarns Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** This course offers students a practical understanding on different types of modern development of ring spinning system with their design, constructional features and material passage diagram. Besides this developed practical knowledge on different types of diversified yarn production system.

**COURSE CONTENT**

Schematic gearing/motion transmission diagram of slub attachment machine; Calculation of changeable gear teeth no., draft and twist for a particular slub yarn; Preparation of slub program by analyzing the fabric sample/yarn; Study on cotton-polyester blended yarn; Study on cotton-regenerated cellulose blended yarn; Study on polyester-regenerated cellulose blended yarn; Study on core yarn manufacturing process in conventional ring frame; Study on manufacturing process of recent developed fancy yarn; Industrial visit.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** optimum machine setting parameters for processing of particular materials in production line. |
| **CLO2** | **Analyze** the process parameters involved in slub, core and special yarn process in line with the raw materials quality. |
| **CLO3** | **Evaluate** the yarn quality parameters at different spinning operation. |
| **CLO4** | **Create** the particular machineries layout and parameters for production of special yarn. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | √ | | | |
| **CLO2** | √ | | √ | | | | | | √ | | | |
| **CLO3** | | √ | | | | | | | √ | | | |
| **CLO4** | | | | | | | | | √ | | | √ |

(Tick mark indicates relationship)

**Mapping CLOs with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Set-II**

**TE 4201: Modern Weaving and Special Fabrics**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4201<br>**COURSE TITLE:** Modern Weaving and Special Fabrics | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Textile graduates are responsible for handling every section of a textile industry. The textile engineer, who wants to build his career in the weaving sector, should have the latest knowledge about modern weaving and special fabric manufacturing processes. This course has been designed in such a way that the upcoming textile engineer (Weaving specialist) can fulfil the current demand and he will be confident in this competitive field of woven fabric manufacturing.

**COURSE CONTENT**

**Modern Dobby and Jacquard:** Classification of Jacquards; S.L.S.C., D.L.S.C., D.L.D.C. and electronic Jacquard mechanism; Comparison between various types of jacquard; Building of jacquard harness system; Jacquard harness ties; Method of increasing the figuring capacity of Jacquard; Casting-out; Lifting loss in jacquard; Defects of jacquard; Jacquard calculations. Electronics Dobby and Jacquard.

**Tertiary Motion of Loom:** Features of automatic loom; Definition, objectives and classification of weft replenishment; Modern weft replenishment system; Methods of weft patterning; Weft patterning system in modern loom; Operation of weft accumulator; Objectives and classifications of warp protecting motion; Objectives and classification of warp and weft stop motion; Mechanism of modern warp and weft stop motion.

Modern Weaving: Problems in shuttle weaving; Features of modern weaving machine; Types of modern loom.

**Projectile Loom:** Introduction to projectile; Features; Advantages; Projectile circulation, projectile launching mechanism and insertion cycle of projectile machine.

**Rapier Loom:** Introduction to rapier; Advantages; Various types of rapier with their advantages and disadvantages; Rapier drives, rapier heads and recent development of rapier loom.

**Air Jet Loom:** History; Advantages; Yarn feeders; Main jets; Relay jets; Tractive force and its necessities for jet weaving; Methods of air jet control; Timing diagram, principle of filling insertion, performance of yarn, air compressor, air quality, propulsive force on weft, nozzle design and practical problems of air jet machine.

**Water Jet Loom:** Quality of water, merits, demerits, weft supply system, weft insertion system, amount of water and nozzles of water jet machine.

**Multi-phase Loom:** Introduction, history, merits, demerits, types, weft insertion mechanism by rapier and air in warp way and rotary beat-up of multi-phase loom; Mechanism of circular weaving machine.

**Denim Fabric Production:** Types of denim manufacturing; Warping, sizing, dyeing and weaving process of denim fabric manufacturing.

**Selvedge:** Conventional and various unconventional selvedges and calculation of weft waste percent.

**Special Fabric Production:** Definition; Feature; Structure; Production; Properties; End-uses etc. of tape, ribbon, webbing, belt, label, braid, laminate, bonded, coated and Pile fabric, carpet weaving etc.

**Weaving Management:** Preparing of a weaving plan; Cloth costing and yarn consumption; Time studies in weaving and calculation of weaver's load; Causes of warp and weft breakage in weaving; Factors controlling loom efficiency; Relevant calculations of weaving machinery allocation; Production management; Project balancing and modernization; Current issues in weaving; Factors to be considered before purchasing commercial loom. Conventional and various unconventional selvedges and calculation of weft waste percent.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic concept on tertiary motion, modern weaving, weaving management and special fabrics |
| **CLO2** | **Understand** the principle operation of tertiary motions, modern looms, and special fabrics production |
| **CLO3** | **Analyze** the weavers load, loom efficiency, and fabric faults |
| **CLO4** | **Evaluate** the performance of various modern loom and properties of special fabrics |
| **CLO5** | **Design** a weaving plan, cloth costing, and yarn consumption for a modern woven fabric manufacturing plant |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | √ | √ | | | | | | | | | | |
| **CLO4** | | √ | √ | | | | | | | | | |
| **CLO5** | | √ | | | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4202: Modern Weaving and Special Fabrics Sessional**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4202<br>**COURSE TITLE:** Modern Weaving and Special Fabrics Sessional | | |
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Textile graduate are responsible for handling every section of a textile industry. The textile engineer, who wants to build his career in weaving sector, he should have latest knowledge about modern weaving and special fabric manufacturing processes. This course has been

designed in such a way that the upcoming textile engineer (Weaving specialist) can fulfil the current demand and he will be confident in this competitive field of woven fabric manufacturing.

**COURSE CONTENT**

Jacquard calculation; Technical comparison among different modern loom; Denim manufacturing processes; Analysis of tape, ribbon, webbing, belt, label, braid, laminate, bonded, coated, pile, carpet fabric; Identification of woven fabrics faults and possible remedies; Preparation of weaving plan.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Analyze** the principle mechanism of various modern loom and special fabric manufacturing process |
| **CLO2** | **Evaluate** faults and remedies of woven fabric. |
| **CLO3** | **Design** harness mounting system for a jacquard fabric |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | √ | | | | | | | | | | |
| **CLO2** | | √ | √ | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Set-III**

**TE 4301: Modern Pretreatment and Textile Finishing**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4301<br>**COURSE TITLE:** Modern Pretreatment and Textile Finishing | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The Textile engineering students must have necessary knowledge and skills about the new developments in the textile pretreatment and finishing processing such as pretreatment, mechanical and chemical finishing. This knowledge is important for the textile engineering students who build their career in modern pretreatment and dyeing plants. Hence the course is included in this program.

**COURSE CONTENT**

**Surface Active Agent:** Different types of surface active agents; Surface activity and micelle formation; CMC of surface active agents.

**Pretreatment:** Classification of desizing enzymes; Continuous desizing process; Desizing of synthetic fibers and blends; Desizing efficiency; Special scouring process- solvent and vapor-loc system**;** Advantages and disadvantages; Strength measurement of bleaching agents; Estimation of available chlorine in bleaching powder; Measurement of whiteness and brightness of bleached fabric.

**Physical Finishing:** Removal of excess water; Dewatering and hydro extracting; Various drying systems in wet processing (convection, conduction); Slitting; Low-wet pick-up finishing; Critical application value in low-wet pick-up finishing; Techniques used in low-wet pick-up finishing; Chemistry and classification of optical brightening agents (OBA); Principles of whitening; Application of OBA.

**Chemical Finishing:** Resin and resin finishing; Basic chemistry of cross-linking agents; Effect of cross-linking on the properties of cotton fabric; Problems of formaldehyde-based finishes; Stability of cross-linking agent to laundering; Chemistry and application of different water repellent finishes; Improvement of the durability of fluoro-chemical finishes; Mechanisms of flame retardancy during condensed phase and gas phase; Formaldehyde free flame retardants; Boron, phosphorus and halogen based flame retardants; Flame retardants for polyester, wool, nylon and blends; Chemistry of anti-pilling finishes; Different anti-pilling finishes in textiles; Evaluation of anti-pilling finishes; General requirements for antistatic finishes; Chemistry and application of antistatic finishes; Evaluation of antistatic finishes; Chemistry of soil release finish; Carboxy, hydroxy, ethoxy and fluorine based soil release finishes; Chemistry and evaluation of antimicrobial and insect resist finish.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the terminology relevant to advanced pretreatment and finishing of textile materials. |
| **CLO2** | **Understand** the basic concepts and principles/mechanisms of advanced techniques used for preparatory and finishing of textile materials. |
| **CLO3** | **Apply** the latest techniques involved in pretreatment and finishing of textile materials. |
| **CLO4** | **Analyze** the latest techniques or processes used in pretreatment and finishing regarding scope and applicability. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | | √ | | | | | | | | |
| **CLO4** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping CLOs with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4302: Modern Pretreatment and Textile Finishing Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4302<br>**COURSE TITLE:** Modern Pretreatment and Textile Finishing Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th year 1st semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** The Textile engineering students must have practical knowledge and skills about the new developments in the textile pretreatment and finishing processing methods. Hence, this course is designed to enhance the knowledge and skill for the application of pretreatment and finishing chemicals on textile materials using the appropriate techniques through practical demonstration.

**COURSE CONTENT**

Estimation of scouring effect; Demonstration of vapor-loc and solvent scouring process; Estimation of available chlorine in bleaching powder; Measurement of strength of $H_2O_2$; Application of OBA on textile materials; Application of resin, flame retardant, antimicrobial, soil release and anti-static finishes.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the basic concepts and principles/mechanisms of advanced techniques used for preparatory and finishing of textile materials. |
| **CLO2** | **Apply** the latest technology involved in pretreatment and finishing of textile materials. |
| **CLO3** | **Analyze** the latest techniques or processes used in pretreatment and finishing regarding scope and applicability. |
| **CLO4** | **Evaluate** the product quality in different preparatory processes and finishing processes. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | √ | | | | | | | | | | |
| **CLO2** | | | | √ | | | | | √ | | | |
| **CLO3** | | | | √ | | | | | | | | |
| **CLO4** | | | | | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping CLOs with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Set-IV**

**TE 4401: Apparel Washing and Finishing**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4401<br>**COURSE TITLE: Apparel Washing and Finishing** | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The technology of creating various desired effects on garments using different physical and chemical treatments is special types of finishing in apparel product development. However, this course is specially designed for the graduates who will take apparel manufacturing engineering as a specialization. Therefore, those who are interested to build their career in garments washing and dyeing industry should be knowledgeable on it. Thus, this course has been included as a technical elective course in the program.

**COURSE CONTENT**

**Garments Washing**: Evolution of garments washing; Garments wash: concept, requirements, machineries; Different types of dry and wet washing processes; Quality control in garments washing.
**Modern Fading Techniques on Denim Garments:** Introduction to laser, ozone and plasma technologies; Basic mechanism of laser, ozone, and plasma techniques; Uses of laser, ozone and plasma techniques on textiles; Advantage, disadvantage and safety issues of modern fading technologies.
**Garments Dyeing:** Basic theory of garments dyeing; Concept of swatch making; Garments dyeing with reactive and other dyes; Machineries used in garments dyeing; Problems associated with garments dyeing; Smart colorants in garments dyeing; Special finishes in garments.
**Garments Inspection and Quality Control**: Raw material and finished garment inspection; Quality from design to dispatch; Garments inspection: in-process inspection, final inspection, different methods; Types of garments defects; Detail study on AQL; Product quality audits and comparability tests; TQM in apparel industry; Fabric sew ability assessment.
**Clothing Comfort:** Physiological process of maintaining constant core temperature of human body; Mechanism of heat transfer from human body; Concept of heat transfer and comfort; Sportswear and high performance textiles.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the terminologies of apparel finishing, quality and comfort. |
| **CLO2** | **Understand** the methods of apparel finishing, quality control tools and principles of clothing comfort. |
| **CLO3** | **Apply** various recipes for fading of garments through washing techniques |
| **CLO4** | **Analyze** the effects of finishing chemical and comfort parameters on various apparels. |
| **CLO5** | **Evaluate** the various washing techniques applied on garments |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | | √ | | | | | | | | | |
| **CLO4** | | | | | √ | | √ | | | | | |
| **CLO5** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4402: Apparel Washing and Finishing Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4402<br>**COURSE TITLE:** Apparel Washing and Finishing Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** The technology of creating various desired effects on garments using different physical and chemical treatments is special types of finishing in apparel product development. Thus, the graduates who are interested to build their career apparel industry should have practical knowledge on it.

**COURSE CONTENT**

Development of different wet wash processes sample: normal wash, enzyme wash, bleach wash, stone wash, acid wash; Development of different dry wash processes sample: PP spray, whiskering, grinding, destroying, 2D & 3D crinkle etc.; Practice on garments inspection process: tops & bottoms; Application of TQM tools in apparel industry; Measurement of thermal and moisture comfort of clothing.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** different tools, methods and recipe to produce quality goods with desired effect and comfort properties |
| **CLO2** | **Evaluate** the effect and desired properties of the developed apparels |
| **CLO3** | **Create** quality tools, recipe and new methods for new products |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | √ | | | | | | | |
| **CLO2** | | √ | | | | | | | √ | | | |
| **CLO3** | | | √ | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Set-V**

**TE 4805: Textile Market Research and Product Development**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4805<br>**COURSE TITLE:** Textile Market Research and Product Development | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Textile engineering professionals are responsible for development of new product through market research which helps in managerial decision making process. This course is included as textile professionals are able to conduct a market research project and interpret, communicate and impart research result to development of a new product.

**COURSE CONTENT**

**Marketing Research:** Introduction; Nature; Classification; Role of market research in MIS and DSS; Ethics in market research; Market research problem; Questionnaire and form design for market research; Sampling procedure; Designing market research; Procedure of market research; Field work.
**Consumer Behavior:** Consumer behavior; Modeling behavior; Factors influences on consumer behavior; Understanding consumer with market segments.
**Product Development:** Introduction; Product management; Sales force; Marketing organization; Marketing planning process with components; Market potential and sales forecasting; Element of product strategy; Product positioning; Selection of strategic alternatives; Innovation; Strategy; Strategic planning for new product; New product development process; Idea generation; Evaluation concept with economic analysis; Commercialization tools.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the definition and terminology of textile market research and product development. |
| **CLO2** | **Understand** the nature and classification of market research. |
| **CLO3** | **Apply** the market potential and forecast sales for a new product. |
| **CLO4** | **Analyze** the marketing planning process for a new product development. |
| **CLO5** | **Create** a questionnaire and design a survey for a specific market research problem. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | |
| **CLO4** | | √ | √ | | | | | | | | | |
| **CLO5** | | √ | | √ | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4800: Management Tools and Engineering Graphics Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4800<br>**COURSE TITLE:** Management Tools and Engineering Graphics Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Textile engineering activities (design/ manufacturing/ operation) for any product involve a team of people who communicate graphically. Hence, every textile engineer must have exposure and some competence in presenting ideas as pictures, and be able to unambiguously interpret drawing from others. This course will help develop basic visualization competency as well as ability to representing ideas on both paper and computer.

**COURSE CONTENT**

Understanding the operation of different management tools software: ERP; MIS; GSD; Pay roll; RFID etc. Plane curves and free hand sketching; Curves used in engineering practices; Conic, Ellipse, Parabola, Hyperbola, Practical applications, Free hand sketching; Projection of Points, Lines and Plane Surfaces; Projection of solids; Section of solids and development of surfaces; Orthographic projection; Isometric and perspective projections.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** the operation of different management tools software. |
| **CLO2** | **Analyze** the necessary tools for hand sketching and curves. |
| **CLO3** | **Evaluate** the selection the different curves and practically applied it. |
| **CLO4** | **Design** a surface by different projection method. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | √ | | | | | | | |
| **CLO2** | | | √ | | √ | | | | | | | |
| **CLO3** | | | √ | | | | | | √ | | | |
| **CLO4** | | | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Set-VI**

**TE 4901: Fashion Distribution and Logistics**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4901<br>**COURSE TITLE:** Fashion Distribution and Logistics | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Material sourcing has a significant contribution for successful product development and maintaining the global supply chain. This course is designed to provide advanced knowledge on the tools and technique for sourcing the material as well as solving related challenges. Therefore, this course is offered as an optional advanced course to the textile graduates.

**COURSE CONTENT**

Production of fashion designs and textiles; Different sourcing materials such as fabrics, trims or accessories in the production of fashion products; Locate and compare materials; Needs of clients;

Social and cultural aspects of specific target market; Appropriate judgments about the acquisition of raw materials; Solving problems related to fashion product distribution and logistics.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of various fashion terms. |
| **CLO2** | **Apply** the tools and technique for sourcing the material, solving the problem. |
| **CLO3** | **Evaluate** trims and accessories in the production of fashion products. |
| **CLO4** | **Create** new product development of fashion items. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | | | √ | | | | | | | | | |
| **CLO4** | | √ | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4900: Fashion Illustration Sessional**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4900<br>**COURSE TITLE:** Fashion Illustration | | |
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 1st Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** N/A |

**Rationale of the Course:** This sessional course is designed to provide hands on experience to the textile graduates on advance elements of fashion designing. It includes drawing of the fashion figures starting from the basic understanding of the 9-head proportion, body elements from head to toe, movement and posture to fashion poses with garments as well as applying lines, silhouette and texture on apparel, different rendering techniques etc.

**COURSE CONTENT**

**Introduction:** Observational drawing from life; Attention to fashion pose; Fashion stills; Fashion model drawing; Front and back lay figure; The fashion figure; Movement/poses, line, value and proportion; Representing form by various methods and techniques.

**Lines, Silhouettes and Texture**: Fashion details- necklines, collars and sleeves, shirts, trousers, skirts, blouses and tops, jackets and formal suits; Textures and exploring various techniques.

**Rendering Techniques:** Pencil; Color pencil; Charcoal; Poster color; Oil and acrylic; Fabric rendering – Samples (introduce at least 30 most common samples) of different varieties of fabric.

**Photo Analysis**: Different garments of kids, male and female.

**Drawing various accessories and shading**: Illustration of headgears; Foot wears bows; Ties; Belts; Handbags; Gloves; Jewellery.

**Stylization:** Garment and pose together; Detail of drapes; Frills and other details; Specification drawings of shirt and formal trousers.

**Presentation methods**: Mood board presentation; Color board; Layout planning and presentation.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** lines, silhouette and texture on apparel. |
| **CLO2** | **Analyze** Photos of different garments. |
| **CLO3** | **Evaluate** stylization, drawing and draping of various garments. |
| **CLO4** | **Create** mood board, layout planning for different design. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | | | √ | | | | | | | | | |
| **CLO4** | | √ | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**4TH YEAR 2ND SEMESTER**

**TE 4605: Testing and Quality Evaluation of Fabric and Apparel**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4605<br>**COURSE TITLE:** Testing and Quality Evaluation of Fabric and Apparel | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Testing and quality evaluation of fabric and apparel is a crucial branch textile engineering as it ensures product quality and can eliminate any problems ahead of manufacturing. Besides, the development of new and innovative clothing means that textile testing is more important than ever. Thus, textile graduates should have knowhow on various test methods and their assessment strategies to be competent in respective field.

**COURSE CONTENT**

**Test Standards:** Use of standards BSTI, ISO, ASTM, British and AATCC.
**Physical and Mechanical Testing of Textiles:** Measurement of fabric weight, length and thickness, Fabric tensile strength; bursting strength, Tearing strength test; Fabric stretch and recovery properties**;** Serviceability and wear; abrasion test; Method of assessment**;** Measurement of fabric stiffness; Drape; Measurement of fabric crimp; Shear of fabric; Bias extension; Formability; Method of measuring crease recovery; Pilling and snagging; Methods of pilling and snagging test.
**Moisture Transport:** Methods of measurement of water repellency or resistance**;** Innovative test methods for fabric permeability.
**Thermal Comfort:** Measurement of thermal conductivity; Measurement of air and water vapor permeability.
**Dimensional Stability of Fabric:** Methods of measuring dimensional stability; Dimensional Stability to dry cleaning & dry heat.
**Flammability Testing of Fabrics:** Measurement of fabric flammability; Standard testing methods; Textile flammability standards.
**Dyeing and Coloring Tests for Fabrics:** Change in shade and staining tests; Test standards; Sample preparation and outline of color fastness tests-light fastness; Fastness in relation to manufacturing processes; Printing tests
**Fabric Composition Testing:** Methods of testing fabric content and composition; Traditional testing methods; New testing methods; Identification of textile fibers- feeling tests, burning behavior, microscopic test, chemical tests; Identification of cashmere and wool fiber scale.
**Garment Testing:** Seam strength, seam slippage; Sewability testing; Button pull testing; Zipper testing.
**Analytical tests:** pH, Formaldehyde, Azo, APEO, Nickel, Cadmium, Led.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of fabric and apparel testing. |
| **CLO2** | **Understand** testing tools and principles to characterize textile materials (Fabric and apparel) |
| **CLO3** | **Analyze** the material behaviors and influencing factors during testing |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | √ | | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4606: Testing and Quality Evaluation of Fabric and Apparel Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4606<br>**COURSE TITLE:** Testing and Quality Evaluation of Fabric and Apparel Sessional | | |
|---|---|---|
| **CREDIT:** 1.50 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Testing and quality evaluation of fabric and apparel is a crucial branch textile engineering as it ensures product quality and can eliminate any problems ahead of manufacturing. Besides, the development of new and innovative clothing means that textile testing is more important than ever. Thus, textile graduates should have practical knowhow on various test methods and their assessment strategies to be competent in respective field.

**COURSE CONTENT**

Determination of fabric dimensional stability (spirality and shrinkage) and weight per unit area; Fabric flame resistance, tensile strength of fabric; Bursting and tear strength of fabric; Seam strength and seam slippage of garments; Abrasion resistance and pilling properties of a fabric; Fabric drape ability; Sew-ability assessment of a garment; Fabric moisture and thermal comfort color fastness properties.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** testing methods, principles and statistical tools to determine different properties of fabric and apparels |
| **CLO2** | **Analyze** the behavior fabric based on machine setting, test requirements and buyer demand |
| **CLO3** | **Evaluate** the testing results with respect to pre-determined requirements and standards |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | √ | | | | | | | | | | |
| **CLO2** | | | | | √ | | | | | | | |
| **CLO3** | | | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration showing instruments)

**TE 4807: Supply Chain and Operations Management**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4807<br>**COURSE TITLE:** Supply Chain and Operations Management | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The course is designed to introduce with the students to key operation management responsibilities such as capacity planning, quality control product design and flow of materials through different processes. Learn about the concept of lean management and apply it to a textile or garment industry helps to analyze quality problems. Learning this course textile engineers are able to take up problems and challenges pertaining to inventory, supply chain and logistics.

**COURSE CONTENT**

**Introduction to Production and Operation Management:** Operation management; Transformation process; Concept of production; Production system; Production management system; Lean system; Tools and techniques in lean system; Six sigma.

**Textiles Project Management:** Project management and control; Critical path analysis (CPA); Program evaluation and review technique (PERT).

**Textiles and Apparel Product Design and Process Selection:** Product design process and matrix; Process flow design and analysis; Application of work study.

**Inventory Management**: Objectives; Types; Inventory management and cost; Order quantity model; MRP; MRP II; ERP.

**Supply Chain in Operation Management:** Supply chain; Purchasing; Global textile and apparel sourcing; Lean and agile supply chain.

**Capacity Planning, Facility Location and Facility Layout:** Capacity planning and capacity strategy; Facility location; Plant location methods; Products and process layout.

**Forecasting:** Forecasting; Methods; Techniques; Forecasting accuracy.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the definition of basic terminology of supply chain and operations management. |
| **CLO2** | **Understand** the explanation of the basic operations/production system and relate it to textile engineering. |
| **CLO3** | **Apply** the calculation of operation/supply chain management related terms in the textile field. |
| **CLO4** | **Analyze** the categorization of the operation/production system for textiles with supply chain and apply lean concepts. |
| **CLO5** | **Evaluate** the textile projects and take decision considerating the related issues. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | |
| **CLO4** | √ | | | | √ | | | | | | | |
| **CLO5** | | | | | √ | | | | | | √ | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4002: Industrial Training**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4002<br>**COURSE TITLE:** Industrial Training | | |
|---|---|---|
| **CREDIT:** 1.50 | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** The purpose of industrial attachment is to introduce the students about manufacturing process and managerial practices in textile industries. A substantive training is provided which is supervised by both industry and academic professionals. Students pursing a bachelor's degree

in the Textile Engineering are required to complete at least four weeks internship. Since, the internship incorporates in an industrial setting, it also provides an opportunity to develop network with textile professionals.

**COURSE CONTENT**

For mill training or internship, the students will be placed in selected textile mills or organizations for four weeks. On completion of the internship, the students will prepare a project report based on industrial training and make a presentation on it.

**Course Learning Outcomes (CLOs): at the end of the course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the professional and ethical responsibilities of an engineer. |
| **CLO2** | **Apply** theoretical knowledge, technical skills and modern engineering tools in solving industrial problems. |
| **CLO3** | **Analyze** the problems identified during manufacturing to provide suitable solution. |
| **CLO4** | **Evaluate** alternatives solutions to extend beyond experiences. |
| **CLO5** | **Design** and develop a layout or manufacturing sequence to develop product using engineering principles. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | √ | | √ | √ | | | |
| **CLO2** | | √ | | | √ | | | | | √ | | |
| **CLO3** | | √ | √ | √ | | | | | | | | √ |
| **CLO4** | | | √ | | √ | | | | | | | √ |
| **CLO5** | | | √ | √ | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Field work / Problem Solving / Feedback based on assessment | Report / Presentation / Viva |
| CLO2 | Field work / Problem Solving / Feedback based on assessment | Report / Presentation / Viva |
| CLO3 | Field work / Problem Solving / Feedback based on assessment | Report / Presentation / Viva |
| CLO4 | Field work / Problem Solving / Feedback based on assessment | Report / Presentation / Viva |
| CLO5 | Field work / Problem Solving / Feedback based on assessment | Report / Presentation / Viva |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos, showing instruments)

**Program Courses (Choose any one option)**

**TE 4000*: Thesis**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4000<br>**COURSE TITLE:** Thesis | | |
|---|---|---|
| **CREDIT:** 6.0* | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 50% | **FA Marks:** 50% |

**Rationale of the Course:** The main focus of doing thesis work in this undergraduate program is to testify students' ability to achieve a particular solution of a problem that exists in the textile industry and or available in the literature. By taking this course students are familiar with independent research works, finding research gaps, critical literature review, building their own methodology, proper referencing and formatting of a clear, well-structured thesis book.

**COURSE CONTENT**

For successful completion of course work every students shall submit a thesis report on his project work, which would be selected and approved by the department. Every candidate shall be required to appear at an comprehensive oral examination on a date fixed by the head of the department and must satisfy the examiners that he is capable of intelligently applying the results of this research to the solution of problems of undertaking independent work and also afford evidence of satisfactory knowledge related to the theory and technique used in his research work.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** in-depth relevant research or engineering knowledge to solve conflicting technical and engineering issues utilizing diverse resources. |
| **CLO2** | **Apply** relevant tools/methods, standards and codes to solve the problem and explore research findings. |
| **CLO3** | **Analyze** literature to identify and formulate problem or research question. |
| **CLO4** | **Evaluate** alternative solutions to extend beyond experiences. |
| **CLO5** | **Design** and implement a solution using engineering principles and research-based creative knowledge in novel way. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | √ |
| **CLO2** | | √ | √ | | | | | √ | | √ | | |
| **CLO3** | | | √ | √ | √ | √ | | | √ | √ | | |
| **CLO4** | | | | √ | | | √ | √ | | | √ | |
| **CLO5** | | | √ | | √ | √ | √ | √ | √ | √ | √ | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Presentation / Viva |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Presentation / Viva |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Presentation / Viva |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Presentation / Viva |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Presentation / Viva |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 4004*: Capstone Project**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4004<br>**COURSE TITLE:** Capstone Project | | |
|---|---|---|
| **CREDIT:** 6.0* | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 50% | **FA Marks:** 50% |

**Rationale of the Course:** Capstone project offers students the opportunity to learn solving textile related engineering problems (conceptual design to working model), examine them critically to improve their knowledge through teamwork. It provides students with the experience of recognizing a problem, segregating the causes of the problem and presenting a method to overcome the causes. Additionally, a capstone project helps students prove their proficiency to their future employer.

**COURSE CONTENT**

For successful completion of course work every student shall submit a project report on his project work, which would be selected and approved by the department. Every candidate shall be required to appear at an comprehensive oral examination on a date fixed by the head of the department and must satisfy the examiners that he is capable of intelligently applying the results of this research to the solution of problems of undertaking independent work and also afford evidence of satisfactory knowledge related to the theory and technique used in his research work.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** in-depth engineering knowledge to solve conflicting technical and engineering issues utilizing diverse resources. |
| **CLO2** | **Apply** relevant tools/methods, standards and codes to solve the problem and explore alternative solutions. |
| **CLO3** | **Analyze** industry information and literature to identify and formulate engineering problems. |
| **CLO4** | **Evaluate** alternative solutions to extend beyond experiences. |
| **CLO5** | **Design** and implement a solution using engineering principles and research-based creative knowledge in a novel way. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | √ |
| **CLO2** | | √ | √ | | | | | √ | | √ | | |
| **CLO3** | | | √ | √ | √ | √ | | | √ | √ | | |
| **CLO4** | | | | √ | | | √ | √ | | | √ | |
| **CLO5** | | | √ | | √ | √ | √ | √ | √ | √ | √ | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Option I (Choose any one course from the following)**

**TE 4607: Advanced Technologies in Textiles**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4607<br>**COURSE TITLE:** Advanced Technologies in Textiles | | |
|---|---|---|
| **CREDIT: 3**.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Advancement in the field of fiber, yarn and fabric modification techniques, Characterization of textile materials for technical applications, performance requirements of apparels for high-performance applications, application of textiles in medical, agriculture, automotive, composites, nanotechnology in textiles are the main focus of study in this course. By taking this course student are capable of learning the start of the arts of facilities used in manufacturing traditional and technical textiles.

**Pre-requisite course**: TE 1609 (Polymer Science)

**COURSE CONTENT**

**Advanced Polymers and Fibers:** Introduction; Characteristics; Structure and chemistry; Manufacturing; Uses and limitations of high performance fibers; Carbon fiber; Glass fiber; Ceramic fiber; Aramid fiber; PLA fiber; Olefin fiber; High density polyethylene (HDPE) fiber**;** PEEK fiber etc.

**Nano-engineered Fibers:** Nanofiber formation techniques; Polymers used for nanofiber formation; Nanofiber for various applications.
**Composite Materials:** Introduction; Types; Preparation process; Applications (Geotextiles; Automotive Textiles).
**Technical Textiles:** Medical textile; Protective textiles; Smart textiles: sports textiles, electronic textiles and other advance applications**.**

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of advanced technologies in textiles. |
| **CLO2** | **Understand** the constructions, features and applications of advanced textiles in medical, sports, automotive, composites and other relevant fields. |
| **CLO3** | **Apply** the design and development techniques for manufacturing of advanced textiles. |
| **CLO4** | **Analyze** the theoretical and functional requirements of different technical clothing. |
| **CLO5** | **Evaluate** the quality of the technical textile based products. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | | √ | | | | | | | | |
| **CLO4** | | | | √ | | | | | | | | |
| **CLO5** | | | | | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4609: Instrumental Analysis of Textiles**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4609<br>**COURSE TITLE: Instrumental Analysis of Textiles** | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The investigation of fiber, yarn, and fabric structure and their physical and chemical characterization is required for selecting the appropriate materials for a specific purpose. The analysis of textile materials by using advanced instruments is therefore essential for their proper and efficient characterization. Hence, this course is designed to provide necessary information to the textile engineering students regarding the operating principles and procedures of advanced instruments as well as to conduct the test using relevant standards for characterizing and analyzing the materials.

**COURSE CONTENT**

**Fourier Transforms Infrared (FT-IR) Spectroscopy**: Application of FT-IR spectroscopy for characterization of functional groups and frequency shifts associated with structural changes.
**Scanning Electron Microscopy (SEM):** Study on operation for determining the morphological structure of textile materials.
**Ultraviolet (UV) - Visible (Vis) Spectroscopy**: Application of UV-Vis spectroscopy for characterization of different chemical solutions.
**Thermal methods:** DSC, TGA and TMA for structural investigation.
**Moisture Management Tester (MMT):** Measurement of fabric moisture properties.
**Fabric Touch Tester (FTT):** Measurement of fabric comfort properties.
**Drying Rate Tester:** Determination of fabric comfort by wet clinginess.
**Sweating Guarded Hotplate (SGPT):** Thermal and evaporating heat resistance of fabric.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the principles and parameters of different test. |
| **CLO2** | **Apply** appropriate methods and techniques to conduct relevant experiment according to standards. |
| **CLO3** | **Analyze** the performance and characteristics of textile materials. |
| **CLO4** | **Evaluate** performance of fiber, yarn and fabric based on test materials. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | | √ | √ | | | | | | | |
| **CLO4** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**Optional (Choose any one set from the following)**

**Set I**

**TE 4103: Modern Spinning**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4103<br>**COURSE TITLE:** Modern Spinning | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** This course will cover the latest spinning process, its mechanisms, design, and constructional features with working principles of different spinning system like compact, rotor, air-jet and alternative spinning process. Also Impart the knowledge on man-made fibers and their processing, production of twines and ropes yarn and preparation of jute and jute blended yarn.

**COURSE CONTENT**

**Air Jet Yarn:** Air jet spinning system, Principle of air jet spinning, Yarn formation, Factor affecting the air jet yarn, advantages and disadvantages.
**Compact Spinning:** Working procedure of different compact spinning techniques and their yarn characteristics; Comparison of ring and compact spinning; Advantages and limitations.
**Rotor Spinning:** Tasks; Principle of operation; Speed relationship; Raw material requirements and preparation; Opening unit; Yarn formation; Rotor; Yarn withdrawal and winding; Automation; Technical and technological data; Economic aspect of rotor spinning; Comparison between rotor and ring yarn.
**Alternative Spinning Process:** Electrostatic spinning, Friction spinning, Twist spinning, Repco spinning, Wrap spinning, False-twist process, Adhesive processes.
**Man-made Fibers and Their Processing:** Details study of processing chemical staple fiber: viscose rayon, polyester, acrylic, modal, tencel and their blends. Changing in machine speeds, setting and production, Properties of blended yarn, analysis of blends.
**Production Of Twines And Ropes:** Raw material, production process, Machinery and equipment used.
**Jute and Jute Blended Yarn Preparation:** Manufacture of jute blended yarns using different spinning systems; Repco, Spin guard, Wrap spun; core spun and twist less spinning technique; Properties and end use of blended yarns; Recent works.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the fundamental concept of man-made fiber processing. |
| **CLO2** | **Understand** the yarn formation techniques of modern spinning machineries. |
| **CLO3** | **Apply** suitable program and process parameters in modern spinning machineries to produce required quality yarn. |
| **CLO4** | **Analyze** the characteristics of raw materials, techniques and parameters required for production of open-end yarn, air vortex yarn, compact yarn, blended yarn and electrostatic yarn etc. |
| **CLO5** | **Evaluate** the manufactured yarn properties and its suitability on application area. |
| **CLO6** | **Create** the process sequences and machine equipment for formation of yarn. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | √ | √ | | | | | | | | | |
| **CLO4** | √ | √ | | | | | | | | | | |
| **CLO5** | | | | √ | | | | | | | | |
| **CLO6** | | | √ | | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO6 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4104: Modern Spinning Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4104<br>**COURSE TITLE:** Modern Spinning Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** This course offers students a practical understanding on different types of modern spinning system with their design, constructional features and material passage diagram. Besides, it enriches practical knowledge on man-made fibers and their processing, production of twines and ropes yarn and preparation of jute and jute blended yarn machineries.

**COURSE CONTENT**

Material passage diagram of rotor machine; Material passage diagram of other new spinning machine; Study on acrylic yarn and viscose yarn; Study the jute and jute blended yarn in conventional spinning line; Study the gearing/motion transmission diagram of rotor, compact and air vortex machine; Study the rotor speed, opening roller speed, feed roller speed; changeable gear teeth no., draft and twist calculation for a particular yarn count.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** optimum machine setting/gauging and production speed for processing of fiber in a modern spinning system. |
| **CLO2** | **Analyze** the process parameters involved in rotor, air jet, compact and other new spinning systems to meet the customer demand. |
| **CLO3** | **Evaluate** the output materials quality parameters and take necessary measures as required. |
| **CLO4** | **Create** material passage/gearing/motion transmission diagram of rotor, air jet, compact and other new spinning system. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | √ | | | | | | | | | | |
| **CLO2** | √ | √ | | | | | | | | | | |
| **CLO3** | √ | | | | √ | | | | | | | |
| **CLO4** | √ | √ | | | | | | | | | | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 4105: Maintenance and Management of Spinning Machinery**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4105<br>**COURSE TITLE:** Maintenance and Management of Spinning Machinery | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** This course will discuss about the maintenance technique of various spinning machinery and safety measures. To impart knowledge on maintenance tools and equipment's, erection & commissioning and air conditioning system.

**COURSE CONTENT**

**Maintenance:** Importance; Types; Planning and scheduling; Cost; Inspection of machine parts; Lubrication; Maintenance procedure of different spinning machineries; Necessary tools.

**Quantitative Technique for Maintenance:** Inventory valuation; Decision theory; Replacement models; Queuing models.
**Material Handling in Spinning Industry:** Material handling; Material handling principles; Material handling equipment; Unit load concept; Economics of material handling; Conveyor system with guideline for choosing.
**Air Conditioning:** Comfort condition; Heating; Cooling; Dehumidification; Humidification; Ventilation; Filtration; Mill illumination.
**Ergonomics in Spinning Industry:** Ergonomics: definition, importance; Application of different ergonomic techniques to work place and layout; Anthropometry; Physiological aspect of muscular work.
**Machine Erection & Commissioning in Spinning Industry:** Floor preparation; Foundation; Machine fixation; Leveling; Commissioning.
**Safety in while maintenance:** Accident; Effects of an accident; Accidents and its related losses; Electrical safety; Housekeeping; Machine guarding.
**Maintenance tools and Equipment's**: Card clothing; Flat clipping; Card wire grinding tools: emery roller, stone roller; Rubber cot grinding and berkolizing; Cot mounting etc.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of maintenance, inventory, refrigeration, material handling, ergonomics, accident, safety and Bangladesh Labor Act 2006. |
| **CLO2** | **Understand** basic maintenance procedures for efficient work ability of spinning machineries. |
| **CLO3** | **Apply** concepts to solve inventory problems and ambient conditions for optimum machine performance. |
| **CLO4** | **Analyze** various industrial hazards with their safety measures. |
| **CLO5** | **Design** a particular maintenance schedule for spinning machineries used in various sections. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | | √ | √ | | | | | | | | |
| **CLO4** | | √ | | | | | | | | | | |
| **CLO5** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping CLOs with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4106: Maintenance and Management of Spinning Machinery Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4106<br>**COURSE TITLE:** Maintenance and Management of Spinning Machinery Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** This course will help to learn about the making of maintenance schedule of various spinning machineries and safety measures procedure. To impart practical knowledge on maintenance tools and equipment's, erection & commissioning.

**COURSE CONTENT**

**Maintenance Scheduling**: Preparation of maintenance schedule from blow room to winding.

**Blow-Room:** Cleaning and inspection of: Take-off roller, opening roller, beater and grid bars condition checked with their necessary setting; Lubricating at different rotating parts.

**Draw Frames:** Checking roller gauge; Stop motion mechanism; coiling system; Rubber cot condition; Drafting pressure and autoleveller.

**Lap former and comber**: Maintenance of lap winding and transportation device; Sliver creelling and drafting roller, Comb wire setting and gauge check.

**Speed and Ring Frame:** Maintenance of drafting systems; Rings rail and overhead; Spindles and gear lubricating, Motion transmission.

**Rotors Spinning Machine:** Maintenance of opening roller and rotor driving systems; Suction unit, EYC.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** various tools to carry out proper maintenance of a given machine. |
| **CLO2** | **Analyze** different settings of different machines to produce goods with desired quality at optimum performances. |
| **CLO3** | **Evaluate** performance of the machine in terms of product quality and productivity after successful maintenance. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | √ | | | | | | | |
| **CLO2** | | | | √ | | | | | √ | | | |
| **CLO3** | | √ | | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Set II**

**TE 4203: Modern Knitting and Non-woven**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4203<br>**COURSE TITLE:** Modern Knitting and Non-woven | | |
|---|---|---|
| **CREDIT: 3**.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Modern knitting and non-woven is very vital for a textile graduate regarding advanced level machines in knitting and non-woven technology. Many knitting and non-woven factories are currently using this advanced knitting machineries to meet the demand of buyers. This, course has been designed in such a way that the upcoming textile graduates can be adopted with advanced knitting fabric manufacturing technique like jacquard knitting, engineering stripe, fashioning, multi guide bar warp knitting, non-woven fabric production process etc.

**COURSE CONTENT**

**Weft Knitting:** Modern weft knit fabric structure and designs; Pattern and selection devices; Pattern wheel and Pattern area calculations; Mechanical and electronic jacquard needle selection; Jacquard double jersey fabrics; Loop transfer; Garment sequences and knitting shape calculation; Feeder stripe & Engineering Stripe fabric, half feeder, full feeder, elastane yarn percentage calculation; Special weft knitted fabric production; Knitting faults and remedies; Kinetics and economics of weft knitting; Automation in knitting industry; Spirality; Calculation related to GSM, stitch length, yarn count, machine speed.

**Warp Knitting:** Multiple guide bars warp knitting machines and their product; Fabric controls mechanism: run-in, yarn feeding and tension control; Fabric take up and batching mechanisms; Laying-in and weft insertion; Fall plate patterning; Cut press and miss-press structure; Multi-axial knitted fabric; Recent research and development in warp knitting; Machine setting change with fabric design.

**Management in Knitting:** Knitting floor management; Factors to be considered before purchasing knitting machines.

**Nonwoven**: Definition and classification of non-woven; Fiber and fiber consumption; Present and future fiber requirements; Methods of web formation; Dry laying; Wet laying; Spun laying; Flash spinning; Melt blown; Web bonding: Chemical bonding; Thermal bonding; Solvent bonding; Mechanical bonding; Properties and uses of nonwoven fabrics; Fault and remedies of nonwoven fabrics; Environmental problems caused by nonwoven fabrics

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** different terminology, functions, machine settings of various modern knitting and non-woven machines. |
| **CLO2** | **Apply** the setting of the machine jacquard, non-jacquard knitted and non-woven fabric as well as the shape calculation for fully fashion garments |
| **CLO3** | **Analyze** the jacquard and non-jacquard weft knitted and warp knitted fabric production, fabric fault and their remedies. |
| **CLO4** | **Create** new stripe and jacquard fabric and their corresponding machine settings. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | √ | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | √ | | | | | | | | | |
| **CLO4** | | | √ | | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4204: Modern Knitting and Non-woven Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4204<br>**COURSE TITLE:** Modern Knitting and Non-woven Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** The applied knowledge about Modern knitting and non-woven is very vital for a textile graduate regarding advanced level machines in knitting and non-woven technology. Many knitting and non-woven factories are currently using these advanced knitting machines to meet the demand of buyers. This, sessional course has been designed in such a way that the upcoming textile graduates can be adopted with advanced knitting fabric manufacturing techniques like jacquard knitting, engineering stripe, fashioning, multi guide bar warp knitting, non-woven fabric production process etc.

**COURSE CONTENT**

**Knitting**: Study on weft knitting jacquard; Pattern wheel and area calculations; Loop transfer; Garment sequences and knitting shape calculation; VDQ pulley adjustment; Positive feeder; Inverter; Lubricating system; Fabric take down mechanism; Machine setting change with fabric design.
Warp knitted fabric controls mechanism: run-in, yarn feeding and tension control; fabric take up and batching mechanisms.
**Nonwoven**: Web formation; Web bonding; Chemical bonding, Thermal bonding, solvent bonding, mechanical bonding.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the modern knitted and non-woven fabrics machines and their devices. |
| **CLO2** | **Apply** various techniques to produce modern knit and non-woven products and new design of stripe fabric & Multiple guide bars warp knitted fabric as well as various shapes of garment panel for fully fashion apparel. |
| **CLO3** | **Analyze** techniques and products of modern knitting and non-woven. |
| **CLO4** | **Create** new stripe and jacquard fabric and their corresponding machine settings. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | √ | | | |
| **CLO3** | | √ | | | | | | | | | | √ |
| **CLO4** | | | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 4205: Maintenance and Management of Fabric Machinery**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4205<br>**COURSE TITLE:** Maintenance and Management of Fabric Machinery | | |
|---|---|---|
| **CREDIT: 3**.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Maintenance is an important part of manufacturing. Textile graduate are responsible for handling every section of a textile industry. The textile engineer, who wants to build his career in fabric manufacturing, he should have latest knowledge about maintenance and management of fabric manufacturing machineries. This course has been designed in such a way that the upcoming B.sc textile engineer can fulfil the current demand and he will be confident in this competitive field of fabric manufacturing.

**COURSE CONTENT**

**Maintenance:** Maintenance: introduction, types; Maintenance cycle; Maintenance planning; Maintenance cost; Common maintenance tools and their functions; Inspection of machine parts; Lubrication; Maintenance procedure of different apparel machineries.

**Quantitative Technique for Maintenance:** Inventory valuation; Decision theory; Replacement models; Queuing models.

**Material Handling in Weaving and Knitting Industry:** Material handling; Material handling principles; Material handling equipment; Unit load concept; Economics of material handling; Conveyor system with guideline for choosing.

**Air Conditioning:** Comfort condition; Heating; Cooling; Dehumidification; Humidification; Ventilation; Filtration; Mill illumination.

**Ergonomics in Weaving and Knitting Industry:** Importance; Application of different ergonomic techniques to work place and layout; Anthropometry; Physiological aspect of muscular work.

**Machine Erection of Weaving and Knitting Industry:** Floor preparation; Foundation; Leveling; Machine fixation; Commissioning.

**Safety in Weaving and Knitting Industry:** Industrial hazards; Safety rules; First aid and pollution control.

**Labor Law:** Conditions of service and employment; Employment of adolescent; Maternity benefit; Health and hygiene; Safety; Working hours and leave; Wages and payment; Workmen's compensation for injury by accident.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of maintenance, inventory, refrigeration, material handling, ergonomics, accident, safety and Bangladesh Labor Act 2006. |
| **CLO2** | **Understand** basic maintenance procedures for efficient work ability of weaving and knitting machines. |
| **CLO3** | **Apply** concepts to solve inventory problems and ambient conditions for optimum machine performance. |
| **CLO4** | **Analyze** various industrial hazards with their safety measures. |
| **CLO5** | **Design** a particular maintenance schedule for weaving machineries used in various sections. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | | √ | √ | | | | | | | | |
| **CLO4** | | √ | | | | | | | | | | |
| **CLO5** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4206: Maintenance and Management of Fabric Machinery Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4206<br>**COURSE TITLE:** Maintenance and Management of Fabric Machinery Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Maintenance is an important part of manufacturing. Textile graduate are responsible for handling every section of a textile industry. The textile engineer, who wants to build his career in fabric manufacturing, he should have latest knowledge about maintenance and management of fabric manufacturing machineries. This course has been designed in such a way that the upcoming B.Sc. textile engineer can fulfil the current demand of maintenance and management of fabric manufacturing.

**COURSE CONTENT**

Repair, maintenance, setting and replacement of different parts of winding machine, warping machine, sizing machine, power loom, rapier loom, projectile loom, air zet loom and water zet loom; Repair, Maintenance, setting and replacement of different parts of circular (plain, rib, interlock) knitting machine, flat bed, V-bed knitting machine and warp knitting machine.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** various tools to carry out proper maintenance of a given machine. |
| **CLO2** | **Analyze** different settings of different machines to produce goods with desired quality at optimum performances. |
| **CLO3** | **Evaluate** performance of the machine in terms of product quality and productivity after successful maintenance. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | √ | | | | | | | |
| **CLO2** | | | | √ | | | | | √ | | | |
| **CLO3** | | √ | | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Set III**

**TE 4303: Advanced Textile Coloration and Measurement**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4303<br>**COURSE TITLE:** Advanced Textile Coloration and Measurement | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Present age is highly concerned about eco-friendly and less water consuming advanced wet process in textile sectile all over the globe. Again thermodynamics in dyeing and color component detrimental analysis is considered significantly for optimum dyeing performance. Hence the course has been designed accordingly along with conventional and modern printing concepts.

**COURSE CONTENT**

**Dyeing Theory:** Thermodynamics of dyeing (affinity, effects of dye structure in affinity, substantivity, adsorption, desorption, absorption, exhaustion, fixation, diffusion and migration); Dyeing equilibria;

Adsorption isotherms; Dye-fiber interactions; Dye aggregation; Dye diffusion models (pore model, free volume model); Diffusion co-efficient; Methods of measuring diffusion co-efficient.
**Natural Dyes and Dyeing:** Sources of natural dyes; Classification of natural dyes (based on chemical structure, color and mordant); Common natural dyes with their sources; Functions of mordant in natural dyeing process; Chemistry of dyeing with natural dyes.
**Mordant and Metal Complex Dyes:** Mordant dyes; Chemistry, method and application of mordant dyes; Dyeing wool fiber with chrome mordant.
**Advanced Dyeing:** Introduction of foam in dyeing and finishing; Different types of foam application systems; Concept of super critical fluid (SCF); Phase diagram of SCF system; Introduction of $CO_2$ as suitable SCF; Scopes of SCF dyeing of textile fibers; Typical solvent dyeing; Eco-friendly aspect of solvent dyeing.
**Technology of Printing:** Methods of screen and roller preparation; Fully automatic flat screen printing; Rotary screen preparation; Screen and roller printing faults; Transfer printing; Jet printing; Flock printing; Burn-out printing.
**Color and Color Vision**: Introduction to color and light; Theory of color mixing; Color dimensions; Munsell theory; CIE XYZ theory; CIE LCH theory; CIE Lab systems for color measurement; Light source and illuminants; Metamerism; Spectrophotometer; Kubelka-Munk theory; Human color vision and deficiencies.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the terminology relevant to advanced dyeing, printing and color measurement of textile materials. |
| **CLO2** | **Understand** the basic concepts of advanced dyeing and printing, dyeing kinetics, color theories, color measurement and human color vision system. |
| **CLO3** | **Apply** of special dyeing and printing methods on suitable textile materials. |
| **CLO4** | **Analyze** the dyeing kinetics and different theories for color measurement of textiles. |
| **CLO5** | **Evaluate** different color theories for the appropriate color measurement and human vision phenomena. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | | √ | | | | | | | | |
| **CLO4** | | | | √ | | | | | | | | |
| **CLO5** | | | | | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

| | | |
|---|---|---|
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4304: Advanced Textile Coloration and Measurement Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4304<br>**COURSE TITLE:** Advanced Textile Coloration and Measurement Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Laboratory scale natural dyeing is considered helpful for the immediate application in pilot plant and even bulk level. Again demonstration of modern dyeing program is essential for the proper understanding and further modification of the modern trends. Spectrophotometer analysis is conducted for the analytical evaluation and further energy saving design of the conventional program.

**COURSE CONTENT**

Dyeing of textiles with mordant dye and natural dye; Demonstration of foam dyeing, SCF dyeing and solvent dyeing techniques; Study on spectrophotometer; Study on illuminants and viewing geometry; Spectrophotometric color analysis by CIE Lab and CIE LCH; Determination of color difference value (dE), K/S value and brightness of dyed textiles; Study on computerized recipe formulation; Measurement of color yield of dyed fabrics

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Understand** the basic concepts of advanced dyeing and printing, dyeing kinetics, color theories, color measurement and human color vision system. |
| **CLO2** | **Apply** of special dyeing and printing methods on suitable textile materials. |
| **CLO3** | **Analyze** the dyeing kinetics and different theories for color measurement of textiles. |
| **CLO4** | **Evaluate** different color theories for the appropriate color measurement and human vision phenomena. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | √ | | | | | | | | | | |
| **CLO2** | | | | √ | | | | | √ | | | |
| **CLO3** | | | | √ | | | | | | | | |
| **CLO4** | | | | | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 4305: Maintenance and Management of Wet Machinery**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4305<br>**COURSE TITLE:** Maintenance and Management of Wet Machinery | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Along with specific field specialization, graduates should be concerned about the mechanical threats, process safety and all types of maintenance schedules relevant with the used machineries. Also labor management is important for the skillful run of the companies. Thus, the course has been constructed on the basis of the mentioned requirements.

**COURSE CONTENT**

**Maintenance:** Maintenance: introduction, types; Maintenance cycle; Maintenance planning; Maintenance cost; Inspection of machine parts; Lubrication; Maintenance procedure of different wet machineries.

**Quantitative Technique for Maintenance:** Inventory valuation; Decision theory; Replacement models; Queuing models.

**Material Handling in Apparel Industry:** Material handling; Material handling principles; Material handling equipment; Unit load concept; Economics of material handling; Conveyor system with guideline for choosing.

**Air Conditioning:** Comfort condition; Heating; Cooling; Dehumidification; Humidification; Ventilation; Filtration; Mill illumination.

**Ergonomics in Dyeing Industry:** Ergonomics: definition, importance; Application of different ergonomic techniques to work place and layout; Anthropometry; Physiological aspect of muscular work.

**Machine Erection of Dyeing Industry:** Floor preparation; Foundation; Machine fixation; Leveling.

**Safety in Dyeing Industry:** Industrial hazards; Safety rules; First aid and pollution control.

**Labor Act, 2006:** Conditions of service and employment; Employment of adolescent; Maternity benefit; Health and hygiene; Safety; Working hours and leave; Wages and payment; Workmen's compensation for injury by accident.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of maintenance, inventory, refrigeration, material handling, ergonomics, accident, safety and Bangladesh Labor Act 2006. |
| **CLO2** | **Understand** basic maintenance procedure for efficient work ability of wet processing machinery. |
| **CLO3** | **Apply** concepts to solve inventory problems and ambient conditions for optimum machine performance. |
| **CLO4** | **Analyze** various industrial hazards with their safety measures. |
| **CLO5** | **Design** a particular maintenance schedule for wet processing machineries used in various sections. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | | √ | √ | | | | | | | | |
| **CLO4** | | √ | | | | | | | | | | |
| **CLO5** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4306: Maintenance and Management of Wet Machinery Sessional**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4306<br>**COURSE TITLE:** Maintenance and Management of Wet Machinery Sessional | | |
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Until required machine handling knowledge and skill are received by the graduates, the factory and working sector cannot run profitably. To accommodate the facilities at education level, the mentioned sessional course has been designed with the static and working maintenance of the pretreatment, dyeing, printing and finishing machineries.

**COURSE CONTENT**

**Preparatory Machinery's:** Maintenance of singeing; Kier boiler; J-box; Rope washing machines; Boilers.
**Dyeing Machinery:** Maintenance of jigger dyeing; Winch dyeing; HTHP; Dyeing; Hank dyeing machinery.
**Finishing Machinery's:** Maintenance of different padding mangles; Dying machinery's, Stenter mercerizing machines; Calendaring and folding machines; Compacting machine; Brushing machine.
**Printing Machineries:** Maintenance of different roller printing and screen printing machineries.
**Laboratory Machineries:** Maintenance of different laboratory machineries.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** various tools to carry out proper maintenance of a given machine. |
| **CLO2** | **Analyze** different settings of different machines to produce goods with desired quality at optimum performances. |
| **CLO3** | **Evaluate** performance of the machine in terms of product quality and productivity after successful maintenance. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | √ | | | | | | | |
| **CLO2** | | | | √ | | | | | √ | | | |
| **CLO3** | | √ | | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Set IV**

**TE 4403: Apparel Production Planning and Merchandising**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4403<br>**COURSE TITLE:** Apparel Production Planning and Merchandising | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Apparel marketing, appropriate pricing and productivity enhancement are three building blocks of apparel industry to sustain in the competitive market. It also helps to reduce

manufacturing cost and satisfy customer demands. Hence, the students who will take this course as an elective will be able to learn new things in this field.

**COURSE CONTENT**

**Production Planning and Production Control:** Production management; Line balancing; Production systems; Productivity improvement; KPI's in apparel industry.

**Tools of Planning:** Work Study; Predetermined motion time system: time study, motion study and method study; Operation bulletin preparation; Operator skill matrix; Motion economy; Factory layout; Application of industrial engineering techniques in garment industries; Scientific method of training; Industrial engineering in apparel quality control.

**Merchandizing in the Garment Industries:** Concept of merchandising; Role of merchandiser; Types of merchandising; Apparel analysis process; Product development; Merchandising planning and order execution; Sourcing strategies.

**Garments Costing and Consumption:** Process of garments costing; Determination of fabric and yarn consumption; Trims & accessories consumption; Determination of different costs for different section; Export procedure and documentation.

**Fully Fashioned Garments**: Concept of fully fashioned garments; Fashioning processes; Production process and shaping calculation; Consumption and Costing.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of apparel production planning and merchandising. |
| **CLO2** | **Understand** the merchandising procedure and practice in apparel industry. |
| **CLO3** | **Apply** tools and techniques for smooth production and competitive costing practice in apparel industry. |
| **CLO4** | **Analyze** apparel production system for better productivity and costing factors for cost minimization |
| **CLO5** | **Design** layout for new product styles |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | | | | √ | | | | | | | |
| **CLO4** | | √ | | √ | | | | | | | | |
| **CLO5** | | | | | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping CLOs with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4404: Apparel Production Planning and Merchandising Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4404<br>**COURSE TITLE:** Apparel Production Planning and Merchandising Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Apparel marketing, appropriate pricing and productivity enhancement are three building blocks of apparel industry to sustain in the competitive market. It also helps to reduce manufacturing cost and satisfy customer demands. Hence, the students who will take this course as an elective will be able to learn practical lessons in this field.

**COURSE CONTENT**

Study on garments analysis & spec-sheet development; Study on SMV and production capacity: tops & bottoms; Preparation of CM cost sheet: tops & bottoms; Study on operation breakdown and machine layout for different garments: tops & bottoms; Line balancing for different garment products; Study on fabric and accessories booking; Preparation of production master file and apparel costing sheet.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** different tools, methods and technique to calculate product cost and different elements of manufacturing in terms of SMV, capacity etc |
| **CLO2** | **Analyze** processing parameters during manufacturing and factors influencing product cost and productivity |
| **CLO3** | **Evaluate** the effectiveness of production method and product pricing |
| **CLO4** | **Design** new methods, layout and tools for new products |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | √ | | | | | | | |
| **CLO2** | | | | √ | | | | | √ | | | |
| **CLO3** | | √ | | | | | | | √ | | | |
| **CLO4** | | | √ | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 4405: Maintenance and Management of Apparel Machinery**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4405<br>**COURSE TITLE:** Maintenance and Management of Apparel Machinery | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Proper maintenance and inventory management is a key requirement for optimum machine performances. It keeps smooth production running and meets the schedule for on time product delivery. Students who are willing to build their career in the apparel industry must have technical knowhow on tools and techniques of machine maintenance.

**COURSE CONTENT**

**Maintenance:** Maintenance: introduction, types; Maintenance cycle; Maintenance planning; Maintenance cost; Inspection of machine parts; Lubrication; Maintenance procedure of different apparel machineries.

**Quantitative Technique for Maintenance:** Inventory valuation; Decision theory; Replacement models; Queuing models.

**Material Handling in Apparel Industry:** Material handling; Material handling principles; Material handling equipment; Unit load concept; Economics of material handling; Conveyor system with guideline for choosing.

**Air Conditioning:** Comfort condition; Heating; Cooling; Dehumidification; Humidification; Ventilation; Filtration; Mill illumination.

**Ergonomics in Apparel Industry:** Ergonomics: definition, importance; Application of different ergonomic techniques to work place and layout; Anthropometry; Physiological aspect of muscular work.

**Machine Erection of Apparel Industry:** Floor preparation; Foundation; Machine fixation; Leveling.

**Safety in Apparel Industry:** Industrial hazards; Safety rules; First aid and pollution control

**Labor Act, 2006:** Conditions of service and employment; Employment of adolescent; Maternity benefit; Health and hygiene; Safety; Working hours and leave; Wages and payment; Workmen's compensation for injury by accident.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of maintenance, inventory, refrigeration, material handling, ergonomics, accident, safety and Bangladesh Labor Act 2006. |
| **CLO2** | **Understand** basic maintenance procedure for efficient work ability of apparel machineries. |
| **CLO3** | **Apply** concepts to solve inventory problems and ambient conditions for optimum machine performance. |
| **CLO4** | **Analyze** various industrial hazards with their safety measures. |
| **CLO5** | **Design** a particular maintenance schedule for apparel machineries used in various sections. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | | √ | √ | | | | | | | | |
| **CLO4** | | √ | | | | | | | | | | |
| **CLO5** | | | | √ | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4406: Maintenance and Management of Apparel Machinery Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4406<br>**COURSE TITLE:** Maintenance and Management of Apparel Machinery Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** Proper maintenance and inventory management is a key requirement for optimum machine performances. It keeps smooth production running and meet the schedule for on time product delivery. Students who are willing to build their career in apparel industry must have practical knowhow on tools and techniques of apparel manufacturing machine maintenance.

**COURSE CONTENT**

Repair, Maintenance, setting and replacement of different parts of rotary knife, Straight Knife, Band knife machine; Repair, Maintenance, setting and replacement of different parts of Die cutting machine, Notcher and drill machine; Repair maintenance, setting and replacement of different parts of lockstitch, Blind stitch and chain stitch machine; Repair maintenance, setting and replacement of different parts of Over edge stitch and flat lock sewing machines; Repair, maintenance and setting of fusing machines and Pressing machines.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** various tools to carry out proper maintenance of a given machine. |
| **CLO2** | **Analyze** different settings of different machines to produce goods with desired quality at optimum performances. |
| **CLO3** | **Evaluate** performance of the machine in terms of product quality and productivity after successful maintenance. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | | | √ | | | | | | | |
| **CLO2** | | | | √ | | | | | √ | | | |
| **CLO3** | | √ | | | | | | | √ | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Set V**

**TE 4809: Economic Issues and International Marketing of Textile and Apparel Business**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4809<br>**COURSE TITLE:** Economic Issues and International Marketing of Textile and Apparel Business | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** The knowledge of taxation, insurance, export import practice, licensing, franchising, joint venture and foreign direct investment are very important for a textile engineering professional as textile and garments business are basically export import oriented. This course is included as textile engineering professionals are developed their skill in researching and analyzing trends in global textile market and modern marketing practice.

**COURSE CONTENT**

**Economic Issues Affecting Apparel Business:** Interest on different types of capital; Costs of utilities; Transport facilities and cost; Port facilities; Clearing and forwarding formalities; Banking and exchange rate; Export policy and import policy; Damping, anti-damping; Issues of International Economics.

**Taxation:** Income Tax; Value Added Tax; Custom duty; Excise duty; Gift tax.
**Insurance:** Insurance contracts; Life insurance; Fire life insurance; Marine insurance; Crop insurance; Cattle insurance; Civil aviation insurance; Export credit guarantee; Group insurance; Self-insurance; Fidelity insurance; Bank deposit insurance.
**Introduction to International Trade:** Definition; Importance; Trend of international trade with reference to Bangladesh; Theory of comparative advantage; Source of international trade; Protectionism and free trade; Removing barriers of free trade; Economics of foreign exchange; International financing system; International trade transaction; Foreign trade and export import transaction.
**Export and Import Practices**: Export import strategy; Intermediaries; Export import procedure; Bill of lading; Clearing agent; Letter of credit; Export processing zone in Bangladesh.
**International Textile and Apparel Trade**: World textile and apparel trade; International trade in textile clothing; Trends of export and import in Bangladesh with reference to textile and apparel.
**International Sourcing and Negotiation:** Sourcing criteria, methods and principles; Sourcing management; International sourcing; Sourcing strategy, Principles of negotiation, Negotiation action; Interpersonal skills.
**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of taxation, insurance and international trade. |
| **CLO2** | **Understand** rules and laws of export import for international marketing of textile. |
| **CLO3** | **Apply** the payment procedure involving tax, duties and insurance for international transactions of textile and apparel trade. |
| **CLO4** | **Analyze** the tax, duties and insurance for international marketing of textile and apparel. |
| **CLO5** | **Evaluate** the selection of suitable procedures for sourcing products from international market with export import practices. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | √ | √ | | | | | | | | |
| **CLO4** | √ | √ | | | | | | | | | | |
| **CLO5** | | √ | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4804: CAD/CAM Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4804<br>**COURSE TITLE: CAD/CAM Sessional** | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** CAD and CAM systems assist in automating tasks within design and manufacturing. CAD helps in design and product development and CAM helps in controlling the operations steps of production and equipment. The analysis of design and their translation for the manufacturing system is carried out by the help of CAD and CAM system. This course is included for textile engineering professionals as they analyze a design in a systematic way and reproduce the style accurately.

**COURSE CONTENT**

Practical experience will depend on the selected stream and encompass CAD/CAM systems for concept/mood board's development; Woven and knitted fabric design and development; Garment design and development; Visual merchandising; 3-D draping; Specification/costing management systems; Business management software.

This course will develop understanding of computer-aided textile design in the key areas of communication; Industry specifications and visual media presentation; Increasingly textile designers require communication tools to promote their concepts; Designs & product development ideas to a client; The course will provides with the appropriate skills in software, analysis, presentation styles and communication techniques to effectively promote students and their folio of work to clients and employers.

Course should develop good understanding and practice on the following design software- Adobe Photoshop, Adobe Illustrator CS4 with the Apple Mac and PC platforms.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** the knowledge of mood boards in garments design technology. |
| **CLO2** | **Analyze** the processing parameters of CAD and CAM to fabric manufacturing and garment manufacturing. |
| **CLO3** | **Evaluate** the select a business project with the help of ERP software. |
| **CLO4** | **Design** a garment and develop it by 3D drapping method. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | √ | | | | | | √ | | | |
| **CLO2** | | | | | √ | | | | | | | |
| **CLO3** | | | | | √ | | | | | | √ | |
| **CLO4** | | | √ | | | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 4811: Entrepreneurship and Business Project Development**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4811<br>**COURSE TITLE:** Entrepreneurship and Business Project Development | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Entrepreneurship and business project development is one of the core competencies of technical human resource. Creating awareness regarding entrepreneurial traits, entrepreneurial support system, opportunity identification, project report preparation and understanding of legal and managerial aspects can be helpful in motivating technical stream students to start their own small scale business. Based on the broad competencies listed above, following detailed contents are arrived to develop the stated competencies.

**COURSE CONTENT**

**Entrepreneurship and Small Business:** Entrepreneurship theory; Entrepreneurial motivation; Environment of entrepreneurship; Sources and procedures of government and private assistance; Government regulations; Problems of entrepreneurship; Preparation of business plan; Case studies of entrepreneurs; Small business and economic development; Different schemes of training; Problems in small business.

**Business Project Development:** Schemes of small business development; Success and failures; Existing schemes and future plans; Feasibility study of new business project; Financial and technical feasibility studies; Economic evaluation and comparison of alternative investments; Capital budgeting technique; Payback period; Net present value; Internal rate of return; Benefit cost ratio; Project management through CPM/PERT.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the definition and terminology of entrepreneurship and business projects. |
| **CLO2** | **Understanding** the explanation of the effect of small business in economic development. |
| **CLO3** | **Applying** the calculation of payback period, net present value and internal rate of return for business project feasibility study. |

| | |
|---|---|
| **CLO4** | **Analyzing** the different schemes for small business development. |
| **CLO5** | **Design** a business plan for starting a small business. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | | | | √ | | | | | | √ | |
| **CLO4** | | | √ | √ | | | | | | | | |
| **CLO5** | | | | | | | | | | | √ | √ |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4812: Entrepreneurship and Business Project Development Sessional**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4812<br>**COURSE TITLE:** Entrepreneurship and Business Project Development Sessional | | |
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** During the course, student will get a chance to develop their skills in project initiation, change, organization, and operational management. This course covers fundamentals of business projects, projects and peoples and development of a small business approaches alongside professional skills, business economics, management and digital transformation. This course is included as it aims at developing skills in the textile student whereby they apply the knowledge and skills gained from this course in the solution of particular problem or undertaking a business project.

**COURSE CONTENT**

Preparation of a business plan; Feasibility study of a textile mill; Financial and technical feasibility study of a business by different economical method; Project management through CPM and PERT; Case studies of different entrepreneurs and preparation of a motivational report.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** the rules and regulations for preparing a marketing plan. |
| **CLO2** | **Analyze** the necessary information for feasibility study. |
| **CLO3** | **Evaluating** selection of project alternatives by different economical method. |
| **CLO4** | **Design** a business plan for starting a small business. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | √ | | | | | | √ | | | |
| **CLO2** | | | | | √ | | | | | | | |
| **CLO3** | | | | | | | | | √ | | √ | |
| **CLO4** | | | | | | | | | | | √ | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**Set -VI**

**TE 4903: Trend Forecasting and Portfolio Development**

| | | |
|---|---|---|
| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4903<br>**COURSE TITLE:** Trend Forecasting and Portfolio Development | | |
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Fashion trend is continuously evolving day by day. Therefore, theoretical methods and practical applications to predict the trends as well as strategic decision making in recognizing the patterns, cycles and dissemination of information is very important for designing a new fashion. On the other hand, portfolio encompasses a collection of designs with relevant documented visual, creative and technical information to fulfill the design brief to show off the skills of a fashion designer. Therefore, this course is offered as an optional advance courses to the textile graduates.

**COURSE CONTENT**

**Trend Forecasting: T**heoretical methods and practical applications to predict the trends; Creative and analytical skills in developing skilled research methods; Incorporated with strategic decision making in recognizing the patterns, cycles and dissemination of information; Micro environments and consumer behavior; Practical challenges of translating trends in terms of objectives and how to incorporate the creativity of trends into development of commercially viable product; Trends written reports, folios and presentations. (Discuss, draw & practice only the issues permitted in Islamic regulation).

**Portfolio Development:** Comprehensive portfolio encompassing a collection of designs with relevant documented visual, creative and technical information to fulfill the design brief; Formulation; Concept; Direction; Ideas sourcing; Research and adaptation; Fabric theme and color story; Consolidation of ideas; Idea sheets; Illustrated designs as a story; Presentation of drawings; Working drawings for sample development; Accessory co-ordination; Total look enhancement by use of appropriate accessories; Transformation of 2D ideas into 3D Prototypes- pattern adaptation and development; Work stand and toile preparation; Making up prototypes; Toiles to actual garments; Fitting on work stand and mannequins; Costing and production spec sheets; Presentation of collection- different methods of display.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of trend forecasting and product development. |
| **CLO2** | **Apply** fabric theme and color story; Formulation; Concept; Direction; Ideas sourcing; Research and adaptation; Consolidation of ideas; Idea sheets; Illustrated designs as a story. |
| **CLO3** | **Analyze** practical challenges of translating trends in terms of objectives and how to incorporate the creativity of trends into development of commercially viable product. |
| **CLO4** | **Evaluate** work stand and toile preparation; Making up prototypes; Toiles to actual garments; Fitting on work stand and mannequins. |
| **CLO5** | **Create** a product for fashion items. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | √ | | | | | | | | | | |
| **CLO4** | | | | √ | | | | | | | | |
| **CLO5** | | | | | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping CLOs with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4904: CAD/CAM in Fashion and Textiles Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4904<br>**COURSE TITLE: CAD/CAM in Fashion and Textiles Sessional** | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** CAD and CAM systems assist in automating tasks within design and manufacturing. CAD helps in design and product development and CAM helps in controlling the operations steps of production and equipment. The analysis of design and their translation for the manufacturing system is carried out by the help of CAD and CAM system. This course is included for textile engineering professionals as they analyze a design in a systematic way and reproduce the style accurately.

**COURSE CONTENT**

CAD/CAM operational technique in weaving and knitting technology; CAD/CAM operational technique in apparel manufacturing; Concept and design development process of a garment by Mood board; Garment design by 3D drapping method; ERP software for business management system and costing management.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** the knowledge of mood board in garments design technology. |
| **CLO2** | **Analyze** the processing parameters of CAD and CAM to fabric manufacturing and garment manufacturing. |
| **CLO3** | **Evaluate** business project with the help of ERP software. |
| **CLO4** | **Create** a garment and develop it by 3D drapping method. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | | | √ | | | | | | √ | | | |
| **CLO2** | | | | | √ | | | | | | | |
| **CLO3** | | | | | √ | | | | | | √ | |
| **CLO4** | | | √ | | | | | | | √ | | |

(Tick mark indicates relationship)

**Mapping CLOs with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

**TE 4905: Product Development and Marketing**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4905<br>**COURSE TITLE:** Product Development and Marketing | | |
|---|---|---|
| **CREDIT:** 3.0 (Theory) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** 3.00 | **CIE Marks:** 30% | **SEE Marks:** 70% |

**Rationale of the Course:** Product development is a series of processes to design a product from the conceptual idea to the sale of the final product according to market trends and changes. The textile product creation through market analysis based on customer demands is an important responsibility for textile engineering graduates. Therefore, this course has been added to this program.

**COURSE CONTENT**

Product Development: Introduction to product development; Role of textile product development process and textile product engineering in textile manufacturing and management; Identify the textile product development strategy through market and product trend research; Identify customer expectations, market requirements, product appearance, aesthetics, performance and technical requirements; Research new and alternative technologies and equipment available (type, capability, capacity), raw materials and finishes.

**Feasibility Study:** Feasibility analysis and developing an engineering brief; Students produce/source trial samples to required product engineering criteria and evaluate efficiency of the process; Product performance and cost effectiveness of the new product; Clear emphasis will be placed on improving the environmental credentials of the new products.

Basic principles and concepts of marketing as a foundation to understand world fashion market

**Market Research:** Marketing overview; Strategic planning; Marketing mix; Decisions and competitive advantages; Consumer behavior; Organizational markets and buying behavior.

Market research; SWOT; Market segmentation; Targeting; Product positioning; Planning; Details on new product development stages; Branding and packaging; Product distribution; Advertising; Sales promotion and publicity; Pricing strategy.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Remember** the basic terminology of Product Development, Market Research, Product Engineering, Product Marketing, Product Positioning, Brand Making etc. |
| **CLO2** | **Apply** the alternative product designing strategy, Estimate the market demand, Interpret the market structure. |
| **CLO3** | **Analyze** the product category, Illustrate the market nature, Relate market mix to the product designing, Analyze product branding processes. |
| **CLO4** | **Evaluate** the market characteristics. |
| **CLO5** | **Create** a product for a specific market, Create a Brand. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | | | | | | | | | |
| **CLO2** | √ | | | | | | | | | | | |
| **CLO3** | | √ | | | | | | | | | | |
| **CLO4** | | | | √ | | | | | | | | |
| **CLO5** | | | | √ | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO2 | Classroom Instructions / Feedback based on assessment | Class test / Exam |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |
| CLO5 | Classroom Instructions / Problem Solving / Feedback based on assessment | Assignment / Class test / Presentation / Exam |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, showing videos)

**TE 4906: Apparel Design Analysis Sessional**

| **DEGREE PROGRAM:** B.Sc. in Textile Engineering<br>**COURSE CODE:** TE 4906<br>**COURSE TITLE:** Apparel Design Analysis Sessional | | |
|---|---|---|
| **CREDIT:** 0.75 (Sessional) | **TERMS OFFERED:** 4th Year 2nd Semester | |
| **Exam Hours:** N/A | **CIE Marks:** 100% | **SEE Marks:** 00% |

**Rationale of the Course:** This sessional course is designed to provide hands on experience to the textile graduates on basic skills for designing and sampling fabrics. This course will cover the principal areas of printed, woven, and knitted textile design as well as usage of color, repeat patterning, storyboarding, resources, and research and presentation techniques.

**COURSE CONTENT**

Introduce the students to the key skills and capabilities in the areas of textile design processes, colour usage, repeat patterning, storyboarding, resources and research and presentation techniques; Students will be introduced to the fundamentals of repeat design for various textile outcomes, with an accent on colour accuracy and textile production specifications; Design concepts, croquis and illustration will develop and then converted into technically and commercially printed woven or knitted fabrics for Industry projects and/or small manufacturing enterprise product development; The Textile design course will also introduce student to the basic practical skills for designing and sampling fabrics. Along with class lectures, One part will be workshop based and covers the principal areas of printed, woven and knitted textile design; Emphasis will be given on creating original design using forecasting and research information, development in the use of color, themes, forecasting analysis and illustration styles; Certain projects within this course are team focused and individual project work can be taken through to Textile Design. Student will select a specialist discipline in either - Surface Pattern: Printed textile design, or Constructed Textiles: Knitted and Woven textile design; Presentation techniques for specific markets are introduced in this course. Drawing components are included in key projects to encourage development of original design concepts.

**Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to**

| | |
|---|---|
| **CLO1** | **Apply** reverse engineering of a textile product. |
| **CLO2** | **Analyze** the requirement of raw materials for Apparel designing, Analyze apparel sample. |
| **CLO3** | **Evaluate** fabric sampling and product designing. |
| **CLO4** | **Design** of apparel. |

**Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLO1** | √ | | | √ | | | | | | | | |
| **CLO2** | | √ | | | | | | | | | | |
| **CLO3** | | | | √ | | | | | | | | |
| **CLO4** | √ | | | | √ | | | | | | | |

(Tick mark indicates relationship)

**Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy**

| **CLOs** | **Teaching-Learning Strategy** | **Assessment Strategy** |
|---|---|---|
| CLO1 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO2 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO3 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |
| CLO4 | Classroom Instructions / Problem Solving / Feedback based on assessment | Report / Quiz / Viva / Presentation |

(Classroom Instruction: Whiteboard, PowerPoint presentation, reading, classroom demonstration, showing instruments)

# Part D

## Academic Ordinance for Undergraduate Studies

**(Approved by the Syndicate on the recommendation of the Academic Council)**

### 1. Definitions

1.1 'University' means the Dhaka University of Engineering & Technology, Gazipur abbreviated as DUET, Gazipur.
1.2 'Syndicate' means the Syndicate of the University,
1.3 'Academic Council' means the Academic Council of the University.
1.4 'Chancellor' means the Chancellor of the University.
1.5 'Vice-Chancellor' means the Vice-Chancellor of the University.
1.6 'Dean' means the Dean of a faculty of the University.
1.7 'Head of the Department' means the Head of a department of the University.
1.8 'Registrar' means the Registrar of the University.
1.9 'Academic Committee' means the Academic Committee for Undergraduate Studies (ACUG) of a degree awarding department of the University.
1.10 'Degree' means the degree of Bachelor of Science in a particular discipline of Engineering offered by the University.
1.11 'Departmental Monitoring Committee' means the Committee for upgrading/changing the Undergraduate Curriculum and the Course system and monitoring the teacher-student activities.
1.12 'Degree Equivalence Committee' means the committee for equivalencing different degrees obtained from home and/or abroad.
1.13 'Teacher' means Professor, Associate Professor, Assistant Professor, Lecturer and any other person approved as a teacher by the University.
1.14 'Student' means Student who has been admitted into the regular academic curriculum of the University.

### 2. Faculties

The University shall have the following Faculties:

i. Faculty of Civil Engineering is comprised of
   a. Department of Civil Engineering
   b. Department of Architecture
ii. Faculty of Electrical and Electronic Engineering is comprised of
   a. Department of Electrical and Electronic Engineering
   b. Department of Computer Science & Engineering
iii. Faculty of Mechanical Engineering is comprised of
   a. Department of Mechanical Engineering
   b. Department of Textile Engineering
   c. Department of Industrial & Production Engineering
   d. Department of Chemical & Food Engineering
   e. Department of Materials and Metallurgical Engineering
iv. Faculty of Engineering is comprised of
   a. Department of Chemistry
   b. Department of Mathematics
   c. Department of Physics
   d. Department of Humanities & Social Science

## 3. Departments

The University shall have the following Departments:

### 3.1 Degree-Awarding Departments

i. Department of Civil Engineering
ii. Department of Electrical and Electronic Engineering
iii. Department of Mechanical Engineering
iv. Department of Computer Science and Engineering
v. Department of Textile Engineering
vi. Department of Industrial & Production Engineering
vii. Department of Architecture
viii. Department of Chemical & Food Engineering
ix. Department of Materials and Metallurgical Engineering
x. Any other department to be instituted by the Syndicate on the recommendation of the Academic Council from time to time.

### 3.2 Teaching Departments

i. Department of Civil Engineering
ii. Department of Electrical and Electronic Engineering
iii. Department of Mechanical Engineering
iv. Department of Computer Science and Engineering
v. Department of Textile Engineering
vi. Department of Industrial & Production Engineering
vii. Department of Architecture
viii. Department of Chemical & Food Engineering
ix. Department of Materials and Metallurgical Engineering
x. Department of Mathematics
xi. Department of Physics
xii. Department of Chemistry
xiii. Department of Humanities & Social Science
xiv. Any other department that may be instituted by the Syndicate on the recommendation of the Academic Council from time to time.

## 4. Degrees Offered

The University shall offer courses leading to the award of the following degrees:

i. Bachelor of Science in Civil Engineering abbreviated as B. Sc. Engineering (Civil)
ii. Bachelor of Architecture abbreviated as B. Arch
iii. Bachelor of Science in Computer Science and Engineering abbreviated as B. Sc. Engineering (Computer Science and Engineering)
iv. Bachelor of Science in Electrical and Electronic Engineering abbreviated as B. Sc. Engineering (Electrical and Electronic)
v. Bachelor of Science in Mechanical Engineering abbreviated as B.Sc. Engineering (Mechanical)
vi. Bachelor of Science in Industrial & Production Engineering abbreviated as B.Sc. Engineering (IPE)
vii. Bachelor of Science in Textile Engineering abbreviated as B. Sc. Engineering (Textile)
viii. Bachelor of Science in Chemical & Food Engineering abbreviated as B. Sc. Engineering (CFE)
ix. Bachelor of Science in Materials and Metallurgical Engineering abbreviated as B. Sc. Engineering (MME)
x. Any other degree that may be awarded by a department with the approval of the syndicate on recommendation of the Academic Council from time to time.

## 5. Student Admission

**5.1** The four academic years of study for the degree of B. Sc. Engineering shall be designated as first year class, second year class, third year class and fourth year class in succeeding higher levels of study. Each academic year comprises two semesters, i.e., 1st and 2nd semester. Students shall generally be admitted into the 1st year 2nd semester class. The 1st semester of 1st year class is exempted because of the candidates' completion of Diploma in Engineering backgrounds after 10 years of schooling.

**5.2** An Admission Committee shall be formed in each academic session by the Academic Council for admission into 1st year B Sc. Engg. program.

**5.3** A candidate for admission into the 1st year class must have passed the Diploma in Engineering examination from Bangladesh Technical Education Board (after 10 years of schooling) or any examination recognized as equivalent there to and must also Dhaka University of Engineering & Technology, Gazipur fulfill all other requirements as may be prescribed by the Admission Committee. In case of confusion regarding the equivalence the case may be referred to the Degree Equivalence Committee. However, a candidate must fulfill the requirements mentioned below:

| Sl. No. | Name of the Department | Entry Requirements |
|---|---|---|
| 1. | Civil Engineering | Diploma in Engineering (Civil/ Civil with wood specialization/Architecture with special optional subjects/Environmental with special optional subjects, Surveying and Construction Technology.) |
| 2. | Electrical and Electronic Engineering | Diploma in Engineering (Electrical/ Electronics/ Telecommunication/ Electro medical/ Instrumentation & Process Control) |
| 3. | Mechanical Engineering | Diploma in Engineering (Mechanical/ Power/ Chemical/ Automobile/ Refrigeration and Air Conditioning/ Food/ Mechatronics/ Marine Technology) |
| 4. | Computer Science and Engineering | Diploma in Engineering (Computer/ Computer Science & Technology/ Electronics/ Data Telecommunication and Networking Technology) |
| 5. | Textile Engineering | Diploma in Engineering (Textile/Jute/ Garments & Pattern Making Technology) |
| 6. | Industrial & Production Engineering | Diploma in Engineering (Mechanical/ Power/ Chemical/ Automobile/ Refrigeration and Air Conditioning/ Food/ Marine/ Mechatronics/ Ship Building/Instrumentation & Process Control Technology) |
| 7. | Architecture | Diploma in Engineering (Architecture/ Architecture & Interior Design) |
| 8. | Chemical & Food Engineering | Diploma in Engineering (Food/ Chemical/ Mechanical/ Power/ Refrigeration and Air Conditioning/ Instrumentation & Process Control Technology) and Diploma in Agriculture |
| 9. | Materials and Metallurgical Engineering | Diploma in Engineering (Mechanical/ Power/ Automobile/ Refrigeration and Air Conditioning/ Chemical/ Mining & Mine Survey/ Ceramic/ Glass/ Ship Building Technology). |

**5.4** The rules and conditions for admission into various departments shall be framed by the Academic Council on the recommendation of the Admission Committee in each year.

**5.5** All candidates for admission into B. Sc. Engineering programmes must be citizens of Bangladesh unless the candidature is against the seats those are reserved for foreign students. Candidates for all seats except the reserved ones, if any, shall be selected on the basis of merit.

The rules for admission into the reserved seats shall be framed by the Academic Council on the recommendation of the Admission Committee.

**5.6** No student shall ordinarily be admitted into 1st year after the start of the corresponding classes. The date of commencement of classes for the newly admitted students will be announced in advance.
Prior to admission to the University every student shall be examined by a competent medical officer as prescribed in the admission rules.

**5.7** Admission of a newly admitted student in the 1st year class will be cancelled if he/she remains absent without prior permission from University authority for ten working days after the start of class. If any student fails to report due to unavoidable circumstances within the stipulated period, he/she may appeal within the next twenty working days to the Academic Council through the concerned Head of the Department. The decision of the Academic Council will be final.

## 6. Method of Course Offering and Instruction

The undergraduate curriculum of the University is based on course system. The salient features of the course system are as follows:

i. Generally, number of regular theoretical courses taken by a student will not exceed five in each semester
ii. Continuous evaluation of student's performance
iii. Evaluation by using Letter Grades and Grade Points
iv. Introduction of some additional optional courses and thus enable students to select courses according to his/her interest as far as possible
v. Opportunity for students to choose fewer or more courses than the normal course load depending on his/her capabilities and needs
vi. The flexibility to allow the student to progress at his/her own pace depending on his/her ability or convenience, subject to the regulations on credit and minimum grade point average (GPA) requirements
vii. Promotion of teacher-student contact. In the curriculum for the undergraduate programs, besides the professional courses pertaining to each discipline, there is a strong emphasis on acquiring a thorough knowledge in basic sciences of mathematics, physics and chemistry and subjects in humanities and social sciences. Emphasis has been given on introducing courses dealing with professional practices, project planning and management, socioeconomic and environmental aspects of development projects, communicative skills etc. This will help the students to interact more positively with the society.

## 7. Academic Calendar

**7.1** The academic year shall ordinarily be divided into two regular semesters each having duration of ordinarily not less than 14 teaching weeks (70 working days) of classes.

**7.2** There shall be final examinations at the end of each semester and the examination will be conducted as per academic regulations.

**7.3** The registrar office will announce the academic schedule for each semester ordinarily before the start of the class on the approval of the Academic Council.

**7.4** Academic schedule may be prepared according to the following guidelines:

Two alternatives are provided: (i) based on two regular semesters with a provision of a review examination in each semester and (ii) based on two regular semesters and a short semester of about 8-week duration during one academic year whenever possible.

**ALTERNATIVE: I**

| **Semester-I** | **No. of Weeks 23** |
|---|---|
| Classes | 14 |
| Mid Semester Break | 1 |
| Regular & Review examination including preparatory leave* | 4.5** |
| Publication of results | 3.3** |
| **Inter-Semester Recess and Preparation for next semester** | 2 |
| **Semester-II** | **No. of Weeks 23** |
| Classes | 14 |
| Mid Semester Break | 1 |
| Regular & Review examination including preparatory leave* | 4.5** |
| Publication of results | 3.3** |
| **Inter-session break and Vacations throughout the session** | 4 |
| **Total =** | **52** |

* There shall be at least one examination date in a week.
** The digit after the decimal indicates number of days.

**ALTERNATIVE: II**

| **Semester-I** | **No. of Weeks 22** |
|---|---|
| Classes | 14 |
| Regular examination including preparatory leave* | 5.4** |
| Publication of results | 2.3** |
| **Inter-Semester Recess and Preparation for next semester** | 2 |
| **Semester-II** | **No. of Weeks 22** |
| Classes | 14 |
| Regular examination including preparatory leave* | 5.4** |
| Publication of results | 2.3** |
| **Inter-session break and Vacations throughout the session** | 6 |
| **Total =** | **52** |

***** There shall be at least one examination date in a week.
** The digit after the decimal indicates number of days.

## 8. Duration of Programme and Course Structure

**8.1** The B Sc. Engineering programme shall extend over a period of four academic years, each with a normal duration of one calendar year. Each academic year is divided into two semesters (except the 1st year) for the purpose of academic programme and conduct of examinations.

**8.2** The curricula of the B. Sc. Engineering degree in the different departments shall be as proposed by the respective ACUG and approved by the Academic Council on the recommendation of the Executive Committee of the concerned Faculty.

**8.3** The ACUG may review the curricula once in every academic year and put forward suggestions to the Academic Council through the Executive Committee of the respective Faculty.

**8.4** The courses are reckoned in credits and the credits allotted to various courses will be determined by the ACUG with the following guidelines:

| | **Nature of Course** | **Contact Hour *** | **Credit** |
|---|---|---|---|
| (i) | Theory /Lecture | 1.0 hour/week | 1.0 |
| (ii) | Tutorial | 1.0 hour/week | 1.0 |
| (iii) | Independent Lab/Sessional/Design | 1.5 hours/week | 0.75 |
| (iv) | Project/Thesis | 3.0 hours/week | 1.5 |
| (v) | Field Work/Industrial Attachment | 3.0 weeks | 1.5 |
| (vi) | Seminar/Special Studies | 3.0 hours/week | 1.50 |

* 1.0 Contact hour means a class with a minimum period of 50 minutes.

**8.5** The minimum credits for the award of bachelor's degree in engineering will be decided by the respective ACUG and approved by the Academic Council on the recommendation of the Executive Committee of the Faculty. However, at least **140** credits including the specified core courses must be earned to be eligible for graduation.

**8.6** The total number of credits for which a student should register shall be from 15 to 24 credits in a semester except the review course. However, a student may be allowed to register for less than 15 credits in a semester if

i. he/she is considered academically weak,
ii. number of credits required for graduation is less than 15 in that semester,
iii. student cannot find appropriate courses for registration subject to the approval of the adviser.

**8.7** The total contact hours for students including lecture, tutorial and lab/sessional should be around 30 periods per week, each period being of 50 minutes duration.

**8.8** In each degree-awarding department, one of the Assistant Professors or above nominated by the Head of the Department for one Academic year will act as Course Coordinator as well as Member Secretary of ACUG.

**8.9** A course plan showing details of lectures for each course, approved by the Head of the department is to be announced at the start of each semester.

**8.10** Project and thesis should be of 1.5 credits in each semester. Credit in any theory subject should not exceed 4 and that in sessional subject should not exceed 1.5.

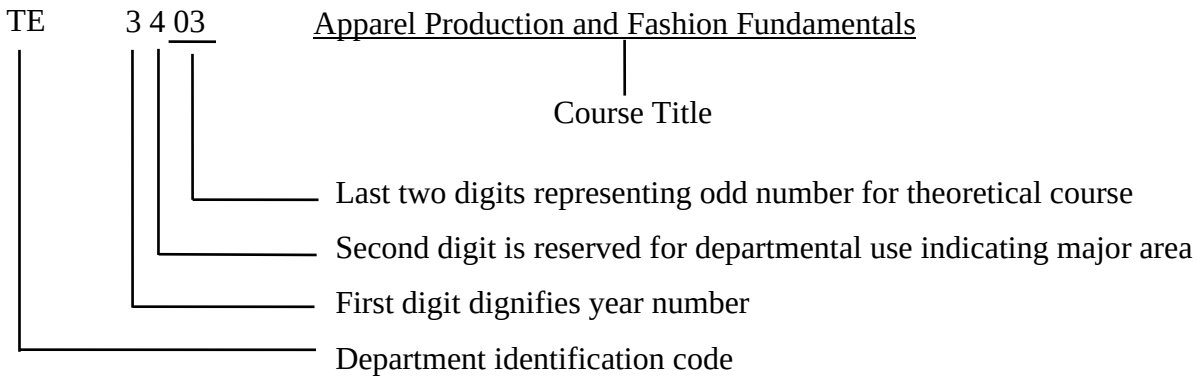
**Course Designation and Numbering System**

Each course is designated by a two to four letter word identifying course offering department followed by a three-digit number with the following criteria:

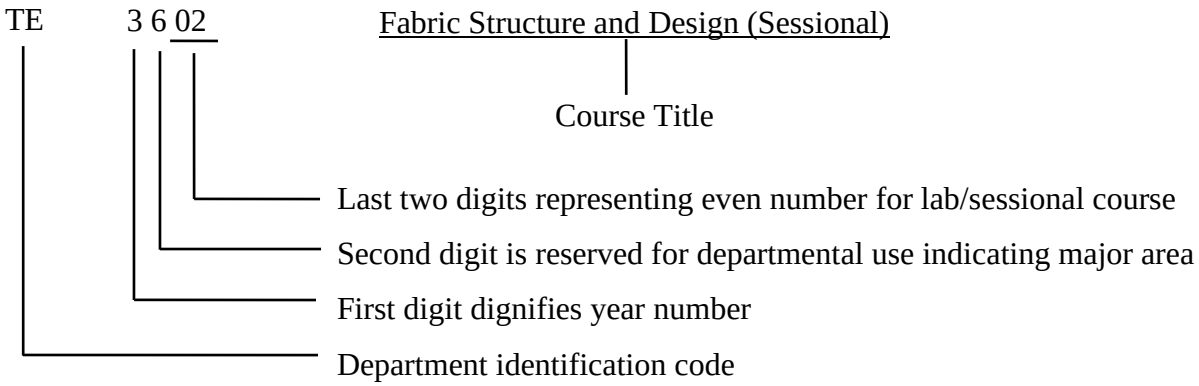
a. The first digit will correspond to the year in which the course is normally taken by the students.
b. The second digit will be reserved for departmental use.
c. The last digit will usually be odd for theoretical and even for laboratory or sessional courses.

The course designation system is illustrated by two examples as shown below:

**Example 1:**



**Example 2:**




**10. Type of Courses**

The courses included in undergraduate curricula are divided into several groups as follows:

**10.1 Core Courses**

In each discipline a number of courses will be identified as core courses which form the nucleus of the respective bachelor's degree programme. A student has to complete all of the designated core courses for his discipline.

**10.2 Pre-requisite Courses**

Some of the core courses are identified as pre-requisite courses. A pre-requisite course is one which is required to be completed before some other course(s) can be taken. Any such course on which one or more subsequent courses build up, may be offered in each of the two regular semesters.

**10.3 Optional Courses**

Apart from the core courses, students will have to complete a number of courses which are optional in nature. In that case, students will have some choice to choose the required number of courses from a specified group/number of courses.

**10.4 Non-Credit Courses**

Non-credit course(s) may be offered to a student to improve his/her knowledge in some specific fields. The credits in these courses will not be counted towards GPA and Cumulative GPA calculation but will be reflected in the transcript as satisfactory (S)/unsatisfactory (U). Non-credit course(s) may be offered under the following circumstances:

If a student's Thesis/Project supervisor feels that the study/design is highly related to course(s) offered by any other department for its students, he can recommend to the concerned Head of the Department for participation of the student(s) in the course(s). Such registration of course(s) will not affect the normal course registration of the student.

**11. Departmental Monitoring Committee and Students' Advisor**

**11.1 Departmental Monitoring Committee**

Consistent with its resilient policy to keep pace with new development in the field of Engineering and Technology, the university will update its course curricula at frequent intervals. Such updating aims not only to include the expanding frontiers of knowledge in the various fields but also to accommodate the

changing social, industrial and professional needs of the country. This can be done through deletion and modification of some of the current courses and also through the introduction of new ones.
ACUG of each department will constitute a Departmental Monitoring Committee with three senior teachers of the department as members and Head of the department as chairman. This committee will monitor and evaluate the effectiveness of the Course System within the department. In addition to other teachers of the department, the committee may also propose from time to time to the ACUG any changes and modifications needed for upgrading the Undergraduate Curricula and the Course System.

### 11.2 Students' Advisor

One advisor will be assigned for a batch of students by the Head of the Department who will advise each student on the courses to be taken by the student. The adviser will discuss with the student his academic programme and then decide the number and nature of courses for which he/she can register. However, it is the student's responsibility to keep contact with his/her adviser who will review and eventually approve the student's specific plan of study and check on subsequent progress. The adviser should generally be of the rank of an Assistant Professor or above from the concerned department. However, in case of shortage of teachers, lecturer may also act as adviser.

For a student of second and subsequent semesters, the number and nature of courses for which he/she can register will be decided on the basis of his/her academic performance during the previous semester. The adviser will advise the students to register for the courses during the next semester within the framework of the guidelines in respect of minimum/maximum credit hour limits. The Adviser is also authorized to permit the student to drop one or more courses based on his academic performance. Special provisions exist for academically weak students with regard to make-up courses.

### 11.3 Teacher Student Contact

The proposed system encourages students to come in close contact with teachers. For promotion of teacher-student contact, each student is assigned to an Advisor and the student is free to discuss with his/her advisor about all academic matters, especially those related to courses taken and classes being attended by him/ her. Students are also encouraged to meet other teachers any time for help on academic matters.

## 12. Course Registration and Its Procedure

Any student who wants to study a course is required to register formally. The following steps will be maintained during registration:

i. Student (both resident/attached) will collect registration form from respective office of hall of residence and take the signature of provost to ensure that he has no dues related to the hall.
ii. After collecting registration form, each student will fill up his/her course registration form in consultation with his/her adviser. The advisor will write the number of courses and sign it.
iii. Students will collect the fee deposit form from account section of the university.
iv. After filling up the fee deposit form, students will deposit registration fee in the bank prescribed by the university.
v. Students will submit registration form and the fee deposit form to his/her adviser.
vi. Adviser will submit duly signed registration form along with fee deposit form (copy for accounts section) to the head of the department.
vii. Head of department will send the duly signed course registration form to the academic section.
viii. The requisite number of copies of the course registration form will be made by the academic section for distribution among the adviser, the head and controller of examination.

For Online Course Registration, students have to go at this site:

http://www.duetbd.com/eregistration/

An online course registration manual is available there for the benefit of students.

### 12.1 Credit Limit in a Semester

A student must be enrolled for the requisite number of credits as mentioned in article 8.6. A student must enroll for the prescribed sessional/laboratory courses in the respective semester within the allowed credit limits.

### 12.2 Pre-condition for Registration

A student will be allowed to register those courses subject to the capacity constraints and satisfactory completion of prerequisite courses. If a student fails in a pre-requisite course in any semester, the concerned department monitoring committee may allow him/her to register for a course which builds on the pre-requisite course, when his/her attendance and grades in continuous assessment in the said pre-requisite course are found to be satisfactory.

Registration will be done within the first ten working days of each semester. Late registration is, however, permitted under special circumstances within next five working days on payment of late registration fee as decided by the authority. Students having outstanding dues to the University, or a hall of residence shall not be permitted to register. All students have, therefore, to clear their dues prior to complete the course registration procedure.

### 12.3 Course Adjustment Procedure

A student would have some limited options to add or replace courses from his/her registration list, within the first ten working days from the beginning of the semester. Dropping of a course is allowed within twenty working days from the beginning of the semester. Adjustment of initially registered courses in any semester can be done by duly completing the Course Adjustment Form. These forms will normally be available in the academic section.
Any student willing to add, replace or drop courses will have to fill up a Course Adjustment Form in consultation with his/her adviser. The original copy of the Course Adjustment Form will be submitted to the academic section, and then the requisite number of copies will be made by the academic section for distribution among the concerned adviser, Head, student and controller of examination.

Any changes in courses must be approved by the Adviser and the concerned Head of the department. The Course Adjustment Form will have to be submitted to the academic section after duly filled in and signed by the persons concerned.

### 12.4 Withdrawal from a Semester

If a student is unable to complete the semester Final Examination due to illness, accident or any other valid reason etc., he/she may apply to the Registrar through the Head of the department for total withdrawal from the semester within five working days after the end of the semester final examination. However, he/she may choose not to withdraw any laboratory/sessional course if the grade obtained in such a course is ‘D’ or higher and he/she has to indicate that clearly in the withdrawal application. The withdrawal application must be supported by a medical certificate from the University Medical Officer. The Academic Council will take the final decision about such application.

## 13. Striking off the Names and Readmission

**13.1** The names of the students shall be struck off and removed from the student list on the following grounds:

i. Non-payment of University fees and dues within the prescribed period.
ii. Forced to discontinue his/her studies under disciplinary rules.
iii. Withdrawal of names from the University on grounds acceptable to the Vice-Chancellor of the University after having cleared all dues.
iv. Failure to earn the required credits for graduation as outlined in the respective curriculum and/or fulfill the Cumulative GPA requirements within the maximum

allowed time of 7 academic years including any period of punishment. On valid medical grounds, the period may be extended by the approval of Academic Council.

**13.2** In case a student whose name has been struck off the student list under clause (i) of Article 13.1 seeks re-admission within the session in which his/her name was struck off, he/she shall be re-admitted on payment of all the arrear fees and dues. But if he/she seeks readmission in any subsequent session, the procedure for his/her readmission will be the same as described under Article 13.3.

**13.3** Every student whose name has been struck off the student list by exercise of the clause (ii) of Article 13.1 seeking readmission after expiry of the period for which he/she was forced to discontinue his/her studies, shall submit an application to the Head of the Department in the prescribed form before the commencement of the session to which he/she seeks re-admission. The Head of the department shall forward the application to the Vice-Chancellor of the University with his remarks. In case the re-admission is allowed, the student will be required of payment of all dues to get him/herself admitted not later than one week from the date of permission given by the Vice-Chancellor. All re-admissions should preferably be completed before the session starts. The percentage of attendance of the readmitted students shall be counted from the date of re-admission.

**13.4** The application of a student for readmission will only be considered if he/she applies within two academic sessions from the semester of discontinuity in his/her studies in the University. Other than department as punishment under ordinance of the University relating to discipline, a student of any kind failing for any other reason whatsoever to become a candidate for a semester final examination in which he/she ought to have had in the usual process of his/her progressive academic activities, shall be considered to have discontinued his/her studies for the relevant semester together with striking the name off from current student list and two such discontinuous periods will be considered equivalent to that for one academic session. The maximum period of discontinuity under no circumstances is to exceed two academic sessions during a student's period of studies for the degree.

**13.5** No student who has withdrawn his/her name under clauses (iii) and (iv) of Article 13.1 shall be given re-admission.

**13.6** In case any application for re-admission is rejected, the student may appeal to the Academic Council for re-consideration. The decision of the Academic Council shall be final.

## 14. Grading System, Calculation of GPA and Cumulative GPA, and Conversion of Marks

### 14.1 Grading System

The letter grade system shall be used to assess the performance of the student and shall be as follows:

| Numerical Grade | Letter Grade | Grade Point |
|---|---|---|
| 80% or above | A Plus | 4.00 |
| 75% to less than 80% | A Regular | 3.75 |
| 70% to less than 75% | A Minus | 3.50 |
| 65% to less than 70% | B Plus | 3.25 |
| 60% to less than 65% | B Regular | 3.00 |
| 55% to less than 60% | B Minus | 2.75 |
| 50% to less than 55% | C Plus | 2.50 |
| 45% to less than 50% | C Regular | 2.25 |
| 40% to less than 45% | D | 2.00 |
| Less than 40% | F | 0.00 |

A grade 'X' shall be awarded for courses (like project & thesis, etc.) in the odd semester, which will continue through the even semester.

**14.2 Calculation of GPA and Cumulative GPA**

Grade Point Average (GPA) is the weighted average of the grade points obtained in all the courses passed/completed by a student in a semester. 'F' grades will not be counted towards GPA calculation. GPA of a semester will be calculated as follows:

$$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$$

where n is the total number of courses passed by the student, $C_i$ is the number of credits allotted to a particular course i and $G_i$ is the grade point corresponding to the grade awarded for i -th course.

The overall or Cumulative GPA gives the cumulative performance of the student from first semester up to any other semester to which it refers and is computed by dividing the total grade points ($\sum C_i G_i$) accumulated up to the date by the total credit hours ($\sum C_i$).

Both GPA and Cumulative GPA will be rounded off to the second place of decimal for reporting.

Suppose a student has completed five courses in a semester and obtained the following grades:

| Course | Credits | Grade | Grade points |
|---|---|---|---|
| TE 2101 | 4 | A plus | 4.0 |
| HSS 1502 | 0.75 | B regular | 3.0 |
| TE 3303 | 3 | A regular | 3.75 |
| ME 2700 | 0.75 | B plus | 3.25 |
| Math 2503 | 4 | A minus | 3.5 |

Then his/her GPA for the semester will be computed as follows:

$$GPA = \frac{4(4.0) + 0.75(3.0) + 3(3.75) + 0.75(3.25) + 4(3.5)}{4 + 0.75 + 3 + 0.75 + 4} = 3.68$$

**14.3 Conversion of Grade into Marks**

a. Marks = 79 + 84 (X – 3.75); $3.75 \leq X \leq 4$

b. Marks = 44 + 20 (X – 2); $2.2 \leq X \leq 3.75$

Where X = Grade (Cumulative GPA) obtained by a student

**15. Distribution of Marks**

**15.1 The distribution of marks for a given course will be as follows**

(a) **Theory Courses:**

| | | |
|---|---|---|
| (i) Continuous Assessment: | | |
| Class participation and attendance | | 10% |
| Class Tests/spot tests | | 20% |
| (ii) Semester Final Examination (3 hours duration) | | 70% |
| | **Total =** | **100%** |

(b) **Courses on Laboratory/Sessional/Field Work:**

| | | |
|---|---|---|
| Class participation and attendance | | 10% |
| Quizzes/ Viva Voce | | 40% |
| Performance/Reports | | 50% |
| | **Total =** | **100%** |

(c) **Project and Thesis**:

| | |
|---|---|
| Viva Voce (Conducted by a Viva Voce Committee of minimum 3 members to be constituted by the Examination Committee) | 30% |
| Supervisor (Internal Examiner) | 50% |
| External Examiner (any other teacher of the Department/Examination Committee) | 20% |
| **Total =** | 100% |

**15.2 Basis for distribution of marks in class participation and attendance will be as follows:**

| ***Attendance*** | ***Percentage of Marks*** |
|---|---|
| 90% or above | 10% |
| 85% to less than 90% | 9% |
| 80% to less than 85% | 8% |
| 75% to less than 80% | 7% |
| 70% to less than 75% | 6% |
| 65% to less than 70% | 5% |
| 60% to less than 65% | 4% |
| Less than 60% | 0% |

**15.3** The students whose average percentage of attendance will fall short of 75% in any of the theory, lab/sessional/field work courses for which he/she has registered in one academic year shall not be eligible for the award of any type of scholarship/stipend/grant for the following academic session.

**16. Class Tests, Quizzes and Spot Tests**

i. For 2, 3 and 4 credit courses 3 best out of 4 class tests may be taken for awarding marks. These may be considered as the minimum recommended number of class tests for any course. If the number of class tests administered in a course exceeds these suggested minimum numbers, then two-thirds best of all may be considered.
ii. Duration of a class test should not exceed **15-20 minutes** and materials covered should be what were taught in 2 to 4 immediate previous classes or most recent classes.
iii. For the convenience of conducting the class tests, one class period time slot should be kept at the first period of each working day.
iv. The dates for the class tests shall be fixed by the Course Coordinator in consultation with the Head of the Department and shall be announced accordingly.
v. Spot test will be considered as class test and duration of which should not exceed ten minutes. The materials covered should be what were taught in previous immediate class. The maximum number of spot test should not exceed more than four. Maximum 50% spot test will be considered.
vi. All class tests shall ordinarily be of equal value. The result of each individual class test shall be posted for information of the students preferably before the next class test is held.
vii. Quizzes will be held on the basis of sessional/lab/field work classes. Duration of a quiz should not exceed one hour.

**17. Earned Credits**

The courses in which a student has obtained ‘D’ or a higher grade will be counted as credits earned by him/her. Any course in which a student has obtained ‘F’ grade will not be counted towards his/her earned credit calculation. A student who obtains ‘F’ grade in any core course in any semester, he/she will have to repeat the course. If a student obtains ‘F’ in an optional course he/she may choose to repeat the course or take a substitute course, if available. No ‘F’ grade will be counted for GPA calculation but will stay permanently on the grade sheet and transcript. When a student will repeat a review course in which he/she previously obtained ‘F’ grade, he/she will not be eligible to get a grade higher than B in such a course. A student obtaining D grade in a course, will be allowed to repeat the course for the

purpose of grade improvement if cumulative GPA of the student falls below 2.20. In such case he/she will be awarded the new grade that he/she obtains or retains his/her previous grade if he/she fails.

A student obtaining 'C' or a better grade in a course will not be allowed to repeat the course for the purpose of grade improvement if cumulative GPA of the student falls below 2.20. Absence in semester final examination will result in 'F' grade unless he/she had withdrawn from the semester as per Article 12.4.

**18. Measures for Helping Academically Weak Students**

The minimum cumulative GPA requirement for obtaining a B.Sc. Engineering degree is 2.20. The performance of a student will be evaluated in terms of two indices, viz. semester grade point average (GPA), and cumulative grade point average (cumulative GPA).
Students will be considered to be making normal progress toward a degree if their Cumulative GPA for all courses attended is 2.20 or higher. Students who regularly maintain semester GPA of 2.20 or higher are making good progress toward their degrees and are in good standing with the University. Students who fail to maintain this minimum rate of progress will not be in good standing rather considered to be academically weak. This can happen when one or more of the following conditions exist:
i. Semester GPA falls below 2.20 or
ii. Cumulative GPA falls below 2.20 or
iii. Earned credits fall below 15 times the number of semesters attended/studied
All such students can make up deficiencies in GPA and credit requirements by completing 'F' graded course(s) and repeating 'D' graded course(s) in the next semester(s). When GPA and credit requirements are fulfilled, the student is considered to be returned to good standing.

**19. Honours, Dean's List and University Gold Medal**

**19.1 Honours**
Candidates for Bachelor's degree in Engineering will be awarded the degree with Honours if their cumulative GPA is 3.75 or above.

**19.2 Dean's List**
In recognition of excellent performance, the names of students who maintain a GPA of 3.75 or above in regular semester(s) of an academic year may be published in the Dean's List in each Faculty. In this regard Dean will give a certificate to the student confirming his name in the Dean's List. The student will be honored Tk. 2000 for his name in the Dean's List by the approval of academic council. Students who have earned 'F' grade in any course during any semesters will not be considered for Dean's List in that year.

**19.3 University Gold Medal**
University Gold Medal for outstanding graduates will be awarded to the students who secure the 1st position with cumulative GPA not below 3.75 in each Department. The student must have completed his/her undergraduate course work within four consecutive academic years. Students who have earned 'F' grade in any course during any semesters will not be considered for University Gold Medal.

**20. Student Classification**

For a number of reasons, it is necessary to have a definite system by which students can be classified as First, Second, Third and Fourth Year. The students are classified according to the number of credit hours earned towards a degree. The following classification applies to the students:

| ***Year*** | ***Earned Credits*** |
|---|---|
| First Year | From 0 to < (T1 – 8) |
| Second Year | From (T1 – 8) to < (T2 – 12) |
| Third Year | From (T2 – 12) to < (T3 – 16) |
| Fourth Year | ≥ (T3 – 16) |

Where
T1 = total credits prescribed in the 1st Year 2nd Semester
T2 = total credits prescribed up to 2nd Year 2nd Semester
T3 = total credits prescribed up to 3rd Year 2nd Semester

**21. Probation and Suspension**

Students who regularly maintain semester GPA of 2.20 or above satisfying the minimum credit requirements are making good progress toward their degrees and are in good standing with the University. Students who fail to maintain this minimum rate of progress may be placed on academic probation.

The status of academic probation is a reminder/warning to the student that satisfactory progress towards graduation is not being made. A student may be placed on academic probation when either of the following conditions exist:

i. The semester GPA falls below 2.20, or
ii. The cumulative GPA falls below 2.20
iii. Earned Credits fall below 15 times the number of semester attended/studied.

Students on probation are subject to such restrictions with respect to courses and extracurricular activities as may be imposed by the respective Head of the department. The minimum period of probation is one semester, but the usual period is for one academic year. This allows the academically weak student an opportunity to improve the GPA through the completing 'F' graded course(s) and repeating 'D' graded course(s) during the period. The probation may be extended for additional semesters until the student achieves an overall GPA of 2.20 or above. Once that condition is improved, the student is considered to be returned to good standing.

Academic probation is not to be taken lightly rather to be considered very seriously. A student on academic probation who fails to maintain a GPA of at least 2.20 during two consecutive academic years may be suspended from the University. A student who has been suspended may apply for consideration to the Dean of the faculty, but this application will not be considered until the student remains suspended at least for one full semester.

Petitions for reinstatement must set forth clearly the reasons for the previous unsatisfactory academic record and it must delineate the new conditions that have been created to prevent the recurrence of such work. Each such petition is to be considered individually on its own merits.

After consideration of the petition in consultation with the student, adviser and the respective Head of the department, Dean in some cases, may reinstate the student if this is the first suspension. However, a second suspension will be regarded as final and absolute.

**22. Minimum Earned Credits and GPA Requirements for Obtaining Degree**

Minimum credit requirements for the award of Bachelor of Science in Engineering degree will be proposed by the Academic Committee for Undergraduate Studies (ACUG) on the recommendation of the respective faculty and approved by Academic Council. The minimum cumulative GPA requirements for obtaining a Bachelor of Engineering degree is 2.20.

A student may take additional courses with the consent of his/her adviser in order to raise cumulative GPA, but he/she may take a maximum of 15 such additional credits beyond respective credit requirements for B. Sc. Engineering degree during his/her entire period of study.

**23. Time Limits for Completion of B. Sc. Engineering Degree**

A student must complete his/her studies within a maximum period of seven academic years for engineering degree. On valid medical ground, the period may be extended by the approval of Academic Council.

**24. Industrial/Professional Training Requirements**

Depending on each department's own requirements a student may have to complete a prescribed number of days for industrial/professional training in addition to minimum credit and other requirements, to the satisfaction of the concerned Department.

**25. Application for Graduation and Award of Degree**

A student who has fulfilled all the academic requirements for Bachelor's degree will have to apply to the Controller of examination through his/ her Adviser by the approval of Head of the Department for graduation. Provisional degree will be awarded on completion of Credit and GPA requirements. Such Provisional degrees will be confirmed by the Academic Council.

**26. Absence during Semester**

A student should not be absent from lab/sessional, quizzes, class tests, class participation, attendance, etc. during the semester. Such absence will naturally lead to reduction in grade points/marks, which count towards the final grade. Absence in semester final examination will result in 'F' grade.

**27. Review Courses**

i. Students obtained 'F' Grade in theory course having registered previously will get opportunity for registration of one course in each semester as review. One will be allowed to sit for the review course examination without making any change of previously obtained class test and class performance and attendance marks.
ii. Review course examination will be conducted separately at the end of the regular semester.
iii. Any student who has failed in any sessional course(s) he may be allowed to complete the course(s) by attending the sessional classes with the students of next regular semester(s).

**28. Special Examination**

A special examination on 'F' graded course(s) may be conducted for the outgoing students who have a maximum of 3 (three) 'F' graded theory courses for completion of degree. The special examination will be arranged at a convenient time by the Controller of Examination within 8 weeks after the publication of results of the 4th year 2nd semester regular examination. If a student repeats 'F' graded theory course(s) in special examination he/she will not be eligible to get a grade higher than B in such course(s). A student who has failed in the special examination may register the course(s) in the regular semester.