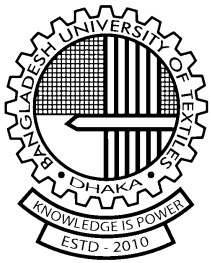
Academic Regulation, Course Structure And Detail Syllabus For The B.Sc. In Textile Engineering Courses

BANGLADESH UNIVERSITY OF TEXTILES

92, Shahid Tajuddin Ahmed Sarani, Tejgaon I/A, Dhaka-1208



Academic Regulations, Course Structure and Detail Syllabus For the B. Sc. in Textile Engineering Courses

Bangladesh University of Textiles
92 Shahid Tajuddin Ahmed Sarani
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Approved by the Syndicate, Vide its Meeting No : 34
Date: 26 - 02 - 2016 on the recommendation of Academic Council (Meeting No. : 31, Date: 02-02-2016.

Effective from the Level-1 of session : 2015-2016 and onwards

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1.0 Definitions

In this regulations, unless the context otherwise requires

1.1 "University" means the Bangladesh University of Textiles abbreviated as BUTEX;

1.2 "Regulations" means Academic Regulations;

1.3 "Syndicate" means the Syndicate of the University;

1.4 "Academic Council" means the Academic Council of the University;

1.5 "Academic Committee" means Academic Committee of Degree Awarding Departments.

1.6 "Vice-Chancellor" means the Vice-Chancellor of the University;

1.7 "Dean" means the Head of a Faculty of the University.

1.8 "Registrar" means the Registrar of the University.

1.9 "Department" means concerned Academic Department of the University;

1.10 "Head" means the Head of the Academic Department;

1.11 "Chairman" means the Chairman of the Examination Committee.

1.12 "Controller" means the Controller of Examinations of the University;

1.13 "Equivalence Committee" means the Equivalence Committee of the University;

1.14 "Level" means an academic year, consisting of Term-I and Term-II.

1.15 "Term" means a semester.

1.16 "Student" means a student admitted in any degree awarding department of the University.

1.17 "Course System" means pass or fail on course basis.

1.18 "Failed Courses" means the courses registered but not appearing at the examination or not passed after appearing at the examination.

1.19 "Discontinuity" means failure to appear in all courses (Theory and Practical/Sessional) in a particular Term/Level.

2.0 Faculties and Departments

The University will have the following Faculties & Departments

2.1 Faculty of Textile Engineering

(a) Department of Yarn Engineering
(b) Department of Fabric Engineering
(c) Department of Jute & Allied Fiber Process Engineering

2.2 Faculty of Textile Chemical Engineering

(a) Department of Wet Process Engineering
(b) Department of Material Science & Engineering
(c) Department of Dyes and Chemical Engineering
(d) Department of Environmental Science & Engineering

2.3 Faculty of Textile Fashion Design & Apparel Engineering

(a) Department of Apparel Engineering
(b) Department of Textile Fashion & Design
(c) Department of Apparel Merchandizing

2.4 Faculty of Textile Management & Business Studies

(a) Department of Textile Engineering Management
(b) Department of Industrial & Production Engineering
(c) Department of Humanities & Social Science

2.5 Faculty of Science & Engineering

(a) Department of Textile Machinery Design & Maintenance
(b) Department of Physics
(c) Department of Chemistry
(d) Department of Mathematics & Statistics

2.6 Any other Faculties to be instituted by the Syndicate on the recommendation of the Academic Council from time to time.

3.0 Degree to be offered

The University shall offer courses leading to the award of the following Degrees

(a) B. Sc. in Textile Engineering (Yarn)

(b) B. Sc. in Textile Engineering (Fabric)

(c) B. Sc. in Textile Engineering (Wet Process)

(d) B. Sc. in Textile Engineering (Apparel)

(e) B. Sc. in Textile Engineering (Management)

(f) B. Sc. in Textile Engineering (Fashion & Design)

(g) B. Sc. in Textile Engineering (Industrial & Production)

(h) B. Sc. in Textile Engineering (Machine Design & Maintenance)

(i) B. Sc. in Textile Engineering (Dyes & Chemical)

(j) B. Sc. in Textile Engineering (Environment)

(k) Any other degree may be offered by a department on the approval of the Syndicate.

4.0 Student Admission

4.1 Students shall be admitted to the Level-1, Term-I class of B. Sc. in Textile Engineering Program.

4.2 An Admission Committee shall be formed in each academic session by the Academic Council for admission to Level-1 Term-I of B. Sc. in Textile Engineering program.

4.3 Candidate for admission to the Level-1, Term-I class must have passed the H.S.C. Examination from a Higher Secondary Education Board in Bangladesh (after 12 years of schooling) with Physics, Chemistry and Mathematics as his/her subjects of Examination or any examination in Higher Secondary Level of examination recognized as equivalent by Equivalence Committee and must also fulfill all other requirements as may be prescribed by the Admission Committee.

4.4 The Rules and conditions for admission into various courses of studies of Department shall be framed by the academic council on the recommendation of the Admission Committee.

4.5 All candidates for admission into the courses of B.Sc. in Textile Engineering must be the citizens of Bangladesh unless the candidature is against the seats which 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 of admission into the reserved seats (for Foreign, Freedom Fighter, Tribal etc), if any, shall be framed by the Academic Council on the recommendation of the Admission Committee.

4.6 No candidate shall be admitted in the Level-1, Term-I course after the beginning of the corresponding session, i.e., when the classes start.

4.7 List of newly admitted students shall be notified in the University notice board before commencement of the classes.

4.8 A student shall never take admission simultaneously in more than one Department/Course of this University or any other higher institution with an exception of Certificate/Diploma course. If the stated clause is violated, studentship, examination and examination results of the reported student shall immediate be cancelled.

4.9 If any newly admitted student fails to attend the classes within the first two weeks after the start of the classes, he/she will not be allowed to Level-1 courses and his/her admission will be cancelled.

4.10 Being admitted to the university, each student shall attain his/her studentship for the University to an academic program as per the University rules. He/She shall be required to register with the University through the University registration process and on payment of the required fees as determined by the University authority from time to time.

5.0 Medium of Instruction

The medium of instruction will be English for the B. Sc. in Textile Engineering courses.

6.0 The Curriculum & Courses

6.1 The undergraduate curricula of Bangladesh University of

Textiles is based on course system. The salient features of course system are:

(a) Provision for continuous evaluation of students performance through Attendance, Class Test, Practical/Sessional class etc.

(b) Evaluation of the performance of course/courses by using Letter Grades and Grade Points.

(c) In the curriculum, besides the professional courses pertaining to each discipline, there is an emphasis on acquiring knowledge in basic sciences, humanities and social science & related courses of other discipline. Emphasis shall be given to introduce courses dealing with professional protective, project planning and management, socio-economic and environmental aspects of development projects, communication skills, etc.

6.2 Number of Terms in an Academic Year (Level)

The duration of Bachelor Degree program shall be 04 (four) academic years and 8 (eight) Terms. The four academic years of study for the degree of B.Sc. in Textile Engineering shall be designated as Level-1, Level-2, Level-3 and Level-4 in succeeding higher Levels of study. Each academic year comprises two semesters, i.e. Term-I and Term-II.

6.3 Duration of Terms

The duration of each of Term-I and Term-II will be as follows:

Term -I

Classes	: 15 weeks
Recess before Term final Examination	: 02 weeks
Term final examination	: 03 weeks
	: 20 weeks
Inter Term Break	: 01 Week

Term -II

Classes	: 15 weeks
Recess before Term final Examination	: 02 weeks
Term final examination	: 03 weeks
	: 20 weeks

Holidays, Vacations and Result Publication : 11 weeks

Total : 52 Weeks

6.4 Definition of Courses

6.4.1 Syllabus of different Department shall consist of several courses. Following structure shall be followed to articulate the courses. There shall be 05 (Five) types of courses as follows:

(i) **Theoretical Courses:** Includes Class-teaching, Open discussion, Academic tasks etc.

(ii) **Practical/Sessional Courses:** Includes Laboratory experiment/Field Work etc.

(iii) **Industrial Attachment:** The students must undergo 2 (two) months' intensive Industrial Training program in the relevant area of specialization after completion of Level-III, Term-II.

(iv) **Project and Thesis:** During the Level-IV of study each student will be required to complete a Project and Thesis in the relevant field of their specialization. For such a work the students will be guided by a teacher of the concerned Department.

(v) **Comprehensive Viva:** The Comprehensive Viva will cover the whole each Level course of study as per course structure. No specific class hour will assigned for the Comprehensive Viva.

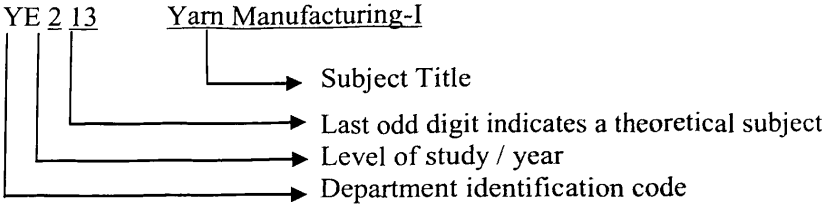
6.5 Course Designation & Numbering

Each course shall be designated by a two to four letter word identifying the Department which offers it followed by a three digit with the following criteria. The first digit shall

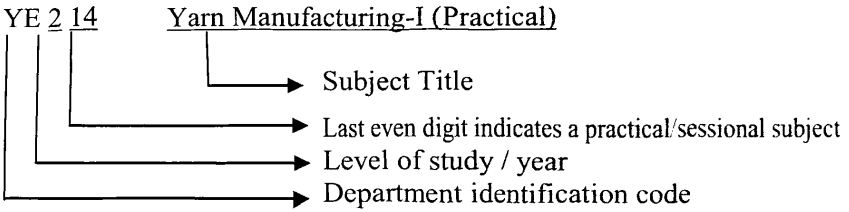
represent the Level in which the course is taken by the students. The two digits shall represent a theoretical course when it is odd number and a Sessional/Laboratory/Design-subject/Course when it is even.

The courses designation system is illustrated by examples as shown below:

(Theoretical subject)



(Practical subject)



Letter reserved for individual department

Departmental Identification Code	Name of the Department
YE	Yarn Engineering
FE	Fabric Engineering
WPE	Wet Process Engineering
AE	Apparel Engineering
TEM	Textile Engineering Management
TFD	Textile Fashion & Design
IPE	Industrial & Production Engineering
MDM	Textile Machinery Design & Maintenance
DCE	Dyes & Chemical Engineering
ESE	Environmental Science & Engineering
MS	Mathematics & Statistics
PHY	Physics
CHEM	Chemistry
HSS	Humanities & Social Science

6.6 Departmental and Non-Departmental Courses

In every Department, courses offered should be either 'Departmental courses' or 'Non-departmental courses'. Non-departmental courses are the courses of other disciplines.

The offered Non-departmental courses shall be taught either by the concerned Department or by the faculties of the related Department as and when requested by the concerned Department.

6.7 Minimum Credit Point

Minimum Credit Point required for the award of Bachelor Degree in Textile Engineering will be decided by Academic Committee subject to the approval of the Academic Council. However, at least 164 credit points for Textile Engineering must be earned to be eligible for graduation.

6.8 Assignment of Credits & Contact Hours

6.8.1 Theoretical Courses

One Lecture per week per Term will be equivalent to 1 (one) Credit. There shall be at least 15 contact hours for each theoretical credit point in each Term. Each theoretical class duration will be 50 minutes.

6.8.2 Practical/Sessional

There shall be normally 02 (two) contact hours in a week and 30 contact hours in a Term for each credit point of Practical/Sessional course.

6.8.3 Industrial Attachment

Credit point for Industrial Attachment will be 3.00.

6.8.4 Project and Thesis

The students will be allowed 06 (six) working hours per week exclusively dedicated for the Project Work. Credit Point for Project and Thesis will be 3.00.

6.8.5 Comprehensive Viva

Credit Point for Comprehensive Viva will be 3.00.

6.9 Layout of Courses offered by different departments in Different Terms & detailed outline of courses are given in Annexure :

A student must register for the requisite number of credits points per Term as per course layout.

6.10 Academic year of B. Sc. in Textile Engineering program will be from July to June.

6.11 A course plan for each course approved by respective Head, showing the details of Lectures to complete the course, is to be announced by the concerned teacher at the beginning of the Term.

6.12 Time Limit for Completion of Bachelor Degree

For the degree of B.Sc. in Textile Engineering maximum allowable number of Terms is 14. But an additional Term may be granted after judging the merit of individual case.

6.13 Syllabus & Curriculum Development

6.13.1 The Curricula of the B.Sc. in Textile Engineering Degree in the different Departments shall be as proposed by the Syndicate on recommendation of Executive committee of respective faculty & Academic council.

6.13.2 The Academic Committee & Committee of Courses and Studies of the concerned Department and Executive Committee of respective faculty shall review the curricula at least once in every academic year and put forward the recommendations to the Academic Council.

7.0 Grading System :

7.1 Grades and Grade Points:

Grades and Grade Point will be awarded on the basis of marks obtained in the Written, Oral or Practical Examinations/Laboratory performances according to the following scheme:

Marks obtained (%)	Grade	Grade point
80 to 100	A+	4.00
75 to < 80	A	3.75
70 to < 75	A-	3.50
65 to < 70	B+	3.25
60 to < 65	B	3.00
55 to < 60	B-	2.75
50 to < 55	C+	2.50
45 to < 50	C	2.25
40 to < 45	D	2.00
Less than 40 (Theory)	F	0.00
Less than 45 (Practical)		
Incomplete	I	--
Withheld	W	--

7.2 Calculation of GPA/CGPA

A student obtaining 'D' or higher grade will be counted as credits earned by him/her. A student obtaining 'F' grade will not be counted towards his earned credits. The GPA (grade point average) will be calculated according to the following formula:

$$\text{GPA} = \frac{\Sigma\,(\text{Grade points in a course} \times \text{Credits for the course})}{\text{Total Courses Passed/Completed}}$$

CGPA = Cumulative GPA for different Level

- The overall or Cumulative GPA gives the cumulative performance of the student from Term-I up to any other Term to which it refers and is computed by dividing the total grade points accumulated up to the date by the total credit hours.
- Both GPA and CGPA will be rounded off to the second place of decimal for reporting.

8.0 Distribution of Marks

Theory

(a)	Continuous Assessment	
	(i) Class Attendance	: 8%
	(ii) Class Test	: 20%
(b)	Term Final Exam.	: 72%
		Total : 100%

(a) Practical/Sessional

(i) Class Attendance	: 20%
(ii) Experiment & Performance	: 40%
(iii) Report & Viva	: 20%
	Total : 80%
(b) Practical (Final)	: 20%
	Total : 100%

Industrial Attachment

(a)	Continuous Assessment	: 50%
(b)	Final Exam.	: 50%
		Total : 100%

Project and Thesis

(a)	Continuous Assessment	: 50%
(b)	Final Exam.	: 50%
		Total : 100%

Comprehensive Viva : 100 Marks

9.0 Evaluation System

9.1 Basis for marking class participation and attendance will be as follows:

Attendance	Marks	
	Theory	Practical
90% and Above	8	20
85% to 89%	7	18
80% to 84%	6	16
75% to 79%	5	14
70% to 74%	4	12
65% to 69%	3	10
60% to 64%	2	8
Less than 60%	0	0

A student is required to attend at least 60% of all classes held in every course.

9.2 Class Test

(a) The number of Class Test for a course will be 04 (four) with equals marks. Summation of four Class Tests will be the total marks obtained.

(b) Duration of each Class Test shall be 15 minutes.

(c) The dates for the Class Tests shall be announced by the Course teacher.

(d) The result of each individual Class Test will be published for information of the students before the next Class Test is held.

(e) The final computed marks sheet of the Class Tests and Class Attendance will be submitted in 2 (two) separate sealed envelope by the course teacher to the Chairman of concerned Examination Committee before preparatory leave for Term final examination. One copy of mark sheet along with answer scripts of all the Class Tests must be submitted to the Controller of Examinations.

9.3 Project and Thesis

50% marks for Continuous Assessment to be evaluated by respective Supervisor.

50% marks for final examination to be evaluated by Project Evaluation Committee.

9.4 Formation of Project and Thesis Evaluation Committee:

Formation of Project and Thesis Evaluation Committee will be as follows:

1.	Respective Dean	Convener
2.	Respective Head of Department	Member
3.	Respective Supervisor	Member
4.	One Teacher from other degree awarding Department	Member
5.	One Industrial/External expert in relevant field.	Member

9.5 Industrial Attachment

50% marks for Continuous Assessment to be evaluated by respective Supervisor and relevant Officer of the concerned industry.

50% marks for Final Examination to be evaluated by Evaluation Committee

9.6 Formation of Industrial Attachment Evaluation Committee:

Formation of Industrial Attachment Evaluation Committee will be as follows:

1.	Respective Dean	Convener
2.	Respective Head of Department	Member
3.	Respective Supervisor	Member
4.	One Teacher from other degree awarding Department	Member
5.	One Industrial/External expert in relevant field.	Member

9.7 Comprehensive Viva : 100 Marks

9.8 Formation of Comprehensive Viva Committee:

Formation of Comprehensive Viva Committee will be as follows:

1.	Respective Dean	Convener
2.	Respective Head of Department	Member
3.	One Senior Teacher of the respective Department	Member
4.	Two teachers from other different Department (Determined by the Deans Committee)	Member

10.0 Term Final Examination Procedure (Theory & Practical)

10.1 Examination Date

Date for Term final examination will be announced by the controller of examinations as proposed by the chairman of the respective examination committee.

10.2 Examiner's Panel

There shall be a panel of examiners for all the subjects of a Department, proposed by the respective Department through Dean and approved by the Academic Council.

10.3 Practical Final

Two course Teacher of respective subject will conduct Practical Final Examination. It will be completed in the last 02 (two) weeks before the preparatory leave starts.

10.4 Examination Committee

The Examination Committee for each Level shall consist of 5 (five) members subject to the approval of the Vice-Chancellor. One Dean will act as Chairman & 4 (four) members will be amongst the Head of the Departments.

10.4 a সিদ্ধান্ত ঃ অধিভূক্তি কলেজসমূহের বি.এসসি. ইন টেক্সটাইল ইঞ্জিনিয়ারিং কোর্সের পরীক্ষা কমিটিতে সংশ্লিষ্ট ডীন সভাপতি থাকবেন এবং পর্যায়ক্রমে ০৪ (চার) জন অধ্যক্ষ সদস্য থাকবেন মর্মে সিদ্ধান্ত গৃহীত হয়। [২৩/৩/১৮ তারিখের সিন্ডিকেটের ৪৭তম সভার সিদ্ধান্ত]

10.5 Function of the Examination Committee

(i) The Chairman of the relevant Examination Committee shall send the names of 2 (two) Question Setters and Examiners for each theory courses from the panel of examiners to the Controller of Examinations who shall issue appointment letters subject to the approval of the Vice-Chancellor.

(ii) For Practical: Name of the examiner will be proposed by the chairman of the examination committee to the Controller of Examinations who shall issue appointment letters subject to the approval of the Vice-Chancellor.

(iii) The Examination Committee shall arrange moderation and printing of question papers.

10.6 All Term Final Examinations shall be conducted by the concerned Examination Committee with the assistance of the Office of the Controller of Examinations. The Controller of Examinations shall be responsible for the safe custody of manuscript, question papers and answer scripts. On the date of examination, the Controller of Examinations shall handover the respective question paper to the chairman of examination committee.

10.7 Duration of Term final Examination

There shall be 03 (three) hours examination for each theory course.

10.8 Term Final Script Evaluation

- Each theoretical paper of the Term Final Examination will have two parts (Part-A & Part-B). Part-A will be evaluated by 1st examiner and Part-B will be evaluated by the 2nd examiner separately. Separate Answer Scripts shall be used for the two parts.

- The 1st examiner & 2nd examiner will take delivery of the answer scripts from the Office of the Controller of Examinations on the date of examination and will return the answer scripts to the Controller of Examinations within the specific date, and simultaneously send two copies of the mark sheet in sealed envelope to the Chairman of the Examination Committee and the third copy of the mark sheet in sealed envelope to the Controller of Examinations, who will keep it in safe custody.

10.9 Scrutinizer

Each theoretical paper (Both of Part-A & B) evaluated by the examiners will be scrutinized by scrutinizer appointed by the controller of examinations with the approval of Vice-Chancellor.

11.0 Tabulation

11.1 The Controller of Examinations will appoint 02 (two) tabulators with the approval of Vice-Chancellor. The tabulators will add up the marks of Class Attendance, Class Test, Practical/Sessional, Term Final Examination, Industrial Attachment, Project and Thesis Work and Comprehensive Viva to produce Letter Grade, Grade Point Average and Cumulative Grade Point Average.

11.2 The tabulation shall not begin until marks of all the courses are received.

11.3 The tabulators will finalize the tabulation sheets separately and then compare together.

11.4 Fractional marks of Class Attendance, Class Test, Practical/Sessional, Term Final Examination etc. of a course will be rounded off only once to the next higher number.

11.5 The Examination Committee will finalize the result and send the tabulation sheet and all other documents to the Controller of Examinations for preservation.

12.0 Publication of Results

12.1 The Controller of Examinations will publish the final results on Department basis with the approval of the Vice-

Chancellor subject to the approval of the Syndicate on recommendation of the Academic Council.

12.2 Re-examination

Re-examination of any script shall not be allowed.

12.3 Preservation of the Examination Documents

The Controller of Examinations will preserve all the documents of examination.

13.0 Promotion Rules

13.1 The minimum passing grade in a theory course shall be 'D' or 2.00 and the minimum passing grade in a Practical or Sessional/ Industrial Attachment/ Project and Thesis/Comprehensive Viva course will be 'C' or 2.25.

13.2 If a student fails to earn minimum grade 'C' or 2.25 in a Practical or Sessional/ Industrial Attachment/ Project and Thesis / Comprehensive Viva course will not be promoted to the next Term. He/she shall have to register the same as a regular student.

13.3 A student will be promoted from Term-I to Term-II of any Level when he/she passes in all the Practical/Sessional courses of Term-I and must fill-up the entry form for term final examination.

13.4 When a student fails to appear some of the courses in the Term-I Final Examination, he may also be promoted to Term-II, considering his/her previous result & number of absent/failed courses.

13.5 Those who earn CGPA 2.20 or more and the cumulative total number of failed courses does not exceed the highest limit of 4 (four) will get promotion from Level-1 to Level-2, Level-2 to Level-3 and Level-3 to Level-4.

13.6 A student who obtains 'F' grade in any theory course in any Term, will have to repeat the course(s) at a convenient time decided by the authority. When a student repeat a course in which he/she previously obtained 'F' grade, he she will not be eligible to get a grade better than 'B' in such course. A student will normally get one chance of clearing 'F' grade of a course.

13.7 'F' grade will not be counted for GPA calculation but will stay permanently on the grade sheet and transcript. In case of clearing of 'F' grade of a course, the student will get supplementary transcript.

13.8 The minimum CGPA requirement for the award of B.Sc. in Textile Engineering Degree is 2.25 without 'F' grade/withheld remaining for any of the courses.

14.0Honours, Dean's List and University Gold Medal

14.1 Honours

Candidates for B.Sc. in Textile Engineering will be awarded the degree with Honours if he/she obtains CGPA 3.75 or above.

14.2 Dean's List

In recognition of excellent performance, the names of students who maintain a GPA of 3.75 or above in regular Terms of an academic year may be published in the Dean's list of each faculty. In this regard Dean will give a certificate to the student confirming his name in the Dean's list. Student who have earned 'F' grade in any course during any of the two regular Terms will not be considered for Dean's list in that year.

14.3 University Gold Medal

University Gold Medal for outstanding graduates will be awarded to the students who secure the 1st position with CGPA not below 3.75 in each Department. The student must have completed his/her undergraduate course work within four consecutive academic years. Student who have earned 'F' grade in any course during any Terms will not be considered for University Gold Medal.

15.0 Improvement of Grade

15.1 If a student obtains a grade lower than 'B' in a course, he/she will be allowed to repeat the course only once for the purpose of grade improvement by forgoing his/her earlier grade, but he/she will not be eligible to get a grade better than 'B' in such a course. A student will be permitted to repeat for grade improvement purposes a maximum of four courses in B.Sc. in Textile Engineering.

15.2 No improvement shall be allowed in Continuous Assessment, Practical/Sessional courses.

16.0 Re-admission

16.1 A student of Level-I, Term-I, failing to appear in the Term final examination, unless otherwise the clause 20.3 is applicable, may be allowed to get Re-admission with the Level-I, Term-I of the immediate next batch. A re-admitted student however, shall always be assigned by the original registration number.

16.2 If a student fails to appear at any Term final examination due to shortage of required percentage of attendance, or failure to pay the dues or expulsion for the University or any other reason as the case may be, she/he shall have to get herself/himself re-admitted to the same Term of the subsequently available batch.

16.3 If a student fails to fulfill the conditions for promotion from any Term to the next may seek Re-admission with the same Term of the subsequent available batch.

16.4 On Re-admission the student shall have to retake all the failed course-works (such as Project and Thesis/Industrial attachment/Comprehensive Viva and Final Examinations) of that Term.

16.5 A student shall not get chance for Re-admission more than three times during the entire Program.

16.6 For Re-admission, a student shall have to apply within 07 (seven) working days after publishing result of the concerned Term.

17.0 Admission for the second and subsequent Terms

At the beginning of each Term, the students who are promoted will have to take admission for the second/subsequent respective Terms by paying requisite fees as determine by the University authority.

18.0 Registration Procedure

18.1 Students must register for each Term in which they will participate. Each student will fill up his/her Course Registration form after admission in consultation with and

under the guidance of the Course Co-ordinator. The original copy of the Course Registration form will be submitted to the Registrar's Office, and then the requisite number of photo copies will be made by the Registrar's Office for distribution. The date, time and venue will be announced in advance by the Registrar's Office.

18.2 Every regular student, if he/she wants to study, shall have to register the courses before the beginning of the class of each Term of each Level.

19.0 Entry-form fill up

19.1 The Entry-form fill up of examination shall have to be conducted by the Academic section of Registrar Office. Each student needs to fill up his/her Entry form to appear at examination. The date, time and venue for filling up the entry forms to appear at the examination will be announced by the Office of the Registrar.

19.2 Requirement of Entry-form fill up

(a) A student shall be allowed to appear at the Term Final Examination if his/her class attendance is at least 75% in theory/practical course.

(b) Students having percentage of attendance between 60% and less than 75% in any courses, may be allowed to appear at the Term Final Examination by paying additional fees as determine by the University authority.

(c) Students having percentage less then 60% in any course, will not be allowed to appear in Term final examination.

(d) If any students fails in Practical Sessional Course(s), he/she will not be allowed to appear in Term Final Examination.

(e) Student having well disciplined and good manner to be certified by the Head of the Department.

(f) Clears all dues of Library and Residential Hall.

(g) Pays requisite fees as determined by the University Authority.

19.3 Head of the Department will send the list of eligible students for filling up the Entry- form to Registrar Office through Dean.

19.4 Entry form will be signed by the Chairman of the concerned Examination Committee.

20.0 Drop-out (Admission Cancelled)

20.1 A student will be dropped out of the program if he/she can not pass within 07 (seven) academic years.

20.2 If a student fails in the same Term/Level two times, his/her studentship will be stand cancelled.

20.3 If a student remains totally absent without any permission from all classes for 2 (two) weeks after the start of Level-1, Term-I classes, his/her admission should be cancelled on the recommendation of the Head of the concerned Department.

21.0 Withdrawal from a Term

21.1 If a student is unable to complete the Term 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 Term within five working days after the end of the Term Final Examination. However, he/she may choose not to withdraw any Practical 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.

21.2 Term withdrawal is not allowed for the Level-1, Term-I students.

22.0 General

22.1 Academic Calendar

Registrar Office will announce the academic schedule for each Term before the start of the class on the approval of the Academic Council.

22.2 Course Co-ordinator

Before starting the classes of each Level, a Course Co-ordinator will be appointed by the concerned Head of the Department. They will look after the academic matters & course progress of the respective Term/Level. They will also meet the failed & irregular students and advise them on all academic matters.

22.3 Attendance

22.3.1 All Students are expected to attend classes regularly and one is required to attend at least 60% of all classes held in every course.

22.3.2 The students whose average percentage of attendance fall short of 75% in any of the theory, Practical/Sessional/Industrial Attachment 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.

22.4 Unfair means

22.4.1 Cases of unfair means and breach of discipline at the University examination shall be dealt with according to the respective rules of the University.

22.4.2 The examination disciplinary committee shall be composed of the following members :

(i)	Vice-Chancellor	Chairman
(ii)	All Deans	Member
(iii)	One non-salaried member of the Syndicate nominated by Vice-Chancellor	Member
(iv)	Proctor	Member
(v)	Director (Student Welfare)	Member
(vi)	Registrar	Member
(vii)	Controller of Examinations	Member Secretary

22.5 Conduct and Discipline

22.5.1 A student shall conform to a high standard of discipline, and shall conduct himself, within and outside the precincts of the

University in a manner befitting the student of a University of national importance. He/she shall show due courtesy and consideration to the employees of the University and Halls of residence, good neighborliness to his fellow students and the Teachers of the University and pay due attention and courtesy to Visitors.

To safeguard its ideals of scholarship, character and personal behavior, the university reserves the right to require the withdrawal of any student at any time for any reason deemed sufficient.

22.5.2 Cases of misconduct & breach of discipline (other then examination offences) shall be dealt with according to the respective Rules/Regulations of the University.

22.6 Student(s) who failed to pass in different course(s) in the previous course system will be absorbed in the new course system of curricula when such situation will arise.

22.6 a সিদ্ধান্ত ঃ তবে ক্রেডিট পূর্ণ করার জন্য যে বিষয়গুলি অধ্যয়ন করে নাই সেই বিষয়গুলি Available লেভেল/টার্মে ভর্তি হয়ে অবশ্যই অধ্যয়ন করে উত্তীর্ণ হতে হবে। [১৮/১১/১৮ তারিখের সিন্ডিকেটের ৫০তম সভার সিদ্ধান্ত]

22.7 The Syndicate on recommendation of Academic Council shall have the authority to decide all matters which are not covered by provision of this Regulation in such manner as it may deem fit.

22.8 The University shall have the authority to amend the Academic Regulations at any time & in any manner as it may be considered necessary in the interest of the University.

(Prof. Md. Monirul Islam)
Registrar (Additional Charge)

(Prof. Md. Abul Kashem)
Vice-Chancellor

Bangladesh University of Textiles

Tejgaon, Dhaka-1208

Course Structure, Total Contact hours & Total Credits (Theory+Practical) for the B.Sc. In Textile Engineering Program

SL. No.	Department	Contact Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1	Yarn Engineering	132	56	188	132	34	166
2	Fabric Engineering	132	62	194	129	37	166
3	Wet Process Engineering	132	56	188	132	34	166
4	Apparel Engineering	129	58	187	129	35	164
5	Textile Engineering Management	129	57	186	132	33	165
6	Textile Fashion & Design	117	84	201	117	48	165
7	Industrial Production & Engineering	129	64	193	129	37	166
8	Textile Machine Design and Maintenance	129	60	189	129	36	165
9	Dyes & Chemicals Engineering	132	52	184	132	33	165
10	Environmental Science & Engineering	132	61	193	132	34	166

Summary of Theoretical, Practical Contact hours and Credits of Yarn Engineering Department							
SL.No.	Level & Term	Contact Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1	L-I T-I	15	8	23	15	4	19
2	L-I T-2	18	8	26	18	4	22
3	L-2 T-I	18	8	26	18	4	22
4	L-2 T-2	18	8	26	18	4	22
5	L-3 T-I	18	8	26	18	4	22
6	L-3 T-2	18	6	24	18	3	21
7	L-4 T-I	15	4	19	15	2	17
8	L-4 T-2	12	6	18	12	9	21
	Total	132	56	188	132	34	166

Yarn Engineering
Level-1, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 101	Mathematics-I	3	3	28	72	100
2	PHY 101	Physics - I	3	3	28	72	100
3	PHY 102	Physics - I (Practical)	2	1	80	20	100
4	CHEM 101	Chemistry - I	3	3	28	72	100
5	CHEM 102	Chemistry - I (Practical)	2	1	80	20	100
6	HSS 101	Business and Communicative English	3	3	28	72	100
7	HSS 102	Business and Communicative English (Practical)	2	1	80	20	100
8	YE 101	Natural Textile Fibres	3	3	28	72	100
9	IPE 104	Engineering Drawing (Practical)	2	1	80	20	100
	Total :		**23**	**19**	**460**	**440**	**900**

Yarn Engineering
Level-1, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 103	Mathematics-II	3	3	28	72	100
2	PHY 103	Physics - II	3	3	28	72	100
3	PHY 104	Physics - II (Practical)	2	1	80	20	100
4	CHEM 103	Chemistry - II	3	3	28	72	100
5	CHEM 104	Chemistry - II (Practical)	2	1	80	20	100
6	WPE 101	Polymer Science & Engineering	3	3	28	72	100
7	IPE 101	Engineering Materials	3	3	28	72	100
8	IPE 102	Machine Shop Practice (Practical)	2	1	80	20	100
9	MDM 101	Computer Programming	3	3	28	72	100
10	MDM 102	Computer Programming (Practical)	2	1	80	20	100
	Total		**26**	**22**	**488**	**512**	**1000**

Yarn Engineering
Level-2, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	YE 201	Fibre and Yarn Testing	3	3	28	72	100
2	YE 202	Fibre and Yarn Testing (Practical)	2	1	80	20	100
3	YE 203	Man-made Textile Fibres	3	3	28	72	100
4	YE 205	Short Staple Spinning-I	3	3	28	72	100
5	YE 206	Short Staple Spinning-I (Practical)	2	1	80	20	100
6	FE 201	Fabric Manufacturing-I	3	3	28	72	100
7	FE 202	Fabric Manufacturing-I (Practical)	2	1	80	20	100
8	IPE 203	Fundamentals of Mechanical Engineering	3	3	28	72	100
9	IPE 204	Fundamentals of Mechanical Engineering (Practical)	2	1	80	20	100
10	MS 201	Statistics	3	3	28	72	100
Total			**26**	**22**	**488**	**512**	**1000**

Yarn Engineering
Level-2, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	YE 207	Short Staple Spinning-II	3	3	28	72	100
2	YE 208	Short Staple Spinning-II (Practical)	2	1	80	20	100
3	YE 209	Textile Physics	3	3	28	72	100
4	WPE 205	Wet Processing-I	3	3	28	72	100
5	WPE 206	Wet Processing-I (Practical)	2	1	80	20	100
6	AE 205	Apparel Manufacturing-I	3	3	28	72	100
7	AE 206	Apparel Manufacturing-I (Practical)	2	1	80	20	100
8	TEM 201	Fundamentals of Marketing	3	3	28	72	100
9	MDM 201	Fundamentals of Electrical and Electronics Engineering	3	3	28	72	100
10	MDM 202	Fundamentals of Electrical and Electronics Engineering (Practical)	2	1	80	20	100
Total			**26**	**22**	**488**	**512**	**1000**

Yarn Engineering
Level-3, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	HSS 301	Economics	3	3	28	72	100
2	YE 303	Long Staple Spinning	3	3	28	72	100
3	YE 304	Long Staple Spinning (Practical)	2	1	80	20	100
4	FE 303	Fabric Manufacturing-II	3	3	28	72	100
5	FE 304	Fabric Manufacturing-II (Practical)	2	1	80	20	100
6	AE 309	Apparel Manufacturing-II	3	3	28	72	100
7	AE 310	Apparel Manufacturing-II (Practical)	2	1	80	20	100
8	WPE 311	Wet Processing-II	3	3	28	72	100
9	WPE 312	Wet Processing-II (Practical)	2	1	80	20	100
10	TEM 313	Industrial Management	3	3	28	72	100
Total			**26**	**22**	**488**	**512**	**1000**

Yarn Engineering
Level-3, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	YE 301	Application of Computer in Yarn Manufacturing	3	3	28	72	100
2	YE 302	Application of Computer in Yarn Manufacturing (Practical)	2	1	80	20	100
3	YE 305	Process Control in Spinning	3	3	28	72	100
4	YE 306	Process Control in Spinning (Practical)	2	1	80	20	100
5	FE 305	Fabric Structure & Design	3	3	28	72	100
6	FE 306	Fabric Structure & Design (Practical)	2	1	80	20	100
7	MDM 301	Utility Machinery	3	3	28	72	100
8	TEM 303	Accounting and Cost Management	3	3	28	72	100
9	IPE 301	Automation & Control Engineering	3	3	28	72	100
Total			**24**	**21**	**408**	**492**	**900**

Yarn Engineering
Level-4, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	HSS 301	Economics	3	3	28	72	100
1	YE 401	Modern Yarn Manufacturing	3	3	28	72	100
2	YE 402	Modern Yarn Manufacturing (Practical)	2	1	80	20	100
3	YE 403	Special Yarn Manufacturing	3	3	28	72	100
4	FE 401	Fabric Testing & Quality Control	3	3	28	72	100
5	FE 402	Fabric Testing & Quality Control (Practical)	2	1	80	20	100
6	TEM 409	Textile & Apparel Merchandizing	3	3	28	72	100
7	HSS 401	Sociology	3	3	28	72	100
Total			**19**	**17**	**300**	**400**	**700**

Yarn Engineering
Level-4, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
3	FE 411	Technical Textile	3	3	28	72	100
2	WPE 407	Environmental Studies	3	3	28	72	100
1	TEM 413	Production Planning & Control	3	3	28	72	100
4	TEM 403	Entrepreneurship & Project Development	3	3	28	72	100
5	YE 404	YE Industrial Attachment (2 months)	3	3	50	50	100
6	YE 406	YE Project Work	3	3	50	50	100
7	YE 408	YE Comprehensive Viva	-	3	-	100	100
Total :			**18**	**21**	**212**	**488**	**700**

Summary of Theoretical, Practical Contact hours and Credits of Fabric Engineering Department							
SL.No.	Level & Term	Contact Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1	L-I T-I	15	8	23	15	4	19
2	L-I T-2	18	8	26	18	4	22
3	L-2 T-I	18	8	26	18	4	22
4	L-2 T-2	18	8	26	18	4	22
5	L-3 T-I	18	8	26	18	4	22
6	L-3 T-2	18	6	24	15	3	18
7	L-4 T-I	15	8	23	15	4	19
8	L-4 T-2	12	8	20	12	10	22
Total		**132**	**62**	**194**	**129**	**37**	**166**

Fabric Engineering
Level-1, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 101	Mathematics-I	3	3	28	72	100
2	PHY 101	Physics - I	3	3	28	72	100
3	PHY 102	Physics - I (Practical)	2	1	80	20	100
4	CHEM 101	Chemistry - I	3	3	28	72	100
5	CHEM 102	Chemistry - I (Practical)	2	1	80	20	100
6	HSS 101	Business and Communicative English	3	3	28	72	100
7	HSS 102	Business and Communicative English (Practical)	2	1	80	20	100
8	YE 101	Natural Textile Fibres	3	3	28	72	100
9	IPE 104	Engineering Drawing (Practical)	2	1	80	20	100
	Total :		**23**	**19**	**460**	**440**	**900**

Fabric Engineering
Level-1, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 103	Mathematics-II	3	3	28	72	100
2	PHY 103	Physics - II	3	3	28	72	100
3	PHY 104	Physics - II (Practical)	2	1	80	20	100
4	CHEM 103	Chemistry - II	3	3	28	72	100
5	CHEM 104	Chemistry - II (Practical)	2	1	80	20	100
6	WPE 101	Polymer Science & Engineering	3	3	28	72	100
7	IPE 101	Engineering Materials	3	3	28	72	100
8	IPE 102	Machine Shop Practice (Practical)	2	1	80	20	100
9	MDM 101	Computer Programming	3	3	28	72	100
10	MDM 102	Computer Programming (Practical)	2	1	80	20	100
	Total		**26**	**22**	**488**	**512**	**1000**

Fabric Engineering
Level-2, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 201	Statistics	3	3	28	72	100
2	YE 201	Fibre and Yarn Testing	3	3	28	72	100
3	YE 202	Fibre and Yarn Testing (Practical)	2	1	80	20	100
4	YE 203	Man-made Textile Fibres	3	3	28	72	100
5	YE 213	Yarn Manufacturing-I	3	3	28	72	100
6	YE 214	Yarn Manufacturing-I (Practical)	2	1	80	20	100
7	FE 203	Weaving Preparatory Process	3	3	28	72	100
8	FE 204	Weaving Preparatory Process (Practical)	2	1	80	20	100
9	IPE 203	Fundamentals of Mechanical Engineering	3	3	28	72	100
10	IPE 204	Fundamentals of Mechanical Engineering (Practical)	2	1	80	20	100
Total			**26**	**22**	**488**	**512**	**1000**

Fabric Engineering
Level-2, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	YE 209	Textile Physics	3	3	28	72	100
2	FE 205	Weaving-I	3	3	28	72	100
3	FE 206	Weaving-I (Practical)	2	1	80	20	100
4	WPE 205	Wet Processing-I	3	3	28	72	100
5	WPE 206	Wet Processing-I (Practical)	2	1	80	20	100
6	AE 205	Apparel Manufacturing-I	3	3	28	72	100
7	AE 206	Apparel Manufacturing-I (Practical)	2	1	80	20	100
8	TEM 201	Fundamentals of Marketing	3	3	28	72	100
9	MDM 201	Fundamentals of Electrical and Electronics Engineering	3	3	28	72	100
10	MDM 202	Fundamentals of Electrical and Electronics Engineering (Practical)	2	1	80	20	100
Total			**26**	**22**	**488**	**512**	**1000**

Fabric Engineering
Level-3, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	HSS 301	Economics	3	3	28	72	100
2	YE 307	Yarn Manufacturing-II	3	3	28	72	100
3	YE 308	Yarn Manufacturing-II (Practical)	2	1	80	20	100
4	FE 307	Knintting-I	3	3	28	72	100
5	FE 308	Knintting-I (Practical)	2	1	80	20	100
6	WPE 311	Wet Processing-II	3	3	28	72	100
7	WPE 312	Wet Processing-II (Practical)	2	1	80	20	100
8	AE 309	Apparel Manufacturing-II	3	3	28	72	100
9	AE 310	Apparel Manufacturing-II (Practical)	2	1	80	20	100
10	TEM 313	Industrial Management	3	3	28	72	100
Total			**26**	**22**	**488**	**512**	**1000**

Fabric Engineering
Level-3, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	FE 301	Application of Computer in	3	3	28	72	100
		Fabric Manufacturing					
2	FE 302	Application of Computer in	2	1	80	20	100
		Fabric Manufacturing (Pactical)					
3	FE 305	Fabric Structure & Design	3	3	28	72	100
4	FE 306	Fabric Structure & Design (Practical)	2	1	80	20	100
5	FE 309	Weaving-II	3	3	28	72	100
6	FE 310	Weaving-II (Practical)	2	1	80	20	100
7	TEM 303	Accounting and Cost Management	3	3	28	72	100
8	IPE 301	Automation & Control Engineering	3	3	28	72	100
Total			**21**	**18**	**380**	**420**	**800**

Fabric Engineering
Level-4, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	HSS 401	Sociology	3	3	28	72	100
2	FE 401	Fabric Testing & Quality Control	3	3	28	72	100
3	FE 402	Fabric Testing & Quality Control (Practical)	2	1	80	20	100
4	FE 404	Knit Fabric Analysis (Practical)	2	1	80	20	100
5	FE 405	Knitting-II	3	3	28	72	100
6	FE 406	Knitting-II (Practical)	2	1	80	20	100
7	FE 409	Special Fabric Production	3	3	28	72	100
8	FE 410	Special Fabric Production (Practical)	2	1	80	20	100
9	TEM 409	Textile & Apparel Merchandizing	3	3	28	72	100
Total			**23**	**19**	**460**	**440**	**900**

Fabric Engineering
Level-4, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	FE 407	Nonwoven	3	3	28	72	100
2	FE 408	Nonwoven (Practical)	2	1	80	20	100
3	FE 411	Technical Textile	3	3	28	72	100
4	WPE 407	Environmental Studies	3	3	28	72	100
5	TEM 413	Production Planning & Control	3	3	28	72	100
6	FE 412	FE Industrial Attachment (2 months)	3	3	50	50	100
7	FE 414	FE Project Work	3	3	50	50	100
8	FE 416	FE Comprehensive Viva	-	3	-	100	100
Total			**20**	**22**	**292**	**508**	**800**

Summary of Theoretical, Practical Contact hours and Credits of Wet Process Engineering Department							
SL.No.	Level & Term	Contact Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1	L-I T-I	15	8	23	15	4	19
2	L-I T-2	15	8	23	15	4	19
3	L-2 T-I	18	6	24	18	3	21
4	L-2 T-2	18	8	26	18	4	22
5	L-3 T-I	21	6	27	21	3	24
6	L-3 T-2	18	8	26	18	4	22
7	L-4 T-I	18	4	22	18	2	20
8	L-4 T-2	9	8	17	9	10	19
	Total :	**132**	**56**	**188**	**132**	**34**	**166**

Wet Process Engineering
Level-1, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 101	Mathematics-I	3	3	28	72	100
2	PHY 101	Physics - I	3	3	28	72	100
3	PHY 102	Physics - I (Practical)	2	1	80	20	100
4	CHEM 101	Chemistry - I	3	3	28	72	100
5	CHEM 102	Chemistry - I (Practical)	2	1	80	20	100
6	WPE 101	Polymer Science & Engineering	3	3	28	72	100
7	IPE 102	Machine Shop Practice (Practical)	2	1	80	20	100
8	MDM 101	Computer Programming	3	3	28	72	100
9	MDM 102	Computer Programming (Practical)	2	1	80	20	100
Total :			**23**	**19**	**460**	**440**	**900**

Wet Process Engineering
Level-1, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 103	Mathematics-II	3	3	28	72	100
2	PHY 103	Physics - II	3	3	28	72	100
3	PHY 104	Physics - II (Practical)	2	1	80	20	100
4	CHEM 103	Chemistry - II	3	3	28	72	100
5	CHEM 104	Chemistry - II (Practical)	2	1	80	20	100
6	HSS 101	Business and Communicative English	3	3	28	72	100
7	HSS 102	Business and Communicative English (Practical)	2	1	80	20	100
8	YE 101	Natural Textile Fibres	3	3	28	72	100
9	IPE 104	Engineering Drawing (Practical)	2	1	80	20	100
Total :			**23**	**19**	**460**	**440**	**900**

Wet Process Engineering
Level-2, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	WPE 201	Wet Preparatory Process	3	3	28	72	100
2	WPE 202	Wet Preparatory Process (Practical)	2	1	80	20	100
3	WPE 203	Chemistry of Textile Chemicals & Auxiliaries	3	3	28	72	100
4	AE 205	Apparel Manufacturing-I	3	3	28	72	100
5	AE 206	Apparel Manufacturing-I (Practical)	2	1	80	20	100
6	YE 209	Textile Physics	3	3	28	72	100
7	TEM 201	Fundamentals of Marketing	3	3	28	72	100
8	MDM 201	Fundamentals of Electrical and Electronics Engineering	3	3	28	72	100
9	MDM 202	Fundamentals of Electrical and Electronics Engineering (Practical)	2	1	80	20	100
Total :			**24**	**21**	**408**	**492**	**900**

Wet Process Engineering
Level-2, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	YE 213	Yarn Manufacturing-I	3	3	28	72	100
2	YE 214	Yarn Manufacturing-I (Practical)	2	1	80	20	100
3	FE 201	Fabric Manufacturing-I	3	3	28	72	100
4	FE 202	Fabric Manufacturing-I (Practical)	2	1	80	20	100
5	YE 211	Textile Testing and Quality Control	3	3	28	72	100
6	YE 212	Textile Testing and Quality Control (Practical)	2	1	80	20	100
7	YE 203	Man-made Textile Fibres	3	3	28	72	100
8	IPE 203	Fundamentals of Mechanical Engineering	3	3	28	72	100
9	IPE 204	Fundamentals of Mechanical Engineering (Practical)	2	1	80	20	100
10	MS 201	Statistics	3	3	28	72	100
Total :			**26**	**22**	**488**	**512**	**1000**

Wet Process Engineering
Level-3, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	WPE 301	Textile Coloration-I	3	3	28	72	100
2	WPE 302	Textile Coloration-I (Practical)	2	1	80	20	100
3	WPE 303	Application of Computer in Wet Processing	3	3	28	72	100
4	WPE 304	Application of Computer in Wet Processing (Practical)	2	1	80	20	100
5	WPE 305	Chemistry of Dyes & Pigments	3	3	28	72	100
6	WPE 307	Theory of Color Physics	3	3	28	72	100
7	FE 305	Fabric Structure & Design	3	3	28	72	100
8	FE 306	Fabric Structure & Design (Practical)	2	1	80	20	100
9	TEM 303	Accounting and Cost Management	3	3	28	72	100
10	IPE 301	Automation & Control Engineering	3	3	28	72	100
Total :			**27**	**24**	**436**	**564**	**1000**

Wet Process Engineering
Level-3, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	WPE 309	Wet Processing Machinery	3	3	28	72	100
2	WPE 310	Wet Processing Machinery (Practical)	2	1	80	20	100
3	YE 307	Yarn Manufacturing-II	3	3	28	72	100
4	YE 308	Yarn Manufacturing-II (Practical)	2	1	28	72	100
5	FE 303	Fabric Manufacturing-II	3	3	28	72	100
6	FE 304	Fabric Manufacturing-II (Practical)	2	1	80	20	100
7	AE 309	Apparel Manufacturing-II	3	3	28	72	100
8	AE 310	Apparel Manufacturing-II (Practical)	2	1	80	20	100
9	HSS 301	Economics	3	3	28	72	100
10	TEM 313	Industrial Management	3	3	28	72	100
Total :			**26**	**22**	**436**	**564**	**1000**

Wet Process Engineering
Level-4, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	WPE 401	Textile Coloration-II	3	3	28	72	100
2	WPE 402	Textile Coloration-II (Practical)	2	1	80	20	100
3	WPE 403	Textile Finishing	3	3	28	72	100
4	WPE 404	Textile Finishing (Practical)	2	1	80	20	100
5	WPE 405	Technical & Functional Textiles	3	3	28	72	100
6	WPE 407	Environmental Studies	3	3	28	72	100
7	TEM 409	Textile & Apparel Merchandizing	3	3	28	72	100
8	TEM 413	Production Planning & Control	3	3	28	72	100
Total :			**22**	**20**	**328**	**472**	**800**

Wet Process Engineering
Level-4, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	WPE 409	Special Wet Processing	3	3	28	72	100
2	WPE 411	Testing and Quality Control of Finished Textiles	3	3	28	72	100
3	WPE 412	Testing and Quality Control of Finished Textiles (Practical)	2	1	80	20	100
4	HSS 401	Sociology	3	3	28	72	100
5	WPE 414	WPE Industrial Attachment (2 months)	3	3	50	50	100
6	WPE 416	WPE Project Work	3	3	50	50	100
7	WPE 418	WPE Comprehensive Viva	-	3	-	100	100
Total :			**17**	**19**	**264**	**436**	**700**

Summary of Theoretical, Practical Contact hours and Credits of Apparel Engineering Department							
SL.No.	Level & Term	Contact Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1	L-I T-I	15	8	23	15	4	19
2	L-I T-2	18	8	26	18	4	22
3	L-2 T-I	15	8	23	15	4	19
4	L-2 T-2	18	8	26	18	4	22
5	L-3 T-I	15	6	21	15	3	18
6	L-3 T-2	18	10	28	18	5	23
7	L-4 T-I	18	4	22	18	2	20
8	L-4 T-2	12	6	18	12	9	21
Total		**129**	**58**	**187**	**129**	**35**	**164**

Apparel Engineering
Level-1, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 101	Mathematics-I	3	3	28	72	100
2	PHY 101	Physics - I	3	3	28	72	100
3	PHY 102	Physics - I (Practical)	2	1	80	20	100
4	CHEM 101	Chemistry - I	3	3	28	72	100
5	CHEM 102	Chemistry - I (Practical)	2	1	80	20	100
6	WPE 101	Polymer Science & Engineering	3	3	28	72	100
7	IPE 102	Machine Shop Practice (Practical)	2	1	80	20	100
8	MDM 101	Computer Programming	3	3	28	72	100
9	MDM 102	Computer Programming (Practical)	2	1	80	20	100
	Total :		**23**	**19**	**460**	**440**	**900**

Apparel Engineering
Level-1, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 103	Mathematics-II	3	3	28	72	100
2	PHY 103	Physics - II	3	3	28	72	100
3	PHY 104	Physics - II (Practical)	2	1	80	20	100
4	CHEM 103	Chemistry - II	3	3	28	72	100
5	CHEM 104	Chemistry - II (Practical)	2	1	80	20	100
6	HSS 101	Business and Communicative English	3	3	28	72	100
7	HSS 102	Business and Communicative English (Practical)	2	1	80	20	100
8	YE 101	Natural Textile Fibres	3	3	28	72	100
9	AE 101	Introduction to Apparel Engineering	3	3	28	72	100
10	IPE 104	Engineering Drawing (Practical)	2	1	80	20	100
	Total		**26**	**22**	**488**	**512**	**1000**

Apparel Engineering
Level-2, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	AE 201	Apparel Production-I	3	3	28	72	100
2	AE 202	Apparel Production-I (Practical)	2	1	80	20	100
3	AE 204	Pattern Making I (Practical)	2	1	80	20	100
4	YE 209	Textile Physics	3	3	28	72	100
5	TEM 201	Fundamentals of Marketing	3	3	28	72	100
6	MDM 201	Fundamentals of Electrical and Electronics Engineering	3	3	28	72	100
7	MDM 202	Fundamentals of Electrical and Electronics Engineering (Practical)	2	1	80	20	100
8	WPE 205	Wet Processing-I	3	3	28	72	100
9	WPE 206	Wet Processing-I (Practical)	2	1	80	20	100
	Total		**23**	**19**	**460**	**440**	**900**

Apparel Engineering
Level-2, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 201	Statistics	3	3	28	72	100
2	YE 213	Yarn Manufacturing-I	3	3	28	72	100
3	YE 214	Yarn Manufacturing-I (Practical)	2	1	80	20	100
4	FE 201	Fabric Manufacturing-I	3	3	28	72	100
5	FE 202	Fabric Manufacturing-I (Practical)	2	1	80	20	100
6	YE 203	Man-made Textile Fibres	3	3	28	72	100
7	YE 211	Textile Testing and Quality Control	3	3	28	72	100
8	YE 212	Textile Testing and Quality Control (Practical)	2	1	80	20	100
9	IPE 203	Fundamentals of Mechanical Engineering	3	3	28	72	100
10	IPE 204	Fundamentals of Mechanical Engineering (Practical)	2	1	80	20	100
	Total		**26**	**22**	**488**	**512**	**1000**

Apparel Engineering
Level-3, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	AE 301	Apparel Production II	3	3	28	72	100
2	AE 302	Apparel Production II (Practical)	2	1	80	20	100
3	AE 304	Pattern Making II (Practical)	2	1	80	20	100
4	FE 305	Fabric Structure & Design	3	3	28	72	100
5	FE 306	Fabric Structure & Design (Practical)	2	1	80	20	100
6	TEM 309	Quality Management	3	3	28	72	100
7	TEM 303	Accounting and Cost Management	3	3	28	72	100
8	IPE 301	Automation & Control Engineering	3	3	28	72	100
Total			**21**	**18**	**380**	**420**	**800**

Apparel Engineering
Level-3, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	AE 305	Apparel Washing, Dyeing & Printing	3	3	28	72	100
2	AE 306	Apparel Washing, Dyeing & Printing (Practical)	2	1	80	20	100
3	AE 308	Pattern Making III (Practical)	2	1	80	20	100
4	YE 307	Yarn Manufacturing-II	3	3	28	72	100
5	YE 308	Yarn Manufacturing-II (Practical)	2	1	80	20	100
6	FE 303	Fabric Manufacturing-II	3	3	28	72	100
7	FE 304	Fabric Manufacturing-II (Practical)	2	1	80	20	100
8	WPE 311	Wet Processing-II	3	3	28	72	100
9	WPE 312	Wet Processing-II (Practical)	2	1	80	20	100
10	TEM 313	Industrial Management	3	3	28	72	100
11	HSS 301	Economics	3	3	28	72	100
Total			**28**	**23**	**568**	**532**	**1100**

Apparel Engineering
Level-4, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	AE 401	Apparel Merchandising	3	3	28	72	100
2	AE 403	Commercial Issues in Apparel Business	3	3	28	72	100
3	AE 404	Pattern Making-IV (Practical)	2	1	80	20	100
4	AE 405	Apparel Production, Planning & Control	3	3	28	72	100
5	AE 407	Application of Computer in Apparel Manufacturing	3	3	28	72	100
6	AE 408	Application of Computer in Apparel Manufacturing (Practical)	2	1	80	20	100
7	AE 409	Clothing Comfort	3	3	28	72	100
8	WPE 407	Environmental Studies	3	3	28	72	100
Total			**22**	**20**	**328**	**472**	**800**

Apparel Engineering
Level-4, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	AE 411	Special Apparel Production	3	3	28	72	100
2	AE 413	Industrial Engineering in Apparel Production	3	3	28	72	100
3	AE 415	Compliance in Apparel Industry	3	3	28	72	100
4	HSS 401	Sociology	3	3	28	72	100
5	AE 416	AE Industrial Attachment (2 months)	3	3	50	50	100
6	AE 418	AE Project Work	3	3	50	50	100
7	AE 420	AE Comprehensive Viva	-	3	-	100	100
Total			**18**	**21**	**212**	**488**	**700**

Summary of Theoretical, Practical Contact hours and Credits of Textile Engineering Management Department							
SL.No.	Level & Term	Contact Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1	L-I T-I	15	8	23	15	4	19
2	L-I T-2	18	8	26	18	4	22
3	L-2 T-I	18	6	24	18	3	21
4	L-2 T-2	18	8	26	18	4	22
5	L-3 T-I	18	8	26	18	4	22
6	L-3 T-2	18	4	22	18	2	20
7	L-4 T-I	18	6	24	18	3	21
8	L-4 T-2	6	9	15	9	9	18
	Total	**129**	**57**	**186**	**132**	**33**	**165**

Textile Engineering Management
Level-1, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 101	Mathematics-I	3	3	28	72	100
2	PHY 101	Physics - I	3	3	28	72	100
3	PHY 102	Physics - I (Practical)	2	1	80	20	100
4	CHEM 101	Chemistry - I	3	3	28	72	100
5	CHEM 102	Chemistry - I (Practical)		1	80	20	100
6	HSS 101	Business and Communicative English	3	3	28	72	100
7	HSS 102	Business and Communicative English (Practical)	2	1	80	20	100
8	YE 101	Natural Textile Fibres	3	3	28	72	100
9	IPE 104	Engineering Drawing (Practical)	2	1	80	20	100
Total :			**23**	**19**	**460**	**440**	**900**

Textile Engineering Management
Level-1, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	TEM 101	Fundamentals of Management	3	3	28	72	100
2	MS 103	Mathematics-II	3	3	28	72	100
2	PHY 103	Physics - II	3	3	28	72	100
3	PHY 104	Physics - II (Practical)	2	1	80	20	100
4	CHEM 103	Chemistry - II	3	3	28	72	100
5	CHEM 104	Chemistry - II (Practical)	2	1	80	20	100
6	WPE 101	Polymer Science & Engineering	3	3	28	72	100
8	IPE 102	Machine Shop Practice (Practical)	2	1	80	20	100
9	MDM 101	Computer Programming	3	3	28	72	100
10	MDM 102	Computer Programming (Practical)	2	1	80	20	100
Total			**26**	**22**	**488**	**512**	**1000**

Textile Engineering Management
Level-2, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	TEM 201	Fundamentals of Marketing	3	3	28	72	100
2	YE 203	Man-made Textile Fibres	3	3	28	72	100
3	YE 213	Yarn Manufacturing-I	3	3	28	72	100
4	YE 214	Yarn Manufacturing-I (Practical)	2	1	80	20	100
5	FE 201	Fabric Manufacturing-I	3	3	28	72	100
6	FE 202	Fabric Manufacturing-I (Practical)	2	1	80	20	100
7	IPE 203	Fundamentals of Mechanical Engineering	3	3	28	72	100
8	IPE 204	Fundamentals of Mechanical Engineering (Practical)	2	1	80	20	100
9	MS 201	Statistics	3	3	28	72	100
	Total		**24**	**21**	**408**	**492**	**900**

Textile Engineering Management
Level-2, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	TEM 203	Operations Management	3	3	28	72	100
2	YE 209	Textile Physics	3	3	28	72	100
3	YE 211	Textile Testing and Quality Control	3	3	28	72	100
4	YE 212	Textile Testing and Quality Control (Practical)	2	1	80	20	100
5	WPE 205	Wet Processing-I	3	3	28	72	100
6	WPE 206	Wet Processing-I (Practical)	2	1	80	20	100
7	AE 205	Apparel Manufacturing-I	3	3	28	72	100
8	AE 206	Apparel Manufacturing-I (Practical)	2	1	80	20	100
9	MDM 201	Fundamentals of Electrical and Electronics Engineering	3	3	28	72	100
10	MDM 202	Fundamentals of Electrical and Electronics Engineering (Practical)	2	1	80	20	100
	Total		**26**	**22**	**488**	**512**	**1000**

Textile Engineering Management
Level-3, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	TEM 301	Human Resource Management	3	3	28	72	100
2	HSS 301	Economics	3	3	28	72	100
3	YE 307	Yarn Manufacturing-II	3	3	28	72	100
4	YE 308	Yarn Manufacturing-II (Practical)	3	1	80	20	100
5	FE 303	Fabric Manufacturing-II	3	3	28	72	100
6	FE 304	Fabric Manufacturing-II (Practical)	2	1	80	20	100
7	WPE 311	Wet Processing-II	3	3	28	72	100
8	WPE 312	Wet Processing-II (Practical)	2	1	80	20	100
9	AE 309	Apparel Manufacturing-II	3	3	28	72	100
10	AE 310	Apparel Manufacturing-II (Practical)	2	1	80	20	100
	Total		**27**	**22**	**488**	**512**	**1000**

Textile Engineering Management
Level-3, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	TEM 303	Accounting and Cost Management	3	3	28	72	100
2	TEM 305	Financial Management	3	3	28	72	100
3	TEM 307	Managerial Economics	3	3	28	72	100
4	TEM 309	Quality Management	3	3	28	72	100
5	TEM 311	Application of Computer in Textile Management	3	3	28	72	100
6	TEM 312	Application of Computer in Textile Management (Practical)	2	1	80	20	100
7	FE 305	Fabric Structure & Design	3	3	28	72	100
8	FE 306	Fabric Structure & Design (Practical)	2	1	80	20	100
	Total		**22**	**20**	**328**	**472**	**800**

Textile Engineering Management
Level-4, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	TEM 401	Business Ethics & Legal Environment	3	3	28	72	100
2	TEM 403	Entrepreneurship & Project Development	3	3	28	72	100
3	TEM 404	Project Development (Practical)	2	1	80	20	100
4	TEM 405	Market Research &Product Development	3	3	28	72	100
5	TEM 406	Product Development (Practical)	2	1	80	20	100
6	TEM 407	Supply Chain Management	3	3	28	72	100
7	TEM 408	Supply Chain Management (Practical)	2	1	80	20	100
8	TEM 409	Textile & Apparel Merchandizing	3	3	28	72	100
9	HSS 401	Sociology	3	3	28	72	100
Total			**24**	**21**	**408**	**492**	**900**

Textile Engineering Management
Level-4, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	TEM 411	International Business	3	3	28	72	100
2	TEM 413	Production Planning & Control	3	3	28	72	100
3	WPE 407	Environmental Studies	3	3	28	72	100
4	TEM 414	TEM Industrial Attachment (2 Months)	3	3	50	50	100
5	TEM 416	TEM Project Work	3	3	50	50	100
6	TEM 418	TEM Comprehensive Viva	-	3	-	100	100
Total			**15**	**18**	**184**	**416**	**600**

Summary of Theoretical, Practical Contact hours and Credits of Textile Fashion Design Department							
SL.No.	Level & Term	Contact Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1	L-I T-I	18	8	26	18	4	22
2	L-I T-2	18	10	28	18	5	23
3	L-2 T-I	15	10	25	15	5	20
4	L-2 T-2	18	12	30	18	6	24
5	L-3 T-I	15	10	25	15	5	20
6	L-3 T-2	15	12	27	15	6	21
7	L-4 T-I	12	8	20	12	4	16
8	L-4 T-2	9	8	17	9	10	19
Total		**120**	**78**	**198**	**120**	**45**	**165**

Textile Fashion and Design
Level-1, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 101	Mathematics-I	3	3	28	72	100
2	PHY 101	Physics - I	3	3	28	72	100
3	PHY 102	Physics - I (Practical)	2	1	80	20	100
4	CHEM 101	Chemistry - I	3	3	28	72	100
5	CHEM 102	Chemistry - I (Practical)	2	1	80	20	100
6	WPE 101	Polymer Science & Engineering	3	3	28	72	100
8	MDM 101	Computer Programming	3	3	28	72	100
9	MDM 102	Computer Programming (Practical)	2	1	80	20	100
10	TFD 101	Basic Fashion Studies	3	3	28	72	100
11	TFD 102	Fashion Design- I (Practical)	2	1	80	20	100
Total			**26**	**22**	**488**	**512**	**1000**

Textile Fashion and Design
Level-1, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 103	Mathematics-II	3	3	28	72	100
2	PHY 103	Physics - II	3	3	28	72	100
3	PHY 104	Physics - II (Practical)	2	1	80	20	100
4	CHEM 103	Chemistry - II	3	3	28	72	100
5	CHEM 104	Chemistry - II (Practical) 2	1	80	20	100	
6	IPE 104	Engineering Drawing (Practical)	2	1	80	20	100
7	YE 101	Natural Textile Fibres	3	3	28	72	100
8	HSS 101	Business and Communicative English	3	3	28	72	100
9	HSS 102	Business and Communicative English (Practical)	2	1	80	20	100
10	TFD 103	Fashion History	3	3	28	72	100
11	TFD 104	Fashion Illustration-I (Practical)	2	1	80	20	100
Total			**28**	**23**	**568**	**532**	**1100**

Textile Fashion and Design
Level-2, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	YE 209	Textile Physics	3	3	28	72	100
2	TEM 201	Fundamentals of Marketing	3	3	28	72	100
3	MDM 201	Fundamentals of Electrical and Electronics Engineering	3	3	28	72	100
4	MDM 202	Fundamentals of Electrical and Electronics Engineering (Practical)	2	1	80	20	100
5	WPE 205	Wet Processing-I	3	3	28	72	100
6	WPE 206	Wet Processing-I (Practical)	2	1	80	20	100
7	AE 205	Apparel Manufacturing-I	3	3	28	72	100
8	AE 206	Apparel Manufacturing-I (Practical)	2	1	80	20	100
9	TFD 202	Fashion Design-II (Practical)	2	1	80	20	100
10	TFD 204	Pattern Drafting-I (Practical)	2	1	80	20	100
Total			**25**	**20**	**540**	**460**	**1000**

Textile Fashion and Design
Level-2, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour Week	Credit	Mark Distribution*		
					C	F	Total
1	YE 213	Yarn Manufacturing-I	3	3	28	72	100
2	YE 214	Yarn Manufacturing-I (Practical)	2	1	80	20	100
3	FE 201	Fabric Manufacturing-I	3	3	28	72	100
4	FE 202	Fabric Manufacturing-I (Practical)	2	1	80	20	100
5	YE 203	Man-made Textile Fibres	3	3	28	72	100
6	YE 211	Textile Testing and Quality Control	3	3	28	72	100
7	YE 212	Textile Testing and Quality Control (Practical)	2	1	80	20	100
8	IPE 203	Fundamentals of Mechanical Engineering	3	3	28	72	100
9	IPE 204	Fundamentals of Mechanical Engineering (Practical)	2	1	80	20	100
10	MS 201	Statistics	3	3	28	72	100
11	TFD 206	Fashion Illustration II (Practical)	2	1	80	20	100
12	TFD 208	Pattern Drafting-II (Practical)	2	1	80	20	100
Total			**30**	**24**	**648**	**552**	**1200**

Textile Fashion and Design
Level-3, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	FE 305	Fabric Structure & Design	3	3	28	72	100
2	FE 306	Fabric Structure & Design (Practical)	2	1	80	20	100
3	TEM 309	Quality Management	3	3	28	72	100
4	TEM 303	Accounting and Cost Management	3	3	28	72	100
5	TFD 301	Textile Coloration and Surface Ornamentation	3	3	28	72	100
6	TFD 302	Textile Coloration and Surface Ornamentation(Practical)	2	1	80	20	100
7	TFD 303	Application of Computer in Fashion Design	3	3	80	20	100
8	TFD 304	Application of Computer in Fashion Design (Practical)	2	1	80	20	100
9	TFD 306	Fashion Design - III (Practical)	2	1	80	20	100
10	TFD 308	Fashion Draping (Practical)	2	1	80	20	100
	Total		**25**	**20**	**592**	**408**	**1000**

Textile Fashion and Design
Level-3, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	YE 307	Yarn Manufacturing-II	3	3	28	72	100
2	YE 214	Yarn Manufacturing-I (Practical)	2	1	28	72	100
3	FE 303	Fabric Manufacturing-II	3	3	28	72	100
4	FE 304	Fabric Manufacturing-II (Practical)	2	1	80	20	100
5	HSS 301	Economics	3	3	28	72	100
6	WPE 311	Wet Processing-II	3	3	28	72	100
7	WPE 312	Wet Processing-II (Practical)	2	1	80	20	100
8	AE 309	Apparel Manufacturing-II	3	3	28	72	100
9	AE 302	Apparel Production II (Practical)	2	1	80	20	100
10	TFD 310	Creative Design Analysis & Collection (Practical)	2	1	80	20	100
11	TFD 312	Professional Studio Practice (Pratical)	2	1	80	20	100
	Total		**27**	**21**	**568**	**532**	**1100**

Textile Fashion and Design
Level-4, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	WPE 407	Environmental Studies	3	3	28	72	100
2	TFD 401	Fashion Merchandising & Retailing	3	3	28	72	100
3	TFD 402	Fashion Composition & Accessories (Practical)	2	1	28	72	100
4	TFD 403	Special Clothing & Materials	3	3	28	72	100
5	TFD 404	Computer Aided Design & Manufacturing (Practical)	2	1	80	20	100
6	TFD 406	Product Development, Preparation and Presentation (Practical)	2	1	80	20	100
7	TFD 408	Portfolio Development (Practical)	2	1	80	20	100
8	TFD 405	Fashion Forecasting and Trend Analysis	3	3	28	72	100
Total			**20**	**16**	**380**	**420**	**800**

Textile Fashion and Design
Level-4, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour Week	Credit	Mark Distribution*		
					C	F	Total
1	HSS 401	Sociology	3	3	28	72	100
2	TFD 407	Consumer Behaviour in Fashion	3	3	28	72	100
3	TFD 409	Fashion Brand Analysis and Development	3	3	28	72	100
4	TFD 410	Final Dress submission & Presentation (Practical)	2	1	80	20	100
5	TFD 412	TFD Industrial Attachment (2 Months)	3	3	50	50	100
6	TFD 414	TFD Project Work	3	3	50	50	100
7	TFD 416	TFD Comprehensive Viva	-	3	-	100	100
Total			**17**	**19**	**264**	**436**	**700**

Summary of Theoretical, Practical Contact hours and Credits of Industrial and Production Engineering Department							
SL.No.	Level & Term	Contact Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1	L-1 T-1	18	8	26	18	4	22
2	L-1 T-2	15	10	25	15	5	20
3	L-2 T-1	18	8	26	18	4	22
4	L-2 T-2	18	8	26	18	4	22
5	L-3 T-1	18	6	24	18	3	21
6	L-3 T-2	18	8	26	18	4	22
7	L-4 T-1	15	6	21	15	3	18
8	L-4 T-2	9	10	19	9	10	19
	Total	**129**	**64**	**193**	**129**	**37**	**166**

Industrial and Production Engineering
Level-1, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	IPE 101	Engineering Materials	3	3	28	72	100
2	IPE 102	Machine Shop Practice (Practical)	2	1	80	20	100
3	MS 101	Mathematics-I	3	3	28	72	100
4	PHY 101	Physics - I	3	3	28	72	100
5	PHY 102	Physics - I (Practical)	2	1	80	20	100
6	CHEM 101	Chemistry - I	3	3	28	72	100
7	CHEM 102	Chemistry - I (Practical)	2	1	80	20	100
8	WPE 101	Polymer Science & Engineering	3	3	28	72	100
9	MDM 101	Computer Programming	3	3	28	72	100
10	MDM 102	Computer Programming (Practical)	2	1	80	20	100
	Total :		**26**	**22**	**488**	**512**	**1000**

Industrial and Production Engineering
Level-1, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour Week	Credit	Mark Distribution*		
					C	F	Total
1	IPE 104	Engineering Drawing (Practical)	2	1	80	20	100
2	IPE 106	Engineering Graphics (Auto CAD, Solid Works Practical)	2	1	28	72	100
3	MS 103	Mathematics-II	3	3	28	72	100
4	PHY 103	Physics - II	3	3	28	72	100
5	PHY 104	Physics - II (Practical)	2	1	80	20	100
6	CHEM 103	Chemistry - II	3	3	28	72	100
7	CHEM 104	Chemistry - II (Practical)	2	1	80	20	100
8	HSS 101	Business and Communicative English	3	3	28	72	100
9	HSS 102	Business and Communicative English (Practical)	2	1	80	20	100
10	YF 101	Natural Textile Fibres	3	3	28	72	100
	Total		**25**	**20**	**488**	**512**	**1000**

Industrial and Production Engineering
Level-2, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	IPE 201	Manufacturing Processes	3	3	28	72	100
2	IPE 202	Manufacturing Processes (Practical)	2	1	80	20	100
3	YE 209	Textile Physics	3	3	28	72	100
4	WPE 205	Wet Processing-I	3	3	28	72	100
5	WPE 206	Wet Processing-I (Practical)	2	1	80	20	100
6	AE 205	Apparel Manufacturing-I	3	3	28	72	100
7	AE 206	Apparel Manufacturing-I (Practical)	2	1	80	20	100
8	TEM 201	Fundamentals of Marketing	3	3	28	72	100
9	MDM 201	Fundamentals of Electrical	3	3	28	72	100
		and Electronics Engineering					
10	MDM 202	Fundamentals of Electrical and Electronics Engineering (Practical)	2	1	80	20	100
Total :			**26**	**22**	**488**	**512**	**1000**

Industrial and Production Engineering
Level-2, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	IPE 203	Fundamentals of Mechanical Engineering	3	3	28	72	100
2	IPE 204	Fundamentals of Mechanical Engineering (Practical)	2	1	80	20	100
3	MS 201	Statistics	3	3	28	72	100
4	YE 203	Man-made Textile Fibres	3	3	28	72	100
5	YE 211	Textile Testing and Quality Control	3	3	28	72	100
6	YE 212	Textile Testing and Quality Control (Practical)	2	1	80	20	100
7	YE 213	Yarn Manufacturing-I	3	3	28	72	100
8	YE 214	Yarn Manufacturing-I (Practical)	2	1	80	20	100
9	FE 201	Fabric Manufacturing-I	3	3	28	72	100
10	FE 202	Fabric Manufacturing-I (Practical)	2	1	80	20	100
Total			**26**	**22**	**488**	**512**	**1000**

Industrial and Production Engineering
Level-3, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	IPE 301	Automation & Control Engineering	3	3	28	72	100
2	IPE 303	Measurement, Instrumentation and Control	3	3	28	72	100
3	IPE 304	Measurement, Instrumentation and Control (Practical)	2	1	80	20	100
4	IPE 305	Product Design	3	3	28	72	100
5	IPE 306	Product Design (Practical)	2	1	80	20	100
6	FE 305	Fabric Structure & Design	3	3	28	72	100
7	FE 306	Fabric Structure & Design (Practical)	2	1	80	20	100
8	TEM 303	Accounting and Cost Management	3	3	28	72	100
9	TEM 309	Quality Management	3	3	28	72	100
	Total :		**24**	**21**	**408**	**492**	**900**

Industrial and Production Engineering
Level-3, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	HSS 301	Economics	3	3	28	72	100
2	YE 307	Yarn Manufacturing-II	3	3	28	72	100
3	YE 308	Yarn Manufacturing-II (Practical)	2	1	80	20	100
4	FE 303	Fabric Manufacturing-II	3	3	28	72	100
5	FE 304	Fabric Manufacturing-II (Practical)	2	1	80	20	100
6	WPE 311	Wet Processing-II	3	3	28	72	100
7	WPE 312	Wet Processing-II (Practical)	2	1	80	20	100
8	AE 309	Apparel Manufacturing-II	3	3	28	72	100
9	AE 310	Apparel Manufacturing-II (Practical)	2	1	80	20	100
10	TEM 313	Industrial Management	3	3	28	72	100
	Total		**26**	**22**	**488**	**512**	**1000**

Industrial and Production Engineering
Level-4, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
2	IPE 401	CAD, CAM & CIM	3	3	28	72	100
3	IPE 404	Engineering Graphics (CATIA Practical)	2	1	80	20	100
4	IPE 405	Material Handling & Maintenance Management	3	3	28	72	100
5	IPE 406	Material Handling & Maintenance Management (Practical)	2	1	80	20	100
6	IPE 407	Operations Management	3	3	28	72	100
7	IPE 409	Operations Research	3	3	28	72	100
2	IPE 411	Ergonomics and Saftey Management	3	3	28	72	100
3	IPE 412	Ergonomics and Saftey Management(Practical)	2	1	80	20	100
Total :			**21**	**18**	**380**	**420**	**800**

Industrial and Production Engineering
Level-4, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	IPE 413	Project & Environment Management	3	3	28	72	100
2	IPE 416	Industrial Simulation (Practical)	2	1	80	20	100
3	IPE 418	IPE Industrial Attachment (2 months)	3	3	50	50	100
4	IPE 420	IPE Project Work	3	3	50	50	100
5	IPE 422	IPE Comprehensive Viva	-	3	-	100	100
6	HSS 401	Sociology	3	3	28	72	100
7	TEM 407	Supply Chain Management	3	3	28	72	100
Total :			**17**	**19**	**264**	**436**	**700**

Summary of Theoretical, Practical Contact hours and Credits of Textile Machinery Design and Maintenance Department							
SL.No.	Level & Term	Contact Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1	L-I T-I	18	8	26	18	4	22
2	L-I T-2	18	8	26	18	4	22
3	L-2 T-I	15	6	21	15	3	18
4	L-2 T-2	15	6	21	15	3	18
5	L-3 T-I	18	8	26	18	4	22
6	L-3 T-2	18	8	26	18	4	22
7	L-4 T-I	18	8	26	18	4	22
8	L-4 T-2	9	8	17	9	10	19
Total		**129**	**60**	**189**	**129**	**36**	**165**

Textile Machinery Design and Maintenance
Level-1, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MDM 101	Computer Programming	3	3	28	72	100
2	MDM 102	Computer Programming (Practical)	2	1	80	20	100
3	MDM 103	Textile Process and Machinery	3	3	28	72	100
4	MS 101	Mathematics-I	3	3	28	72	100
5	PHY 101	Physics - I	3	3	28	72	100
6	PHY 102	Physics - I (Practical)	2	1	80	20	100
7	CHEM 101	Chemistry - I	3	3	28	72	100
8	CHEM 102	Chemistry - I (Practical)	2	1	80	20	100
9	WPE 101	Polymer Science & Engineering	3	3	28	72	100
10	IPE 102	Machine Shop Practice (Practical)	2	1	80	20	100
Total :			**26**	**22**	**488**	**512**	**1000**

Textile Machinery Design and Maintenance
Level-1, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MDM 105	Textile Machine Metallurgy	3	3	28	72	100
2	MDM 106	Machine Drawing (Practical)	2	1	80	20	100
3	MS 103	Mathematics-II	3	3	28	72	100
4	PHY 103	Physics - II		3	28	72	100
5	PHY 104	Physics - II (Practical)	2	1	80	20	100
6	CHEM 103	Chemistry - II	3	3	28	72	100
7	CHEM 104	Chemistry - II (Practical)	2	1	80	20	100
8	HSS 101	Business and Communicative English	3	3	28	72	100
9	HSS 102	Business and Communicative English (practical)	2	1	80	20	100
10	YE 101	Natural Textile Fibres	3	3	28	72	100
Total			**26**	**22**	**488**	**512**	**1000**

Textile Machinery Design and Maintenance
Level-2, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MDM 201	Fundamentals of Electrical and Electronics Engineering	3	3	28	72	100
2	MDM 202	Fundamentals of Electrical and Electronics Engineering (Practical)	2	1	80	20	100
3	YE 209	Textile Physics	3	3	28	72	100
4	WPE 205	Wet Processing-I	3	3	28	72	100
5	WPE 206	Wet Processing-I (Practical)	2	1	80	20	100
6	AE 205	Apparel Manufacturing-I		3	28	72	100
7	AE 206	Apparel Manufacturing-I (Practical)	2	1	80	20	100
8	TEM 201	Fundamentals of Marketing	3	3	28	72	100
Total :			**21**	**18**	**380**	**420**	**800**

Textile Machinery Design and Maintenance
Level-2, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MDM 203	Engineering Mechanics	3	3	28	72	100
2	MDM 204	Engineering Mechanics (Practical)	2	1	80	20	100
3	MS 201	Statistics	3	3	28	72	100
4	YE 203	Man-made Textile Fibres	3	3	28	72	100
5	YE 213	Yarn Manufacturing-I	3	3	28	72	100
6	YE 214	Yarn Manufacturing-I (Practical)	2	1	80	20	100
7	FE 201	Fabric Manufacturing-I	3	3	28	72	100
8	FE 202	Fabric Manufacturing-I (Practical)	2	1	80	20	100
Total			**21**	**18**	**380**	**420**	**800**

Textile Machinery Design and Maintenance
Level-3, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MDM 301	Utility Machinery		3	28	72	100
2	MDM 302	Utility Machinery (Practical)	2	1	80	20	100
3	MDM 303	Machinery Production Processes	3	3	28	72	100
4	MDM 304	Machinery Production Processes (Practical)	2	1	80	20	100
5	MDM 305	Machine Control Engineering	3	3	28	72	100
6	MDM 307	Textile Testing and Machinery	3	3	28	72	100
7	MDM 308	Textile Testing and Machinery (Practical)	2	1	80	20	100
8	FE 305	Fabric Structure & Design	3	3	28	72	100
9	FE 306	Fabric Structure & Design (Practical)	2	1	80	20	100
10	TEM 303	Accounting and Cost Management	3	3	28	72	100
Total :			**26**	**22**	**488**	**512**	**1000**

Textile Machinery Design and Maintenance
Level-3, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	HSS 301	Economics	3	3	28	72	100
2	YE 307	Yarn Manufacturing-II	3	3	28	72	100
3	YE 308	Yarn Manufacturing-II (Practical)	3	1	28	72	100
4	FE 303	Fabric Manufacturing-II	3	3	28	72	100
5	FE 304	Fabric Manufacturing-II (Practical)	2	1	80	20	100
6	WPE 311	Wet Processing-II	3	3	28	72	100
7	WPE 312	Wet Processing-II (Practical)	2	1	80	20	100
8	AE 309	Apparel Manufacturing-II	3	3	28	72	100
9	AE 310	Apparel Manufacturing-II (Practical)	2	1	80	20	100
10	TEM 313	Industrial Management	3	3	28	72	100
Total			**27**	**22**	**436**	**564**	**1000**

Textile Machinery Design and Maintenance
Level-4, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MDM 401	Principles of Machine Maintenance	3	3	28	72	100
2	MDM 403	Yarn Manufacturing Machinery & Maintenance	3	3	28	72	100
3	MDM 404	Yarn Manufacturing Machinery & Maintenance (Practical)	2	1	80	20	100
4	MDM 405	Fabric Manufacturing Machinery & Maintenance	3	3	28	72	100
5	MDM 406	Fabric Manufacturing Machinery & Maintenance (Practical)	2 1		80	20	100
6	MDM 407	Wet Processing Machinery & Maintenance	3	3	28	72	100
7	MDM 408	Wet Processing Machinery & Maintenance (Practical)	2	1	80	20	100
8	MDM 411	Principles of Machine Design	3	3	28	72	100
9	MDM 412	Principles of Machine Design (Practical)	2	1	80	20	100
10	WPE 407	Environmental Studies	3	3	28	72	100
Total :			**26**	**22**	**488**	**512**	**1000**

Textile Machinery Design and Maintenance
Level-4, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour Week	Credit	Mark Distribution*		
					C	F	Total
1	MDM 409	Apparel Manufacturing Machinery & Maintenance	3	3	28	72	100
2	MDM 410	Apparel Manufacturing Machinery & Maintenance (Practical)	2	1	80	20	100
3	MDM 413	Marketing of Textile Machinery	3	3	28	72	100
4	HSS 401	Sociology	3	3	28	72	100
5	MDM 414	MDM Industrial Attachment (2 Months)	3	3	50	50	100
6	MDM 416	MDM Project Work	3	3	50	50	100
7	MDM 418	MDM Comprehensive Viva	-	3	-	100	100
Total :			**17**	**19**	**264**	**436**	**700**

Summary of Theoretical, Practical Contact hours and credits of Dyes and Chemical Engineering Department							
SL/No	Level & Term	Contract Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1.	L-1, T -1	15	8	23	15	3	18
2.	L-1, T -2	18	8	26	18	4	22
3.	L-2, T -1	15	6	21	15	4	19
4.	L-2, T -2	15	8	23	15	4	19
5.	L-3, T -1	18	6	24	18	3	21
6.	L-3, T -2	18	6	24	18	3	21
7.	L-4, T -1	21	4	25	21	2	23
8.	L-4, T -2	12	6	18	12	9	21
Total =		**132**	**52**	**184**	**132**	**33**	**165**

Dyes & Chemical Engineering
Level-1, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 101	Mathematics-I	3	3	28	72	100
2.	PHY 101	Physics-I	3	3	28	72	100
3.	PHY 102	Physics-I (Practical)	2	1	80	20	100
4.	CHEM 101	Chemistry-I	3	3	28	72	100
5.	CHEM 102	Chemistry-I (Practical)	2	1	80	20	100
6.	MDM 101	Computer Programming	3	3	28	72	100
7.	MDM 102	Computer Programming (Practical)	2	1	80	20	100
8.	YE 101	Natural Textile Fibres	3	3	28	72	100
9.	IPE 104	Engineering Drawing (Practical)	2	1	80	20	100
		Total =	**23**	**19**	**460**	**440**	**900**

Dyes & Chemical Engineering
Level-1, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1.	MS 103	Mathematics-II	3	3	28	72	100
2.	PHY 103	Physics-II	3	3	28	72	100
3.	PHY 104	Physics-II (Practical)	2	1	80	20	100
4.	CHEM 103	Chemistry-II	3	3	28	72	100
5.	CHEM 104	Chemistry-II (Practical)	2	1	80	20	100
6.	WPE 101	Polymer Science & Engineering	3	3	28	72	100
7.	IPE 101	Engineering Materials	3	3	28	72	100
8.	IPE 102	Machine Shop Practice (Practical)	2	1	80	20	100
9.	HSS 101	Business & Communicative English	3	3	28	72	100
10.	HSS 102	Business & Communicative English (Practical)	2	1	80	20	100
		Total =	**26**	**22**	**488**	**512**	**1000**

Dyes & Chemical Engineering
Level-2, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1.	DCE 201	Fundamentals of Dyes and Chemicals Engineering	3	3	28	72	100
2.	DCE 202	Fundamentals of Dyes and Chemicals Engineering (Practical)	2	1	80	20	100
3.	YE 213	Yarn Manufacturing-I	3	3	28	72	100
4.	YE 214	Yarn Manufacturing-I (Practical)	2	1	80	20	100
5.	MDM 201	Fundamentals of Electrical and Electronics Engineering	3	3	28	72	100
6.	MDM 202	Fundamentals of Electrical and Electronics Engineering (Practical)	2	1	80	20	100
7.	IPE 203	Fundamentals of Mechanical Engineering	3	3	28	72	100
8.	IPE 204	Fundamentals of Mechanical Engineering (Practical)	2	1	80	20	100
9.	YE 203	Man-made Textile Fibres	3	3	28	72	100
		Total =	**23**	**19**	**460**	**440**	**900**

Dyes & Chemical Engineering
Level-2, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1.	FE 201	Fabric Manufacturing-I	3	3	28	72	100
2.	FE 202	Fabric Manufacturing-I (Practical)	2	1	80	20	100
3.	AE 205	Apparel Manufacturing-I	3	3	28	72	100
4.	AE 206	Apparel Manufacturing-I (Practical)	2	1	80	20	100
5.	WPE 205	Wet Processing -I	3	3	28	72	100
6.	WPE 206	Wet Processing -I (Practical)	2	1	80	20	100
7.	YE 211	Textile Testing and Quality Control	3	3	28	72	100
8.	YE 212	Textile Testing and Quality Control (Practical)	2	1	80	20	100
9.	MS 201	Statistics	3	3	28	72	100
		Total =	**21**	**19**	**460**	**440**	**900**

Dyes & Chemical Engineering
Level-3, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1.	DCE 301	Chemistry of Dyes and Pigments	3	3	28	72	100
2.	DCE 303	Chemistry of Textile Preparatory Chemicals	3	3	28	72	100
3.	YE 323	Yarn Manufacturing-II	3	3	28	72	100
4.	YE 324	Yarn Manufacturing-II (Practical)	2	1	80	20	100
5.	FE 303	Fabric Manufacturing-II	3	3	28	72	100
6.	FE 304	Fabric Manufacturing-II (Practical)	2	1	80	20	100
7.	WPE 311	Wet Processing-II	3	3	28	72	100
8.	WPE 312	Wet Processing-II (Practical)	2	1	80	20	100
9.	TEM 303	Accounting & Cost Management	3	3	28	72	100
		Total =	**24**	**21**	**408**	**492**	**900**

Dyes & Chemical Engineering
Level-3, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1.	DCE 305	Synthesis of Dyes & Chemicals-I	3	3	28	72	100
2.	DCE 306	Synthesis of Dyes & Chemicals-I (Practical)	2	1	80	20	100
3.	DCE 307	Chemicals Testing & Quality Control	3	3	28	72	100
4.	DCE 308	Chemicals Testing & Quality Control (Practical)	2	1	80	20	100
5.	WPE 307	Theory of Color Physics	3	3	28	72	100
6.	AE 309	Apparel Manufacturing-II	3	3	28	7	100
7.	AE 310	Apparel Manufacturing-II (Practical)	2	1	80	20	100
8.	TEM 313	Industrial Management	3	3	28	72	100
9.	HSS 301	Economics	3	3	28	72	100
		Total =	**24**	**21**	**408**	**492**	**900**

Dyes & Chemical Engineering
Level-4, Term-1

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1.	DCE 401	Synthesis of Dyes & Chemicals-II	3	3	28	72	100
2.	DCE 402	Synthesis of Dyes & Chemicals-II (Practical)	2	1	80	20	100
3.	DCE 403	Chemistry of Textile Finishing Chemicals	3	3	28	72	100
4.	DCE 405	Instrumental Analysis	3	3	28	72	100
5.	DCE 407	Biochemical Engineering	3	3	28	72	100
6.	WPE 405	Technical & Functional Textiles	3	3	28	72	100
7.	DCE 409	Application of Computer in Dyes & Chemical Engineering	3	3	28	72	100
8.	DCE 410	Applications of Computer in Dyes & Chemicals Engineering (Practical)	2	1	80	20	100
9.	TEM 405	Market Research & Product Development	3	3	28	72	100
		Total =	**25**	**23**	**356**	**544**	**900**

Dyes & Chemical Engineering
Level-4, Term-2

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1.	DCE 411	Chemical Reaction Engineering	3	3	28	72	100
2.	DCE 413	Chemistry & Applications of Functional Colorants	3	3	28	72	100
3.	WPE 407	Environmental Studies	3	3	28	72	100
4.	HSS 401	Sociology	3	3	28	72	100
5.	DCE 414	Industrial Attachment	3	3	50	50	100
6.	DCE 416	Project Work	3	3	50	50	100
7.	DCE 418	Comprehensive Viva	-	3	-	100	100
		Total =	**18**	**21**	**212**	**488**	**700**

Summary of Theoretical, Practical Contact hours and credits of undergraduate program offered in Department of Environmental Science and Engineering							
Semester	Level & Term	Contact Hours			Credit		
		Theory	Practical	Total	Theory	Practical	Total
1.	L-1, T -I	18	8	26	18	4	22
2.	L-1, T -II	18	8	26	18	4	22
3.	L-2, T -I	18	8	26	18	3	21
4.	L-2, T -II	18	8	26	18	4	22
5.	L-3, T -I	15	8	23	15	4	19
6.	L-3, T -II	18	6	24	18	3	21
7.	L-4, T -I	18	6	24	18	3	21
8.	L-4, T -II	9	9	18	9	9	18
Total =		**132**	**61**	**193**	**132**	**34**	**166**

Environmental Science & Engineering
Level - 1 Term - I

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 101	Mathematics-I	3	3	28	72	100
2	PHY 101	Physics-I	3	3	28	72	100
3	PHY 102	Physics-I (Practical)	2	1	80	20	100
4	CHEM 101	Chemistry-I	3	3	28	72	100
5	CHEM 102	Chemistry-I (Practical)	2	1	80	20	100
6	HSS 101	Business and Communicative English	3	3	28	72	100
7	HSS 102	Business and Communicative English (Practical)	2	1	80	20	100
8	YE 101	Natural Textile Fibres	3	3	28	72	100
9	IPE 104	Engineering Drawing (Practical)	2	1	80	20	100
10	ESE 101	Introduction to Environmental Engineering	3	3	28	72	100
		Total =	**26**	**22**	**488**	**512**	**1000**

Environmental Science & Engineering
Level - 1 Term - II

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	MS 103	Mathematics-II	3	3	28	72	100
2	PHY 103	Physics-II	3	3	28	72	100
3	PHY 104	Physics-II (Practical)	2	1	80	20	100
4	CHEM 103	Chemistry-II	3	3	28	72	100
5	CHEM 104	Chemistry-II (Practical)	2	1	80	20	100
6	WPE 101	Polymer Science & Engineering	3	3	28	72	100
7	MDM 101	Computer Programming	3	3	28	72	100
8	MDM 102	Computer Programming (Practical)	2	1	80	20	100
9	IPE 102	Machine Shop Practice (Practical)	2	1	80	20	100
10	ESE 103	Environmental Chemistry & Biology	3	3	28	72	100
		Total =	**26**	**22**	**488**	**512**	**1000**

Environmental Science & Engineering
Level - 2 Term - I

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	YE 213	Yarn Manufacturing-I	3	3	28	72	100
2	YE 214	Yarn Manufacturing-I (Practical)	2	1	80	20	100
3	FE 201	Fabric Manufacturing-I	3	3	28	72	100
4	FE 202	Fabric Manufacturing-I (Practical)	2	1	80	20	100
5	ESE 201	Industrial Design & Civil Construction	3	3	28	72	100
6	YE 211	Textile Testing and Quality Control	3	3	28	72	100
7	YE 212	Textile Testing and Quality Control (Practical)	2	1	80	20	100
8	YE 203	Man-made Textile Fibres	3	3	28	72	100
9	MS 201	Statistics	3	3	28	72	100
		Total =	**24**	**21**	**408**	**492**	**900**

Environmental Science & Engineering
Level - 2 Term - II

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	AE 205	Apparel Manufacturing-I	3	3	28	72	100
2	AE 206	Apparel Manufacturing-I (Practical)	2	1	80	20	100
3	WPE 205	Wet Processing-I	3	3	28	72	100
4	WPE 206	Wet Processing-I (Practical)	2	1	80	20	100
5	IPE 203	Fundamentals of Mechanical Engineering	3	3	28	72	100
6	IPE 204	Fundamentals of Mechanical Engineering (Practical)	2	1	80	20	100
7	TEM 201	Fundamentals of Marketing	3	3	28	72	100
8	YE 209	Textile Physics	3	3	28	72	100
9	MDM 201	Fundamentals of Electrical & Electronics Engineering	3	3	28	72	100
10	MDM 202	Fundamentals of Electrical & Electronics Engineering (Practical)	2	1	80	20	100
		Total =	**26**	**22**	**488**	**512**	**1000**

Environmental Science & Engineering
Level - 3 Term - I

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	YE 307	Yarn Manufacturing-II	3	3	28	72	100
2	YE 308	Yarn Manufacturing-II (Practical)	2	1	80	20	100
3	FE 303	Fabric Manufacturing-II	3	3	28	72	100
4	FE 304	Fabric Manufacturing-II (Practical)	2	1	80	20	100
5	WPE 311	Wet Processing-II	3	3	28	72	100
6	WPE 312	Wet Processing-II (Practical)	2	1	80	20	100
7	AE 309	Apparel Manufacturing-II	3	3	28	72	100
8	AE 310	Apparel Manufacturing-II (Practical)	2	1	80	20	100
9	ESE 301	Global Climate Change, Adaptation and Disaster Management	3	3	28	72	100
		Total =	**23**	**19**	**460**	**440**	**900**

Environmental Science & Engineering
Level - 3 Term - II

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	FE 305	Fabric Structure & Design	3	3	28	72	100
2	FE 306	Fabric Structure & Design (Practical)	2	1	80	20	100
3	ESE 303	Environmental Pollution & Control: Air, Soil, Noise	3	3	28	72	100
4	ESE 304	Environmental Pollution & Control: Air, Soil, Noise (Practical)	2	1	80	20	100
5	HSS 301	Economics	3	3	28	72	100
6	TEM 303	Accounting and Cost Management	3	3	28	72	100
7	ESE 305	Environmental Analytical & Instrumental Chemistry	3	3	28	72	100
8	ESE 306	Environmental Analytical & Instrumental Chemistry (Practical)	2	1	80	20	100
9	ESE 307	Resource, Energy and Environmental Sustainability	3	3	28	72	100
		Total =	**24**	**21**	**408**	**492**	**900**

Environmental Science & Engineering
Level - 4 Term - I

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	TEM 413	Production Planning & Control	3	3	28	72	100
2	ESE 401	Solid and Hazardous Waste Management	3	3	28	72	100
3	ESE 402	Solid and Hazardous Waste Management (Practical)	2	1	80	20	100
4	ESE 403	Wastewater Management & Modeling	3	3	28	72	100
5	ESE 404	Wastewater Management & Modeling (Practical)	2	1	80	20	100
6	ESE 405	Environmental Impact Studies	3	3	28	72	100
7	ESE 407	Industrial Occupational Hygiene and Safety	3	3	28	72	100
8	ESE 409	Environmental Modeling	3	3	28	72	100
9	ESE 410	Environmental Modeling (Practical)	2	1	80	20	100
		Total =	**24**	**21**	**408**	**492**	**900**

Environmental Science & Engineering
Level - 4 Term - II

Sl. No.	Subject Code	Name of subject	Contact Hour/ Week	Credit	Mark Distribution*		
					C	F	Total
1	ESE 411	Sustainable Textile Processing	3	3	28	72	100
2	ESE 413	Environmental Ethics, Policy and Law	3	3	28	72	100
3	HSS 401	Sociology	3	3	28	72	100
4	ESE 414	ESE Industrial Attachment (2 Months)	3	3	50	50	100
5	ESE 416	ESE Project Work	6	3	50	50	100
6	ESE 418	ESE Comprehensive Viva	-	3	-	100	100
		Total =	**18**	**18**	**184**	**416**	**600**

Department of Mathematics & Statistics

Detailed outline of courses offered for B. Sc. in Textile Engineering

(Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

MS 101 : Mathematics - I

Credit	Hour / Week	Total Hour
3	3	45

Course Outline :

1. **Differential Calculus:** Functions, Limit, Continuity, Differentiability ,Derivatives, Tangent and normal, Expansion of function ; Rolle's theorem ,Mean value theorem,Taylor's series, Maclaurin's series ,L'Hospital's rule ,Convergence and divergence, Extrtema of functions of single variable, Functions of several variables, Partial Derivatives, Chain rule, Euler's theorem .

2. **Integral Calculus :** Indefinite integrals , Different methods of integration (substitution , Integration by parts, Partial fraction). Standard integrals , Integration by successive reduction, Definite integrals and its properties , Walli's formula , improper integrals, Gamma and Beta functions, Arc length of plane curves, Area enclosed by plane curves, volume of solids of revolution .

3. **Linear Algebra :** Matrix , Determinant , Inverse matrix, System of linear equations , Consistent and inconsistent system, Elementary operations , Solution of a system of linear equations, Gaussian elimination method , Cramer's rule, Matrix inversion method , Triangular , Echelon and canonical form of matrix , Rank of matrix ,Test of consistency of a system of linear equation using rank of matrix .

4. **Coordinate Geometry :** Two dimensional coordinate system ,Transformation of coordinates , General equation of second

degree in two variables , Conic Section, Identification of conics.

Three dimensional coordinate system , Direction cosines and ratios , Straight lines, Planes, Conicoids (paraboloid, Ellipsoid, Hyperboloid).

MS 103 : Mathematics - II

Credit	Hour / Week	Total Hour
3	3	45

Course Outline :

1. **Ordinary Differential Equations (ODE) :** Origin of differential equations, Classification of differential equations , Solution of various types of first order ODE, Different methods forsolution of second and higher order ODE (UC, Inverse operator, Variation of parameter), solution of homogeneous linear differential equations .
2. **Vector Analysis:** Scalar and Vector quantity , Scalar and vector product of two vectors and their geometrical interpretations ,vector triple product, Scalar and Vector function, gradient, divergence and curl, Vector line integration, work done, Green's theorem, Vector surface and volume integration, Gauss's divergence theorem , Stoke's theorem .
3. **Complex Variables:** Complex number system , Rectangular and polar form, Modulus and argument, Principal argument, De Moiver's theorem, Euler's formula, Elementary functions of complex Variables, Differentiation, Derivatives, Analytic function, Necessary and sufficient condition for analyticity, Cauchy-Riemann equations, Harmonic function, Harmonic conjugate, Complex line integration, Contours, Cauchy- Goursat theorem, Cauchy's integral formula, Singular point and Pole, Residue , Caquchy's residue theorem, Application of Cauchy's residue theorem to evaluate some special type improper integrals.

4. **Laplace transform (LT):** Definition of Laplace Transform, Laplace transform of elementary functions, Properties of Laplace transform and applications, Inverse Laplace Transform, Convolution theorem, Solution of Ordinary and Partial differential equations using Laplace Transform .

MS 201: Statistics

Credit	Hour / Week	Total Hour
3	3	45

Historical development of the subject. Collection of data - Primary data and secondary data.

Frequency distribution - Grouped frequency distribution and their presentation in the form of frequency polygon, Histogram and Pie diagram.

Measures of central tendency:

(i) Mean : (a) Arithmetic Mean (b) Geometric Mean, (c) Harmonic Mean

(ii) Median

(iii) Mode. Their definition, computation, Advantage, Disadvantage and uses.

Measures of dispersion:

(i) Absolute measure. (a) Range (b) Mean deviation (c) Quartile deviation (d) standard deviation.

(ii) Relative measure. (a) coefficient of variation. Their definition, computation and uses.

Moment, skew ness and kurtosis- Their definition, computation and uses.

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. Probability distribution (i) Binomial, (ii) Poission, (iii) Simple idea about normal

distribution and its probability curve.

Estimation - Simple idea about estimation : Estimation of population mean and proportions, sample size and related mathematical problem.

Correlation and Regression :

(a) Correlation- Ideas of correlation. Measurement of -correlation. Pearsonian correlation co-efficient. and spearman's Rank correlation co-efficient.

(b) Multiple correlation

(c) Regression- Ideas about simple regression. Equation of the regression line. Estimation of the parameters of the regression line.

(d) Multiple regression.

Test of significance - some definitions related to test of significance

(i) t- test. (a) Comparison of a sample mean with a known population mean when S.D. is known and when S.D. is not known. (b) Comparison of two sample means when S.D. is known and also when it is unknown. (c) Paired t test, its practical use in Textile Industry.

(ii) X2 test - Simple application and its practical use in Industry.

(iii) Test related to proportions.

Sampling - Definition of population, sample, parameter, census etc.

(i) Simple Random Sampling, (ii) Stratified random sampling. (iii) Cluster sampling (iv) Systematic sampling, Their definition, computation, use, advantage, disadvantage and related mathematical problems.

Design of experiment: Basic principles of experimental design. Ideas about CRD, RBD and related mathematical problems.

Time series analysis: General idea about time series, different types of time series there construction and computation.

Index Number: General idea about index number, different types of index number, different tests related to index number and its mathematical interpretation.

Demand Analysis: General idea about demand analysis, mathematical interpretation and problems.

Department of Physics

Detailed outline of courses offered for B. Sc in Textile Engineering (Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

PHY 101: Physics - I

Credit	Hour / Week	Total Hour
3	3	45

A. Mechanics:

Fluid Mechanics: Fluid, Rate of flow, Uniform motion, Non uniform motions, Steady motion, Unsteady motion, Streamline motion, Turbulent motion, Equation of continuity, Bernoulli's equation, Speed of efflux : Torricelli's theorem, Venturimeter.

Viscosity: Viscosity, Newton's law of viscous flow - coefficient of viscosity, Critical velocity, Poiseuille's equation, Corrections of Poiseuille's equation, Determination of coefficient of viscosity of a liquid by the capillary flow method.

Surface tension: Molecular forces of cohesion & adhesion, Molecular range : sphere of influence, Surface tension, Surface tension & free energy of a surface, Excess pressure across a curved film or membrane, Capillarity & the angle of contact, Capillary rise: determination of surface tension, Determination of surface tension of water.

Elasticity: Elasticity, Hooke's law, Rigid body, Perfect elastic body, Plastic body, Elastic limit, Breaking weight and breaking stress, Different types of elasticity, Poisson's ratio, Shear is equivalent to compression and extension, Equivalence of a searing stress to an equal tensile & an equal compressive stress at right angles to one another, Relations among the elastic constants, Work done in a strain, Deformation by bending, Bending moment.

Dynamics of circular motion: Moment of Inertia, Radius of Gyration, Theorem of perpendicular axes, Theorem of parallel axes,

Moment of Inertia of a uniform circular disc, Moment of Inertia of a hollow cylinder, Moment of Inertia of a solid sphere, Moment of Inertia of a Flywheel.

B. Optics:

Interference: Wave front, Huygen's principle, Interpretation of law reflection and refraction by Huygen's principle, Interference, Young's experiment, Determination of wave length of light by Fresnel's Biprism, Newton's ring, Colours of thin films.

Diffraction: Diffraction, Fresnel & Fraunhofer diffraction, Diffraction grating and its use, Resolving power of a grating, Dispersive power of a grating, Half period zone, Zone plate, Difference between zone plate & convex lens, X-ray diffraction, Bragg's law.

Polarization: Polarization, Polarization by reflection, Brewster's law; Double refraction, Nicol prism, Malus law, Specific rotation, Laurent's half shade polarimeter.

AS 102: Physics - I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

A. General Physics:

Determination of "g" by compound pendulum.

Determination of moment of inertia of a flywheel.

Determination of Young's modulus of the material of a wire by Vernier method.

Determination of Young's modulus of the material of a wire by Searle's method.

Determination of the rigidity modulus of the material of a wire by oscillation or dynamical method.

Determination of surface tension of water by capillary tube.

Determination of the density of water of various temperatures by specific gravity-bottle.

Determination of the co-efficient of viscosity of a liquid by its flow through a capillary tube.

Determination of surface tension of mercury and the angle of contact by Quincke's method.

Determination of Young's modulus, rigidity modulus and Poisson's ratio of a short wire by Searle's dynamic method.

B. Optics:

Determination of the focal length of a convex lens by conjugate foci method with the help of an optical bench.

Determination of the focal length of a convex lens by displacement method.

Determination of the refractive index of a liquid by using plane mirror and convex lens.

Determination of the refractive index of the material of a prism by spectrometer.

Determination of radius of curvature of a lens by Newton's rings.

Determination of wavelength of sodium light by means of Fresnel's bi-prism.

Determination of wavelength of light from a discharge tube by diffraction grating.

Determination of specific rotation of the plane of polarization in sugar solution using a polarimeter.

PHY 103 : Physics - II

Credit	Hour / Week	Total Hour
3	3	45

Electricity: Coulomb's law, Gauss's law and its application. Capacitors and capacitance, Capacitors with dielectrics, Charging and discharging of a capacitor, Ohm's law; A dipole in an electric field. Electric flux, Kirchhoff's law, Application of Kirchhoff's law to Wheatstone's bridge, Growth and decay of current in L-R circuit. A.C. current, Flow of A.C through inductor, capacitor and resistance in series, Resonance in parallel circuit.

Magnetism: Magnetic Induction, Magnetic force on a current carrying conductor, Torque on a current carrying loop, Hall effect, Faraday's law of electromagnetic induction, Lenz's law of self induction, Mutual induction, Classification of magnetic materials, Hysteresis curve, Electromagnetic Oscillation, L-C oscillations & its analogy to simple harmonic motion.

Kinetic theory of Gases: Heat, Temperature, Different types of Thermometer, Newton's law of cooling, Isothermal & adiabatic process, Adiabatic relation, Fundamental postulates of kinetic theory of gas, Expression of pressure from kinetic theory of gas, Degrees of freedom, Mean free path, Van-der Waals' equation of state, Inter-relations between Van-der Waals' constants & Critical constants, Critical coefficient.

Thermodynamics: System & thermodynamic function, Internal energy, Work done by the gas at constant pressure, First law of thermodynamics, Thermodynamic process, Mechanical equivalent of heat, Cyclic process, Generalization of equation of the difference between two specific heats of gas, Reversible and irreversible process, Second law of thermodynamics, Distinction between 1st & 2nd law of thermodynamics, Efficiency of heat engines, Carnot's cycle and Carnot's engine, Carnot cycle is a reversible cycle, Carnot's theorem, Thermodynamic functions, 3rd law of thermodynamics, Application of 3rd law of thermodynamics, Maxwell's mathematical relation in thermodynamics.

Entropy: Entropy, Change of entropy in reversible & irreversible process, 2nd law of thermodynamics interms of entropy, Entropy and unavailable energy, Entropy and molecular disorderness, Entropy of a perfect gas, Change of entropy is independent of path chosen for the transformation, Clausius's theorem, Clausius-Clapeyron equation or 1st latent heat equation.

Modern Physics: Properties of radiation, Blackbody & blackbody radiation, Emissive power, Absorptive power, Reflecting power, Transmitting power, Kirchhoff's law, Stefan-Boltzman law, Quantum theory of radiation, Special theory of relativity, Lorentz transformation, De-Broglie wave, Photoelectric effect, Compton Effect.

PHY 104 : Physics - II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

A. Electricity:

Determination of resistance of Galvanometer by half deflection method.

Determination of the end-correction of a meter bridge.

Determination of specific resistance of a wire by meter Bridge.

Determination the resistance of a wire by P.O. Box.

Verification of Ohm's law using a tangent Galvanometer.

Determination of the E.C.E of copper.

Determination of the mechanical equivalent of heat by electrical calorimeter.

Determination of the horizontal component of the earth's magnetic field and the magnetic moment of a magnet by magnetometers.

Determination of a high resistance by the method of deflection.

Determination of the value of low resistance by the method of fall of potential.

B. Heat:

Determination of coefficient of linear expansion of solid.

Determination of thermal conductivity of metals.

Determination of Specific heat of solid by the method of mixture with radiation correction.

Determination of specific heat of liquid by the method of cooling.

Determination of Specific heat of liquid by the method of mixture with radiation correction.

Determination of the true temperature of a mixture by radiation correction.

Determination of the boiling point of a liquid by platinum Resistance thermometer.

Determination of the pressure coefficient of a gas at constant volume by constant volume air thermometer.

Department of Chemistry

Detailed outline of courses offered for B. Sc in Textile Engineering

(Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

CHEM 101 : Chemistry - I

Credit	Hour / Week	Total Hour
3	3	45

Periodicity of the elements: Mendeleev's periodic law and periodic table, Distribution of electron in the atoms of elements. Pauli exclusion principle, Aufbau principle, Heisenberg uncertainly principle, Hund's rule, writing electron configuration using the periodic table. Some periodic properties - such as Atomic and Ionic radii, Ionization potential, Electron affinity.

Chemical bonding: Electronic theory of chemical bond, Nature of covalent bond. Fajan's rule, Valance bond theory (VBT), Molecular Orbital theory (MOT), Bond order or bond multiplicity.

Complex Compounds: Types of ligands, Sidgwick theory, Werner theory, Crystal field theory, structure, isomerism and applications.

Acid and Bases: Various concept of acid and bases, Neutralization, Reaction, Strength of acid and bases, Hard and soft acid and bases. Acid bases properties of oxides, hydroxide and salt. Effect of structure on acid bases properties.

Analytical analysis: Instrumental methods and their classification, Advantage of Instrumental method & Chemical method, Limitations of instrumental and chemical method, Sampling. Precision and accuracy, mean and median, types of errors, Significant figure convention.

Physical Chemistry

Theory of dilute solution:- Collegative properties

i) Lowering of vapor pressure
ii) Elevation of boiling point
iii) Depression of Freezing point
iv) Osmosis and osmotic Pressure, Deduction of their formulae and mol. wt. from Raoults law and their experimental determination.

Chemical Equilibrium: Law of mass action, Equilibrium constant, Application of law of mass action to some chemical reaction, Heterogeneous equilibrium, Le-chatelier principle and its application to industrial reactions.

Chemical Kinetics: Rate of reaction, order and molecularity, Zero order reaction, 1st and 2nd order reaction with its mathematical formulation, Determination of order of reaction, Effect of temperature on rate of reaction. Theories of chemical reaction rate, Activation Energy, Activation complex etc. Homogeneous and heterogeneous catalysis, Acid-base catalysis, Enzyme catalysis catalysis retardation and poisoning.

Colloids and Colloidal solution: Classification ,Preparation and purification, Properties, Protective action and application of colloids. Emulsion, Types of emulsion, Role of emulsion.

Photochemistry: Laws of photochemistry, Quantum yield, Decomposition of hydrogen halide, photosensitized reaction, Fluorescence and phosphorescence, Luminescence and Chemiluminescence's.

CHEM 102: Chemistry - I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Qualitative analysis of inorganic mixtures containing not less than three radicals including insoluble and interfering radicals . Analysis include the following:

Dry test for acid radicals (CO_3^{-2}, SO_4^{-2},NO_3^-, Cl^- etc).

Dry test for basic radical.

Preparation of stock solution & wet test for acid radicals (CO_3^{-2}, SO_4^{-2},NO_3^-, Cl^-)

Separation of group I, II, IIIA, IIIB, IV, V.

Analysis of group I (Pb, Ag, Hg).

Analysis of group II (Pb, Cu, Cd, Hg, Sb, Sn).

Analysis of group IIIA (Al, Fe, Cr).

Analysis of group IIIB (Co, Ni, Zn, Mn).

Analysis of group IV (Ca, Ba, Sr).

Analysis of group V (Mg, Na, K, NH_4^+).

Volumetric Analysis:

Preparation of 1M. HCl and standardization.

Preparation of 1M. NaOH and standardization.

Conversation of 98% H_2SO_4 or 37% HCl into suitable concentration.

Preparation of 1M. H_2SO_4l & standardization.

Preparation of 1M. CH_3COOH & standardization.

Preparation of 1M. KOH & standardization.

Inorganic preparation:

Preparation of Chrome Alum.

Preparation of Ferrous Ammonium Sulphate.

Preparation of Potassium dichromate.

Preparation of Potassium Permanganate.

Variation of PH of different solution (Acidic, Basic, Neutral)

CHEM 103 : Chemistry - II

Credit	Hour / Week	Total Hour
3	3	45

Organic Reactions and their Mechanisms:

Inductive effect, Electrometric effect, Mesomeric effect, Carbonium ions, Carbonions, SN1, SN2, E1, E2, Addition reactions.

Organo-metallic Compounds

Importance and structure.

Grignard reagent:- Preparation, Important reactions and application in organic Synthesis.

Organo-zinc compound:- Preparation, properties, reactions and uses.

Tetraethyl lead (TEL):- Preparation, reactions and uses.

Hydroxy compounds

Alcohols:- Classification, Nomenclature, structure, isomerism, general methods of preparation, reactions of aliphatic and aromatic alcohols.

Phenols:- Classification, structure, preparation and important reactions.

Carbonyl Compounds

Aliphatic aldehydes and ketornes:- Structure Nomclature, imsomerism, general methods of preparation and important reactions.

Aromatic aldehydes and ketones:- Structure, Nomenclature, general methods of preparation and important reactions.

Carboxylic Acids

Mono-carboxylic Acids:- Structure, Nomenclature, eneral methods of preparation, physical properties & reactions.

Functional derivatives of mono-carboxylic acids:- Acid chloride, Acid anhydride, Ester & Acid Amide.

N.B. A brief study of preparations, reactions and uses of the above

derivatives.

Amines.

Aliphatic Amines:- Classification, structure, Nomenclature, isomerism, general methods of preparation, and reactions.

Aromatic Amines:- Structure, preparation and reactions.

Diazonium salt and Azo-compoundes.

Carbohydrate

Classification, Nomenclature & Monosachharides:- D-Glucose & Fructose

D-Glucose :- Open structure, Cyclic Structure, physical properties and reactions.

Disaccharides:- Structure of sucrose, Manufacturing process, reactions and uses.

Poly saccharide:- Starch and cellulose.

Cellulose:- Preparation, structure, Derivatives and uses.

Starch:- Source, structure, Derivatives and uses.

Stereo:- Chemistry and inter conversion of carbohydrate.

Amino Acids and Proteins

Amino Acids:- Classification, Nomenclature, optical activity, synthesis, properties and reactions.

Proteins:- Peptide linkage ,composition of proteins, C-terminal and N-terminal residue, identification of C-terminal and N-terminal residue.

Colour, Dyes and Pigments

Color:- Theories of colour, colour and conjugated system.

Dye:- Nomenclature, classification, structure, Raw materials for synthesis of Dyes, Dye intermediates and Non-textile uses of Dyes.

CHEM 104 : Chemistry - II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Identification of organic compounds containing one functional group out of the following:-

Alcohols- Methyl Alcohol, Ethyl Alcohol, Isopropyl Alcohol & Tert-butyl Alcohol.

Carboxylic Acids: Formic acid, Acetic Acid, Oxalic Acid, Benzoic Acid, Salicylic Acid, Picric Acid etc.

Carbonyl Compounds: Formaldehyde, Acetaldehyde, Acetone, Benzaldehyde, Acetophenone etc.

Miscellaneous: Phenols, Aniline, Nitro-benzene, Chloro-benzene, Urea Benzamide, Acetanalide, Acetamide etc.

Various types of titration:

Standardization of $KMnO_4$ Solution with Standard Oxalic acid or Sodium oxalate.

Estimation of Fe^{+2} Iron with Standard $KMnO_4$ Solution.

Standardization of Sodium thio Sulphate Solution with standard $K_2Cr_2O_7$ Solution.

Determination of available Chlorine in bleaching powder by Iodometric method.

Determination of Na_2CO_3 content of Washing Soda.

Determination of Strength of H_2O_2.

Determination of total Acid and Alkali in Soap.

Determination of hardness of water.

Removal of hardness by different methods

Department of Humanities and Social Science

Detailed outline of courses offered for B. Sc. in Textile Engineering (Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

HSS 101 : Business and Communicative English

Credit	Hour / Week	Total Hour
3	3	45

Language: Its function as a primary means of communication to the technologist; writing, speaking, listening and reading; difference between written and spoken language. Language appropriate to task.

Planning-format, paragraph heading, context, vocabulary etc.

Listening, understanding and speaking Skill: Effective Communication between speaker and listener. Techniques of description, Uses of Visual aids.

Reading skill: Technical literature, Books, Magazines, Scientific Journals etc.

Definition of Communication:

Sender- Message + Encoding- Medium- Receiver - Decoding - Feed back

Different types of Communication:

- Intrapersonal Communication
- Interpersonal Communication
- Small group Communication
- Organizational Communication
- Intercultural Communication
- Mass Communication etc.

Significance of Communication:

Special significance of Communication encorporate and multi-national business organizations

Use of Communication by Management:

- Written notice
- Face-to-face conversation
- Group meeting
- Seminar/conferences

Organizational Communication Net-work:

- Vertical Communications - Down-ward Communication and up-ward Communication
- Horizontal Communication

Systems of Communication:

- Stimulus to Communication
- Communication Components

Letter Writing:

Drafting private letters, Applications, Letters of complaint, Letters to the press, Apology and Explanation, Request letters, Business letters- Planning your letters, Selecting formats, Using short-cuts, Evaluating letters.

Characteristics of Business letters:

Kinds of letter, purpose of letters, Functions of a First, Middle and Last Paragraph(s), Characteristics and drafting process of Positive letters, Negative letters, persuasive letters, Routine letters and Memos.

Report Writing:

Types of report, Characteristics and importance of different types - Purpose - Scope - different styles of writing reports. The process of preparing informal and formal reports, Drafting reports, Progress reports, Technical reports, Industrial reports etc.

Proposals:

For new equipment, Increasing production, Description of visits. Experiments etc.

Explaining:

Process explaining, Complaining, Reporting damage etc.

HSS 102 : Business and Communicative English (Practical)

Credit	Hour/ Week	Total Hour
1	2	30

Grammar: Tense, article, preposition, subject-verb agreement, clause, conditional and sentence structure.

Developing reading skill: Strategies of reading-skimming, scanning, predicting, inferencing: Analyzing and interpreting variety of texts; Practicing comprehension from literary and nonliterary texts.

Developing writing skill: Sentences, sentence variety, generating sentences: Clarity and correctness of sentences, dialogue making, writing paragraphs, essays, reports, formal and informal letters.

Listening in practice: Recognizing sounds & words; Catching information; Finding central information in sentences; Listening at conference or seminar; Roll- play dialogue; Answering questions; Note taking.

Developing speaking skill: Situational talks (formal, semi-formal, informal).

Pronunciation practice: IPA transcription.

Visual description.

HSS 301 : Economics

Credit	Hour Week	Total Hour
3	3	45

Introduction to economics and engineering. Different economic system, Fundamental economic problems. Basic elements of demand, supply and product market. Theory of utility and preferences, consumer's surplus. Theory of production and cost. Theory of the firm and market structure. Optimization. Introducing macroeconomics. National income accounting, the simple Keynesian analysis of

national income, employment and inflation. Saving, investment and decision making. Fiscal policy and monetary policy-money and interest rate, income and spending. Economics of development and planning.

HSS 401 : Sociology

Credit	Hour / Week	Total Hour
3	3	45

Introduction : Society, Science and Technology- an overview; Scientific study of society; Social Elements, Society, Community, Association and Institution; Mode of Production and Society Industrial Revolution, Development of Capitalism.

Cultural and Socialization: Culture; Elements of Culture Technology and culture; Cultural Leg: Socialization and personality Family; Crime and Deviance; Social Control. Technology, Society and Development; Industrialization and Development, Development and Dependency Theory; Sustainable Development Development and Foreign Borrowing; Technology Transfer and Globalization Modernity and Environment; Problem and Prospects

Pre-Industrial, Industrial and Post-industrial society: Comm Features of Industrial Society; Development and Types of Soc Inequality in Industrial Society; Poverty, Technology and Soc Social Stratification and Social Mobility; Rural and Urban Are their Evaluation.

Population and Society: Society and population, Fertility Mort and Migration; Science, Technology and Human Migration Theo of Population Growth-Demographic Transition Theory Malthus Population Theory; Optimum Population Theory, Population Policy

Department of Yarn Engineering

Detailed outline of courses offered for B. Sc. in Textile Engineering (Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

YE 101: Natural Textile Fibers

Credit	Hour / Week	Total Hour
3	3	45

Introduction of Textile Fibers: Definition of Textile & Textile fibre, Classification of textile fibres with example, Historical background of textile fibre, Properties required for an ideal textile fibre, Standard Structure of a textile fibre, different bonding of fibers, World production & consumption of textile fibres.

Study of Cellulosic Fibres:

Cotton- Cultivation, Growth and harvesting, Geographical distribution, ginning, grading and classification, Physical and Morphological Structure, Microscopic view (longitudinal and cross-sectional) chemical composition, structure and bonds, Physical and chemical properties, End uses.

Bast fibres-

Jute- Cultivation, Growth and harvesting, Geographical distribution, grading and classification, defects, Physical and Morphological Structure, Microscopic view (longitudinal and cross-sectional) chemical composition, structure and bonds, Physical and chemical properties, up-gradation process, End uses.

Flax- Cultivation, Growth and harvesting, Geographical distribution, grading and classification, defects, Physical and morphological Structure, microscopic view (longitudinal and cross-sectional) chemical composition, structure and bonds, Physical and chemical properties, cottonized flax, End uses.

Study of Protein fibres:

Wool- Growth, Geographical distribution of main wool producing

countries, Shearing, classing and sorting, Sources and types of animal hair fibres, Physical and Morphological Structure, Microscopic view (longitudinal and cross-sectional), chemical composition structure and bonds, physical and chemical properties, End uses.

Silk- Growth, Sericulture and methods of production, Geographical distribution, Physical and Morphological Structure, Microscopic view (longitudinal and cross-sectional), chemical composition, structure and bonds, physical and chemical properties, End uses. Difference between wool, silk and hair fibre.

Mineral fibre : Brief study about Asbestoses Fibre.

Other fibres: Brief study about Hemp, Ramie, Banana, Pineapple, Kapok, Sisal and Coir fibre.

YE 201: Fibre and Yarn Testing

Credit	Hour / Week	Total Hour
3	3	45

Introduction to Textile Testing and Quality Control: Definition of textile testing and quality control, Importance of textile testing, Importance of man, machine and materials on textile quality control, Deming quality cycle.

Moisture Relation and Testing: Definition of moisture regain and moisture content, Relation between moisture regain and content, Standard moisture regain of different fibres, Atmospheric conditions and relative humidity, Measurement of atmospheric conditions, Regain-humidity relations of textiles, Absorption curve of various materials, Factors affecting the regain the textile materials, Effects of regain on fibre properties, The measurement of regain, Correct invoice weight.

The Selection of Samples for Testing: Definition of sample, sampling, Objects of sampling, Types of sampling method, Methods of fibre, yarn and Fabric sampling method.

Fibre length: Fibre length, Staple length, Effective length, Span

length, Fibre length measurement methods:- The Shirley comb sorter, The Fibrograph and importance of fiber length.

Fiber strength and elongation: Define load, elongation, stress, strain Young's modulus, different strength measurement principle and technique.

Fibre Fineness: Definition of fibre fineness, Importance of fibre fineness, Different units of fibre fineness, Fibre fineness measurement methods.

The maturity of cotton: Definition of Maturity and maturity ratio, The degree of cell wall thickening, The effects of immaturity, Types of fibre depending upon maturity, Different test for maturity measurement.

Modern Testing Equipment for Fibre Testing: Detail study about HVI and AFIS, its working principle and measuring parameters.

Yarn Numbering System:

Yarn count:- Definition of yarn count, Direct and Indirect system, Different methods of yarn numbering, measurement of linear density of yarn.

Twist in Yarn:- Definition and Objects of Twist, Measurement of twist, Direction of twist, Effect of twist on yarn and fabric.

Modern Yarn Testing Equipments:- Detail study about Titan Universal Strength Tester, Evenness Tester and Classimate its working principle and measuring parameters.

Discussion about different standards e.g. ASTM, BSTI, ISO.

YE 202 : Fibre and Yarn Testing (Practical)

Credit	Hour Week	Total Hour
1	2	30

Determination of moisture regain and moisture content of cotton, Fibre length and length characteristics, Fibre fineness, Maturity ratio of cotton fibre, Determination of trash content in cotton, Fibre

strength by pressley strength tester, Hank of sliver and roving, Count of yarn by wrap reel and balance in different counting systems. Count of yarn by (i) Knowles balance (ii) Beesley's balance (iii) Quadrant balance, Twist of single and double yarn.

Determination of fiber properties by AFIS and HVI. Determination of neps of raw cotton and sliver.

Determination of (i) Single yarn strength by single yarn strength tester (ii) Lea strength and C.S.P of yarn (iii) Determination of irregularity of sliver, roving & yarn by evenness tester (Uster Tester) and analysis of spectrograph and V-L curve (iv) Analysis of yarn fault by classimate (v) Analysis of load-elongation curve for yarn.

YE 203 : Man-Made Textile Fibre

Credit	Hour / Week	Total Hour
3	3	45

Definition and Classification of Chemical fibres, Principles of different fiber spinning systems, Different fibre structures, bonds of fiber and their effects on fibre properties, Global trends and consumption of man made fibres.

Composition, structure, classification, manufacturing process, properties, uses and application of:

i) **Regenerated fibres:** Viscose, Acetate rayon, derivatives of cellulose and regenerated protein fibres.

ii) **Synthetic fibres:** Polyolifin, Polyester, Polyamide, Polyacrylic, Polyvinyl derivatives Polyurethane etc.

iii) **High Performance fibres:** Aramid, Carbon, Glass, Polyethylene derivatives, Ceramic and other commonly used high performance fibres.

iv) **High functional fibres:** Bi / Multicomponent fibres etc.

Latest development in manmade fibre production and their economical and social aspects.

YE 205 : Short Staple Spinning-I

Credit	Hour / Week	Total Hour
3	3	45

Characteristics of cotton fibre considered by a spinner. Flow chart for the production of carded and combed yarns, Importance of mixing and blending, different mixing and blending techniques.

Blow Room - Principles of opening and cleaning, study of blow room machines for blending, opening, cleaning and control of regularity of mass per unit length, extraction and control of waste, settings for waste, different types of opener and beater, its characteristics, nature with fiber, change points, regulating system and its development, blow room lines for different purposes, use of suitable sequences of machines, safety; prevention of fires, methods of extraction of metal, dust and foreign material main settings, speeds, cleaning efficiency, production. Air current, role, generation, supply and controlling in blow room line. Transport and supply system of fiber through blow room line, modern development of blowroom, calculation of cleaning efficiency and production. (15)

Carding - Principles and objects of carding; Detailed study of the revolving flat card; different chute feeding system, advantages and disadvantages of chute feeding to cards, Function of different parts and design of card. Fiber flow and draft distribution between rollers. Types and care of wire, stripping, grinding, doffing mechanism. extraction and control of waste and dust, can coiling. speeds, productions, settings, cleaning efficiency, control of nep and fibre damage. Variation in sliver mass per unit length. NRE% and production calculation, Modern tend of carding machine. Role of auto-leveller in card. Mechanism of hooked ends created in carding, modern development and different calculation(13)

Draw Frame - Principles of roller drafting; different types of drafting arrangement. Role of different parts at drafting system. Drafting forces; Fibre control; Drafting wave and effect of short fibres and fibres orientation in sliver, reduction of fiber hook end. Mechanical faults

causing periodic variation in sliver. Minimum theoretical variation, Effects of doubling and drafting Study of draw frame, Drafting systems, Stop mechanisms, Can coiling, Roller setting, Production and Production calculation, Introduction to auto levellers. Role of draw frame as a total quality of yarn, features of modern draw frame(12)

YE 206 : Short Staple Spinning-I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Blow Room: Machine parts, Material passage and machine drive, Cleaning Efficiency and Production calculation of Opening, Cleaning, Mixing and Scutcher machine.

Carding: Study Chute Feed system, Machine parts, Material passage and machine drive, Calculation of draft, draft constant and production. Coiling mechanism, Setting points, Demonstration of stripping, grinding and wire mounting.

Draw Frame: Machine parts, Material passage and machine drive, Roller settings, Calculation of draft, draft constant and production.

YE 207: Short Staple Spinning - II (Theory)

Credit	Hour / Week	Total Hour
3	3	45

Lap former: Object of comber lap formation, methods of lap preparation, type of lap former machine, material passage diagram, and specification of lap former machine.

Comber: Object of combing, principle of combing, specification of comber, material passage, function of different parts of comber, cycle of combing operation, type of combing, comber waste and control of waste, setting of comber machine, effect of setting on waste, sliver

quality and amount of waste. Drafting system of comber, theory of noil extraction, sliver coiling arrangement and production calculation, features of modern combing machine and calculation.

Simplex: Object and function of simplex, material passage, specification of simplex, function of different parts of simplex, drafting system of simplex, detail study about drafting system, total draft, setting and distribution of draft, Twist, false twist and amount of twist for different material, building mechanism, winding and bobbin building. Object and action of cone drum and differential mechanism. Drive to bobbin, spindle and flyer. Setting, speed and production calculation, features of modern simplex machine.

Ring: Object and function of ring spinning system, material passage, specification and working principle of ring spinning, different drafting system and its specification, type of ring, traveller and spindle, yarn tension, different forces acting on traveller. Twisting, winding and bobbing building mechanism. End breaks, wastage, yarn fault, setting, production and speed and change pinions, limitations & advantages of ring spinning & steps taken to over-come these limitations. Property and end-uses of ring yarn. Theory of ring spinning, features of modern ring, machine.

Winding: Object and function of winding, principle of auto-coner, Classification of yarn fault, yarn fault detection and cutting of yarn fault, auto splicing mechanism.

Doubling: Different type of doubling and twisting system of ply yarn, sewing thread.

Yarn Conditioning: Object and function of yarn conditioning, procedure and methods of conditioning and yarn finishing.

Packing: Yarn package, reeling, bundling and bailing.

YE 208: Short Staple Spinning - II (Practical)

Credit	Hour Week	Total Hour
1	2	30

Comber: Machine parts, Material passage and machine drive, Index Wheel and Necessary settings. Calculation of draft, draft constant, Noil extraction% and production.

Speed Frame: Machine parts, Material passage and machine drive, Roller settings, Calculation of draft, draft constant, Twist, Twist Constant, Required DCP and TCP and production. Study on bobbin building mechanism and different change wheels.

Ring Frame: Machine parts, Material passage and machine drive, Roller settings, Calculation of draft, draft constant, Twist, Twist Constant, Required DCP, TCP and production. Study on cop building mechanism and different change wheels.

Winding: Machine parts, Material passage and machine drive, Different settings (NSLT, FD, FL)

YE 209 : Textile Physics

Credit	Hour / Week	Total Hour
3	3	45

The Physical structure of fiber: Crystallinity, orientation and amorphousness of fiber, Basic concepts of methods for investigating of fiber structure, e.g X-ray diffraction method, Optical and electron microscopy, infra red radiation absorption, Advantages of infrared radiation method over x-ray diffraction method.

Detailed study of fiber properties:

Mechanical properties: Tensile properties, analysis of stress strain curve, elastic and plastic behaviour of textile fiber, factors affecting the tensile properties of fiber. Creep and relaxation, work of rupture, Torsional and Flexural properties of fiber.

Swelling properties: Importance of swelling phenomenon in textile and different types of swelling.

Frictional properties: Importance of friction and different types of friction, Effect of lubricant on friction, Effects of friction in different

stages of textile processing, Problem of friction in textile, Directional frictional effect and felting properties of wool.

Optical properties: Birefringence properties, Refraction, Methods for measurement of bi-refringence, Reflection, lusture, Factors affecting the lusture of textile.

Thermal properties : Thermal conductivity, Melting temperature, Glass transition temperature, Heat setting, Structural changes due to heat setting, Effect of heat setting in textile wet processing.

Static electricity formation: Theories of static electrification, Explanation of the phenomenon of static electrification in textile, its effect and remedies in textile processes.

Fibre & Yarn structure and their properties: Yarn geometry, effect of yarn twist on yarn strength (obliquity effect), Lustre, yarn diameter and handle, Structure of Ring, Rotor and Air-jet yarn.

Fibre Migration in Yarn: Fibre migration, theory and causes of migration of fibres to surface or core of yarn.

Fabric Geometry: Geometry of plain woven fabric, calculation knowing crimp ratio and thread spacing, Geometry of jammed conditions, crimp interchange, effect of yarn flattening and deformation of fabric. Geometry of plain knitted structure fabric .

Fabric buckling, tensile, shear, drape properties of fabrics and their prediction technique.

YE 211 : Textile Testing and Quality Control

Credit	Hour / Week	Total Hour
3	3	45

Introduction to Textile Testing and Quality Control: Definition of textile testing and quality control, Importance of textile testing, Importance of man, machine and materials on textile quality control.

Moisture Relation and Testing: Definition of moisture regain and moisture content, Relation between moisture regain and content,

Standard moisture regain of different fibres, Atmospheric conditions and relative humidity, Measurement of atmospheric conditions, Regain-humidity relations of textiles, Absorption curve of various materials, Factors affecting the regain the textile materials, Effects of regain on fibre properties, The measurement of regain, Correct invoice weight.

The Selection of Samples for Testing: Definition of sample, sampling, Objects of sampling, Types of sampling method.

Fibre Properties: Fibre length, Staple length, Effective length, Span length, different technique for Fibre length measurement. Fibre fineness, Importance of fibre fineness, strength and its measurement methods.

Definition of Maturity and maturity ratio, the degree of cell wall thickening, The effects of immaturity, Types of fibre depending upon maturity, maturity measurement.

Introduction to HVI and AFIS, its working principle and measuring parameters.

Yarn Numbering System:

Yarn count:- Definition of yarn count, Direct and Indirect system. Different methods of yarn numbering, measurement of linear density of yarn.

Twist in Yarn:- Definition and Objects of Twist, Measurement of twist, Direction of twist, Effect of twist on yarn and fabric.

Modern Yarn Testing Equipments:- Detail study about Titan Universal Strength Tester(single and bundle), Evenness Tester and Classimate its working principle and measuring parameters.

Discussion about different standard e.g. ASTM, BSTI, ISO.

Fabric Testing: Measurement technique of Fabric length, width, thickness, weight and thread density.

Crimp of yarn in fabric:- Crimp, Crimp percentage , Crimp and fabric properties, The measurement of crimp percentage.

Stiffness, Handle and Drape:- Definition of fabric stiffness, handle and drape, Bending length, Flexural rigidity, Bending modulus, different stiffness test.

Serviceability wear and abrasion:- Definition of Serviceability, Wear and Abrasion, Causes of wear, Abrasion, Classification of abrasion and its measurement.

Pilling:- Definition of pilling, Causes and prevention of pilling and measurement of pilling.

Fabric crease:- Crease resistance, Crease recovery, Crease-resist finish, Crease recovery test, Advantage and disadvantages of resin treatments.

Fabric Strength:- Tensile, tearing and bursting strength of fabric and its measurement.

Fastness Test:- Wash, Light, Rubbing and Perspiration fastness.

Water and fabric relationships:- Water proof, Shower proof, Water repellent, contact angle, Different measurement method, Shrinkage test.

Flammability:- Definition of flammable fabric, Flame resistance rating, Flame proof fabric, Flame resistant fabric, Inherently flame proof material, Durably flame proof and temporarily flame proof material, Factors affecting flame resistance, Different flammability tests.

Carpet Testing: Carpet and different types of carpet, Carpet testing methods.

Air Permeability: Definition of air permeability, air resistance, air porosity, air permeability and fabric properties and its measurement.

Garments Testing: Garments inspection system, Seam strength, Button pull test, Zipper test and other garments tests.

YE 212 : Textile Testing and Quality Control (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Determination of standard atmospheric condition.

Determination of moisture regain and moisture content of cotton, Fibre length and length characteristics, fineness, strength and colour.

Determination of fiber properties by AFIS and HVI.

Hank of sliver and roving, Count of yarn by wrap reel and balance in different counting systems. Twist of single and double yarn. Determination of neps of raw cotton and sliver.

Determination of (i) Single yarn strength by single yarn strength tester (ii) Lea strength and C.S.P of yarn (iii) Determination of irregularity of sliver, roving & yarn by evenness tester (Uster Tester) (iv) Analysis of yarn fault by classimate (v) Analysis of load elangation curve for yarn and fabric strength.

Determination the dimensions, weight/unit length, thickness, porosity, strength(tensile, tearing, ballistic and bursting), abrasion, pilling, handle, drape, crease, crease recovery, water absorption, water repellency dimension stability carpet testing.

Determination of size percentage, fastness to light, fastness to wash, fastness to rubbing, fastness to perspiration of woven and knit fabric.

Determination of seam strength, button strength, Garments inspection.

Identification of fibres. Estimation of constituent fibre content of a blended material.

Assessment of yarn, fabric and dyeing quality of a sample. Comparison of yarn, fabric and dyeing quality of more than one supplied sample.

YE 213 : Yarn Manufacturing-I

Credit	Hour / Week	Total Hour
3	3	45

Characteristics of fibre considered by a spinner. Flow chart for the production of carded and combed yarns, Importance of mixing and blending.

Blow Room - Study on Modern Blow Room line, advantages and disadvantages of chute feeding to cards, production.

Carding - Principles and objects of carding; study of the revolving flat card; card clothing,. Production calculation, cleaning efficiency.

Draw Frame - Principles of roller drafting; Drafting wave and effect of short fibres; Effects of doubling and drafting Study of draw frame, Drafting systems, Roller setting, Production, Introduction to auto levellers.

Comber - Objects of the combing process. Methods of comber lap preparation and Principle of comber, Cycle of operations. Comber waste and waste control, noil% and production calculation.

Speed frame - Objects of speed frame. Study of different drafting systems, amount and distribution of draft. Twisting and amounts of twist for different materials, use of false twist. Speeds, production and production calculation.

Ring frame - Function of ring spinning process, description of main working parts. Drafting systems, types of spindle, ring and travellers, speeds, production and production calculation. End breaks.

Introduction to Winding and Yarn conditioning.

YE 214 : Yarn Manufacturing-I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical study of Mixing, Blow room, Carding and Draw frame, simplex, Ring frame of Cotton Spinning

YE-301: Application of Computer in Yarn Manufacturing

Credit	Hour Week	Total Hour
3	3	45

Introduction to Textile Software: Scope and uses of Computer in Textiles; Conventional and Computer based product development cycle; Introduction to Textile software; Introduction to Textile CAD and CAM;

IT and Web Presence in Textile Business; Investment and Infrastructure analysis for Computer Based Production Unit; Future Trend.

Specialized Software for Yarn Manufacturing: Bale Management System; Bale management with USTER Bale Manager; Detailed study on USTER HVI and AFIS Pro operating system; Configuring PLC based Yarn manufacturing machinery; Online monitoring tool for process control and quality management; Ring Data System, Relevant software in Yarn Manufacturing.

Detailed study on mostly used CAD and CAM: Cost effectiveness of CAD and CAM; Process optimization; Product development steps and their detailed study; Product costing and consumption calculation; Reusability;

Data-Management in Yarn Manufacturing Industry: Fundamentals of Database Management System, Essential resources, Structured Query language. Identification of data generating node in Yarn Manufacturing; Data flow study and analysis; Developing data flow diagram; Data Layering; Algorithm design for data management; Data security, Data management infrastructure; Comparative study on available data management system in Yarn Manufacturing.

YE-302: Application of Computer in Yarn Manufacturing (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical Classes based on Theory Class

YE 303: Long Staple Spinning

Credit	Hour / Week	Total Hour
3	3	45

Bale Management: Selection of jute for different quality of yarn, mixing of different grade of jute.

Jute Softening: Emulsion, type of emulsion, quality of emulsion, ingredients of emulsion, function of different ingredients, object, function, working procedure and different parts of softener and Spreader machine.

Breaker and Finisher Card: object, function, working procedure, different parts and control of sliver quality of breaker and finisher card machine. Effect of pin density and r.p.m of different roller on sliver quality, production and wastage.

1st, 2nd and 3rd Drawing Machine: object, function, working procedure, different parts, drafting arrangement, control of sliver quality of 1st , 2nd and 3rd Drawing Machine.

Jute Spinning Machine: object, function, working procedure, different parts, drafting system, twisting procedure, lifting mechanism, yarn tension and package building of flyer spinning machine, modern jute spinning machinery.

Quality of yarn: quality parameter, control of yarn quality at different stages. Standard quality parameter of different jute products.

Diversification of jute: Geo-jute, modification of jute, sulfonation process, different diversified jute products.

Long staple: Manufacturing of jute blend yarn using long and short staple spinning method. Properties and end-uses of jute blend yarn.

YE 304: Long Staple Spinning(Practical)

Credit	Hour / Week	Total Hour
1	2	30

Material passage diagram, Gearing and Draft, twist & Production calculation of Jute softener, Breaker, Finisher Card, 1st , 2nd and 3rd Drawing and Jute Spinning Machine.

YE 305: Process Control in Spinning

Credit	Hour / Week	Total Hour
3	3	45

Process Control: Importance and scope for process control in spinning: Considerations for evolving a system for process control, Key variable for process control, Establishing norms and standards for process control.

Control of Mixing quality and cost: Control of Mixing Quality Through Fibre Characteristics, Simultaneous Control of Mixing Cost and quality.

Control of yarn Realization: Norms for yarn realization, Factors affecting yarn realization, Control of waste & Cleaning in Blow room and card, Control of comber waste.

Control of yarn Quality: Count, Strength & their variability. Yarn unevenness and imperfections, Yarn Hairiness, neps, classimat, faults. Analysis of spectrogram.

Control of yarn faults and package defects,

Machinery Audit- Impact of machine conditions on processing performance and yarn quality. Implementation of the system of machinery Audit, Test instruments for Machinery Audit.

Measurement and analysis of productivity: Definition of indices of productivity, Measurement of productivity, Productivity analysis, productivity and profitability, Means to Improve productivity, Maximizing machine efficiency in ring spinning , Controlling end breakage rate in ring spinning.

Energy conservation in spinning:

Control of stores expenditure:

Implementation of process control in cotton spinning

Implementation of process control in Jute spinning

YE 306: Process Control in Spinning (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Identification of the key variable for process control in spinning.

Establishing norms and standards for process control.

Production of Lap, Sliver, Roving and yarn, Evaluation of Lap, Sliver, roving and yarn, quality. Effect of different speed, settings of blow room and card on product quality. Effects of drawing on noil extraction of comber.

Study on end breakage rate, Effect of yarn clearer setting on yarn quality, Spectogram analysis. Compare of quality of the products with USTER quality.

Prepare a plan to implement process control in spinning.

To practice Machinery audit.

Productivity analysis of different spinning machinery.

YE 307: Yarn Manufacturing- II

Credit	Hour / Week	Total Hour
3	3	45

Long Staple Spinning: Flow-chart of jute spinning, object, material passage, working procedure, different parts and production of jute softener, spreader, breaker card, finisher card, 1st , 2nd , 3rd of jute drawing, different jute spinning machine. Different types of jute yarn and its uses.

Modern Spinning: Modern spinning systems. Brief out line, production, limitation and advantages of rotor, air-jet, air-vortex, friction and wrap spinning. Yarn property and end uses of rotor, air-jet, air-vortex, friction and wrap yarn. Modern long-staple spinning systems.

Spinning of Man-made fibres & their blends: Detailed study of processing man-made staple fibres, viz, viscose rayon, polyester, acrylic and their blends with cotton on cotton processing machines, changes in machine speeds, settings and productions, properties of blended yarns.

Special Yarn: Production, character and end-uses of special yarn(core-spun, slub, siro, compact, chenille, textures, fancy and different composite yarn). Special Jute yarn.

YE 308: Yarn Manufacturing- II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical study of jute spinning machinery.

Material passage diagram gearing, setting and draft, twist & Production calculation.

Practical study of Rotor and Airjet Spinning machine. Material passage diagram and Production calculation.

YE 401: Modern Yarn Manufacturing

Credit	Hour / Week	Total Hour
3	3	45

Modern Spinning: Historical background and basic concept of modern spinning. In depth study of Rotor Spinning, Air-jet and Air-vortex:, Friction Spinning, Wrap, Twillo, Anti-static, Twistless and other different new spinning system. Comparison of different spinning method, twisting capacity, yarn quality, productions and economics with ring spinning system.

Compact Spinning System: Definition of compact spinning. Conventional ring spinning vs compact ring spinning, Principle of compact spinning, Detail method of compacting, compacting fibre

strand, Advantages and disadvantages of compact spinning, Properties of compact yarn.

Spinning of Man-made fibres & their blendes: Detail study of processing man-made fiber, i,e Viscose Rayon, Polyester, Polyamide, Acrylic and their blend with cotton on cotton processing machines. Changes required in machine speeds and different setting. Properties of blended yarn, analysis of blend, Effects of blend proportion, fiber length, fineness and surface characteristics of fiber on yarn properties.

YE 402: Modern Yarn Manufacturing (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Detail practical study of Rotor and Airjet Spinning.

Material passage diagram, Gearing and Production calculation.

Study on slub and core-spun attachment of ring spinning.

Study the machine of Two for one twister, Texturizing and Waste opener.

YE 403: Special Yarn Manufacturing

Credit	Hour / Week	Total Hour
3	3	45

General Introduction: Yarn, Classification of yarn, Yarn designation, world production and consumption of yarn Market, production and consumption of yarn of Bangladesh.

Overview of Fancy Yarns: Introduction and classification, basic principles, Production methods, Design construction of fancy yarn, Historical development, The size of market for fancy yarns, Different forms of fancy yarns (spiral; diamond; multifold; gimp; mock; chenille; cloud; knop; loop; snarl; stripe; slub; Neepy; Inject;

Mellange; eccentric; folded chenille etc.); basic principle of fancy yarn production by using ring system (slubs, siro, inject, marl, loop, gimp, boucle, spiral, corkscrew, eccentric, button etc), fancy doubling system (spiral, loop, knop, caterpillar, marl, gimp, snarl etc.), Hollow spindle process (Gimp, mock chenille, chenille, spiral etc), Rotor spinning system (slub and lopp yarn). Coloured yarns: solid shades; gill mixing; re-combing, Melange yarns, Speciality coloured yarns: twist shades; single marl; marl; half marl; double marl; single mottle etc. ; Draft, twist and production of different fancy yarn; Future developments of fancy yarn; The retail potential of fancy yarns ; The challenge of marketing of fancy yarn.

Overview of Sewing threads: Introduction and Technology of Sewing threads manufacturing Process.

Overview of Textured yarns: Introduction; Concept and classification of textured yarns. Different texturing methods and brief working principles. Principles of false twist texturing, air-jet texturing etc. and properties of false twist textured, air-jet textured yarns; structural geometry and properties of these types of textured yarns. Different factors affecting Texturing process & properties of textured yarns. Post treatment of false twist textured yarns, Defects of textured yarn.

Objectives and different methods of producing bulk yarns. Principles of manufacturing high bulk yarn. Testing and evaluation of textured yarns.

Technical Textile Yarn: Carbon, Glass, Aramid, Cavler, High density polyethylene yarn.

YE 404 : Industrial Attachment (2 months)

Credit	Hour / Week	Total Hour
3	2 month	--

The students must undergo 2(two) months intensive of Industrial Training program in the relevant area of specialization after completion of Level-III, Term-II.

YE 406 : Project Work

Credit	Hour / Week	Total Hour
3	--	--

During the Level-IV of study each student will be required to complete a Project Work in the relevant field of their specialization. For such a work the students will be guided by a Supervisor of the concerned Department.

YE 408 : Comprehensive Viva

Credit	Hour / Week	Total Hour
2	--	--

The Comprehensive Viva will cover the entire 4 years courses of study. 60% weightage will be on the departmental subjects. 40% weightage will be on all other subjects. No specific class hour will assigned for the comprehensive Viva.

Department of Fabric Engineering

Detailed outline of courses offered for B. Sc. in Textile Engineering (Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

FE 201: Fabric Manufacturing- I

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Introduction and historical background of fabric manufacturing. Flow chart of weaving.

Weaving Preparation:

Winding: Types of winding package, precision and non-precision winding, pirn and cone winding machines, winding defects and their remedies.

Warping: Definition & classification of warping, warping machines, warping plan for a particular fabric, faults in warping and their remedies.

Sizing: Size materials and their function, technological changes due to sizing, typical recipes, warp sizing and weaving efficiency, defects in sizing and their remedies.

Looming: Introduction with drafting, drawing, denting, pinning, tying-in & gaiting and machineries involved in these processes.

Weaving:

Introduction to the historical/ development of looms, classification of looms and description of various types of conventional looms, motions of loom.

Shed and Shedding: Various types of shed, objective and classification of shedding mechanisms, basic principles of tappet shedding. Dobby shedding & jacquard shedding mechanisms.

Picking: Classification, basic mechanisms of conventional and modern picking systems, picking faults.

Beat-up: Classification, basic principles of crank & cam beat-up.

General study on other secondary & tertiary motions.

Weaving Issues:

Features of modern loom. Brief study on projectile, rapier and air jet looms.

Woven fabric properties and factors, fabric selvedges, fabric faults with their causes and remedies.

Denim weaving.

FE 202: Fabric Manufacturing - I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Passage diagram and production calculation of winding, warping and sizing machines. Detailed study of relevant mechanisms and operation of loom. Study about various woven fabric defects & their remedies. Visit to woven composite plant.

FE 203: Weaving Preparatory Process

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Introduction to fabric manufacturing; historical background of weaving, flow chart of weaving, introduction to yarn preparation.

Winding: Definition, parameters, requirements, types of winding packages with their uses, methods of driving the packages, precision & non precision winding. Yarn tensioning devices, modern concepts

of winding, package hardness, ballooning, winding machines, winding defects and their remedies.

Calculations regarding winding.

Warping: Definition, objects, importance and techniques of warping, different warping machines with detailed function and controlling points, faults in warping and their remedies.

Calculations regarding Warping.

Sizing: Definition, objects, importance and types of sizing. Size ingredients with their functions & requirements, technological changes due to sizing.

Sizing machineries, typical recipes, techniques of sizing, mechanism of size take-up, size cooking, drying methods and factors.

Warp sizing and weaving efficiency, dressing of jute yarn, sizing of blended and synthetic yarn.

Attempts to substitute sizing process, defects in sizing and their remedies, Calculations regarding sizing.

Looming: Introduction to weaving: drafting, drawing-in, denting, pinning, tying -in and gaiting, equipment or machineries involved in these processes, related calculation.

FE 204: Weaving Preparatory Process (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Winding: Passage diagram and production calculation of cone, cheese, flanged bobbin, pirn, cop and spool winding machines.

Warping: Passage diagram and production calculation of high speed and sectional warping machines.

Sizing: Passage diagram and production calculation of slasher sizing machine.

Looming: Introductory study to related machines.

FE 205: Weaving-I

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Historical / Chronological development of looms. Classification of looms. Discussion on various conventional shuttle looms, motions of loom, loom drive and brakes.

Shedding: Definition, objects and classification of shedding, different types of shed, conditions for good shedding, basics of shed geometry.

Tappet shedding: Scope and types of tappet, typical tappet shedding mechanism with top roller mounting and spring, construction of shedding tappet, advantages and disadvantages of tappet shedding.

Dobby Shedding: Scope and classification, negative, positive, cam & cross-border dobby with peg plan, timing & dwell period of dobby.

Jacquard Shedding: Scope, types and basic principles of SLSC, DLSC, DLDC, open shed, center shed, fine pitch & other special jacquard shedding mechanisms. Systems of harness mounting, Casting out, Card cutting & lacing.

Jacquard calculations.

Picking: Objective, classification, over picking & under picking mechanisms, picking faults and calculation of picking forces.

Beat-up: Classification, single and double beat-up mechanism, sley eccentricity ratio and its effects.

Let-off mechanisms: Objects, classification, mechanisms of different let-off systems, related calculations.

Take-up mechanisms: Objects, classification, mechanisms of different take-up systems, related calculations.

Automation in conventional loom: Features of automatic looms. Causes of warp & weft breakages in weaving. Warp stop & weft stop motions, warp protector motion, feeler mechanism, methods of weft patterning, weft replenishment.

FE 206: Weaving-I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Introduction with a conventional loom.

Detailed study on various conventional shedding mechanisms (tappet, dobby & jacquard).

Detailed study on various conventional picking & beat-up mechanisms.

Detailed study on let-off and take-up mechanisms.

Study on various tertiary motions of conventional power looms.

FE 301: Application of Computer in Fabric Manufacturing

Credit	Hour / Week	Total Hour
3	3	45

Introduction to Textile Software: Scope and uses of Computer in Textiles; Conventional and Computer based product development cycle; Introduction to Textile software; Introduction to Textile CAD and CAM; IT and Web Presence in Textile Business; Investment and Infrastructure analysis for Computer Based Production Unit; Future Trend.

Specialized Software for Fabric Manufacturing: Detailed study on Fabric CAD: Yarn modeling; Structure and design development; Yarn patterning and color palette; Control of fabric parameter; Fabric modeling and simulation; E-sampling; Machine configuration; Development of associated tools; Card punching and machine file generation; Costing and consumption; Quality prediction; Comparative study on available Fabric CAD. Online monitoring tool for process control and quality management. Relevant software in Fabric Manufacturing.

Detailed study on mostly used CAD and CAM: Cost effectiveness of CAD and CAM; Process optimization; Product development steps and their detailed study; Product costing and consumption calculation; Reusability;

Data-Management in Fabric Manufacturing Industry: Fundamentals of Database Management System, Essential resources, Structured Query language. Identification of data generating node in Fabric Manufacturing; Data flow study and analysis; Developing data flow diagram; Data Layering; Algorithm design for data management; Data security, Data management infrastructure; Comparative study on available data management system in Fabric Manufacturing.

FE 302: Application of Computer in Fabric Manufacturing (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical classes on product development, characterization and evaluation on weaving CAD, knitting CAD and other relevant CAD software.

FE 303: Fabric Manufacturing - II

Credit	Hour / Week	Total Hour
3	3	45

Knitting:

Introduction: Introduction and historical background of Knitting Technology, Raw materials for knitting.

General terms and principles of knitting Technology; Knitting action of latch, bearded and compound needle. Basic mechanical principles of knitting Technology, elements of knitted loop structure.

Basic weft knitted structures: Characteristics, Notations, Identification and uses.

Basic loop or stitch type: Definition, Features and Knitting action of Tuck, Held and Float stitches.

Weft knitting machine: classification of weft knitting machinery; Plain circular latch needle machine - Description, Knitting action, Cam system, Sinker timing.

Circular Rib machine- Description, knitting action, needle timing etc.

Circular Interlock machine- Description, knitting action, interlock cam system, etc.

Flat knitting machine: Features, Classification, Main parts, Knitting action and cam system.

Calculation related to weft knitting; weft knitted fabric faults with causes and remedies.

Warp Knitting: Introduction to warp knitting: Basic elements of warp knitting i.e. needle, sinker and guide, lapping movements of guides, pattern mechanism, warp beam, chain link, basic overlap and underlap variations, basic structures of warp knitting.

Warp knitting machinery: Classes of warp knitting machinery.

Tricot warp knitting machines: Features, knitting elements and knitting action on bearded and compound needle.

Raschel warp knitting machines: Features, knitting elements and knitting action on latch and compound needle.

Two fully threaded guide bar structures: Features, lapping diagram, chain notation and end uses

Calculation related to warp knitting. Warp knitted fabric faults.

Non-woven:

Introduction to nonwoven, Methods of web formation. Web bonding techniques, economic advantages, uses of non-woven fabrics.

FE 304: Fabric Manufacturing - II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Layout of machinery involved, loop forming techniques of different circular, flat and warp knitting machines. Practical study on feeding, take down, driving and operational technique of knitting machinery, stop motion etc. detection of fabric specification from given samples.

FE 305: Fabric Structure & Design

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Classification of woven fabrics, Identification of warp and weft yarn, Definition related to structure and design, Fabric weight calculation, Parts of a complete design, Methods of indicating drafts, Classification of drafting.

Plain Weave Fabrics: Features and classification of plain weave. Derivatives of plain weave and their characteristic, Ornamentation of plain weave fabrics. Commercial plain fabrics and uses.

Twill-weaves: Features and classification of twill weave. Derivatives of twill weaves and their characteristics. Influence of yarn twist on the twill lines. Angle of inclination of twill weaves. Commercial twill fabrics and their uses.

Satin and sateen weaves: Features of satin / sateen weaves, classification, and move number selection. Derivatives of satin weaves. Commercial satin fabrics and their uses.

Fancy designs of fabrics: Characteristic, Construction principle and uses of huckaback, mock leno, distorted thread effects, honeycomb, bedford cord, pique and crepe weaves.

Color & Weave effects: Introduction to colour and weave effect. Simple colour and weave effects (pinstripe, crow's foot, dog's tooth, shepherds check etc.) Compound colour and weave effects (Stripe and check effects).

Figuring with extra threads: Characteristic, Construction principle and uses of Extra warp and extra weft design.

Double Cloth: Principle of double width, tubular, multiply fabric. Characteristic, classification, Construction principle and uses of stitched double cloth.

Commercial Fabrics: Specification, characteristics and their uses.

FE 306: Fabric Structure & Design

Credit	Hour / Week	Total Hour
1	2	30

General procedure for the analysis of woven fabric, Determination of specifications for the reproduction of fabric samples of all types. Calculations relevant to the production of different types of woven fabric.

FE 307: Knitting - I

Credit	Hour / Week	Total Hour
3	3	45

Introduction to knitting: Historical background of knitting Technology. General terms related to knitting. Characteristics of knitting yarn, mechanical principles of knitting technology, Elements of knitting, knitting action on latch, bearded and compound needles.

Weft knitting:

Basic weft knitted structures: Characteristics, Notations, Identification and uses.

Basic loop or stitch type: Definition, Features and Knitting action of Tuck, Held and Float stitches.

Weft knitting machines: Features, Classification and products of weft knitting machines. Fabric machines used for cut & sewn knitwear and garment length machines used for fully fashioned knitwear.

Single jersey circular knitting machines: Features, Main parts, Knitting action, Cam system and sinker timing.

Rib and Interlock circular knitting machine: Features, Main parts, Needle gaiting, Knitting action, Cam system and needle timing.

Purl knitting machine: Features, Knitting action and cam system.

Flat knitting machine: Features, Classification, Main parts, Knitting action and cam system.

Calculation related to weft knitting.

Warp Knitting: Introduction to warp knitting: Basic elements of warp knitting i.e. needle, sinker and guide, lapping movements of guides, pattern mechanism, warp beam, chain link, basic overlap and underlap variations, basic structures of warp knitting.

Warp knitting machinery: Classes of warp knitting machinery.

Tricot warp knitting machines: Features, knitting elements and knitting action on bearded and compound needle.

Raschel warp knitting machines: Features, knitting elements and knitting action on latch and compound needle.

Two fully threaded guide bar structures: Features, lapping diagram, chain notation and end uses.

Calculation related to warp knitting.

FE 308: Knitting - I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Layout of machinery involved, loop forming techniques of different circular, flat and warp knitting machines. Practical study on feeding, take down, driving and operational technique of knitting machinery, stop motion etc. detection of fabric specification from given samples.

FE 309: Weaving - II

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Features and classifications of modern looms. Differences between conventional & modern looms.

Modern shedding mechanisms: Positive tappet/cam shedding mechanism, electronic dobby, electronic jacquard, crank shedding and pneumatic shedding mechanisms.

Modern picking mechanisms: Projectile, rapier, jet and multiphase weft insertion mechanisms, calculation of weft insertion rates.

Modern beat-up mechanisms: Cam and multilink beat-up mechanisms. Loom timing.

Secondary motions on modern looms: Electrical & Electronic take-up and let-off mechanisms.

Tertiary motions on modern looms: Mechanisms of auto pick finding, readily design changing, weft detecting motion etc.

Weaving issues: Fabric properties & related factors. Various selvedges, calculation of weft waste percent. Fabric faults and their remedies, four point system for woven fabric. Production calculation, factors affecting production and efficiency of a loom and a plant.

Weaving plan. Weaving floor management.

Denim weaving: History, process, classification, finishing and application.

FE 310: Weaving - II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Detailed study on various modern shedding mechanisms (cam, dobby, jacquard, crank & pneumatic).

Detailed study on various modern picking (projectile, rapier, air jet) & beat-up mechanisms.

Detailed study on let-off and take-up mechanisms.

Study on various tertiary motions of modern looms.

Study of woven fabric defects.

Visit to manufacturing plants.

Seminar on latest development on weaving.

FE 401: Fabric Testing & Quality Control

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Tests methods & international quality standards-. BS, BSTI, ISO, ASTM, AATCC & other standards.

Concepts of quality assurance and quality control. Off-line & online quality control.

Fabric dimensions: Measurement of length, width, thickness, ends and picks per unit length in woven fabric, courses and wales per unit length in knitted fabric. Crimp of yarn in woven and knitted fabric.

Fabric Strength: Methods of measurement for tensile, tearing, bursting tests of woven and knit fabric. Relationship among fiber, yarn and fabric strength.

Fabric stiffness: Measurement of fabric stiffness and its relation to crease, handle and drape, factors affecting on stiffness, handle and drape of fabric.

Surface Properties: Define and measurement of air, water permeability/retention, water pressure, crease recovery, wrinkle recovery, serviceability, wear and abrasion tests, pilling of fabrics, flame retardant flame resistance tests.

Objective measurement of fabric handle by Kawabata Testers and FAST Testers.

Fastness Properties: Measurement of fastness to light, washing, rubbing and perspiration. Estimation of damage to materials caused by physical & chemical treatments viz, singeing scouring and bleaching.

Determination of size and residue of size on fabric.

Carpet Testing: Carpet thickness, compression, resiliency and durability tests.

Fabric composition analysis: Identification of different natural & man-made fibers from fabric sample. Estimation of constituent fiber percentage from blended sample.

FE 402: Fabric Testing & Quality Control (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Measurement of the dimensions and dimensional stability of woven and knitted fabrics.

Measuring strengths of woven and knitted fabrics

Measuring stiffness and drape of fabrics.

Measurement of air permeability, water permeability, crease recovery, wrinkle recovery, abrasion and pilling of fabrics.

Detailed study on various fastness properties of fabrics.

Detailed study on carpet testing.

Composition analysis of fabrics.

FE 404: Knit Fabric Analysis (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Basic Techniques of Fabric Analysis

Sample analysis of various knitted sample:

Identification of notation diagram, Needle arrangement, Cam arrangement of Various Single jersey, Rib and Interlock Structure.

Preparation of chain notation, link arrangement, threading, lapping diagram of various warp knitted fabric.

Pattern making, tube arrangement, threading arrangement of various crochet fabric.

Making of various handmade knit fabric.

FE 405: Knitting - II

Credit	Hour / Week	Total Hour
3	3	45

Weft knitting:

Designs of weft knitted fabrics: Ornamentation of single jersey fabric, Single jersey derivatives, Double jersey derivatives based on Rib and Interlock structures, cam arrangement and needle set-outs for single and double jersey structures.

Weft knitted jacquard design single jersey and double jersey Jacquard.

Pattern and selection devices: Butt length and butt position, Multi-step butt set-out, Element selection, Full Jacquard mechanical needle selection, Pattern wheel and Electronic needle selection.

Special weft knitted fabric production: Knitted pile fabric: Fleece, Knitted terry fabric; Stripe fabric: Feeder stripe and engineering stripe; Stretch fabric (Lycra fabric): Lycra percentage and attachment.

Fabrics with high performance fibers, Loop wheel frame and Sinker wheel frame. Weft knitted fabric faults with causes and remedies.

Aspects of knitting science: loop shape and loop length control, yarn feed system, fabric take up mechanism, Weft knitted fabric relaxation, shrinkage and spirality, Knitted fabric geometry, Tightness factor and robbing back.

Flat knitting: Collar and cuff production, welt, garments panel separation, Sweater production, production of different design, racking, loop transfer: loop transfer mechanism and stitches, Fashioning: widening, narrowing and shaping calculation, linking.

Straight bar frame: Features, knitting action, fashioning action.

Warp knitting: Laying-in and weft insertion, Fall plate patterning, Cut presser and Miss-press structures. Crochet warp knitting machine: Feature, Knitting action, End-use etc. Multiple guide bar warp knitting machines: Feature, Knitting action and their products. Warp knitted fabric faults with causes and remedies.

Multi-axial knitting: Fabric construction and Multi-axial Raschel machine

FE 406: Knitting - II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Detailed practical study of machinery. Dismantling and reassembling of different parts of machinery.

Needle selection mechanism of jacquard knitting, Production of knitted samples with given specifications, adjustment of machine parts for a desired GSM, Lycra attachment and related mechanism.

FE 407: Nonwoven

Credit	Hour / Week	Total Hour
3	3	45

Introduction to nonwovens: Definition of nonwovens; Nonwoven manufacturing processes; Nonwoven properties and applications; Development of the nonwovens industry; Future perspectives.

Processes to manufacture nonwovens:

Dry-laid process: Fibre preparation; Production of fibrous webs by carding; Roller carding theory; Web forming; Web drafting; Aerodynamic principle; Fibre webs following the aerodynamic procedure; Extrusion nonwovens; Polymers for extrusion; Process technology and equipment to be used; Spunlaid nonwovens; Fine-fibre spun-bonded nonwovens; Meltblown process; Flash-spinning process; Electrostatic spun-bonding; Film nonwovens.

Wet laid process: Principle of the method; Raw materials; Fibre types; Binders; Fibre preparation; wet laying systems; Web forming; Bonding; Pressing; Web drying; Batching.

Web bonding:

Mechanical Bonding: Needling process; High-performance needling technique; Surface structuring; Influence of needling conditions on the needle felt's characteristics; Stitch-bonding; Hydro entanglement;

Details of Thermal Bonding and Chemical Bonding.

Finishing nonwovens:

Mechanical finishing: Shrinking; Compacting and creping; Glazing, calendaring, pressing; Perforating, slitting, breaking; Splitting, emerizing, suede finishing, shearing, raising; Singeing;

Chemical finishing: Washing; Dyeing; Printing; Finishing, softening, special effects; Coating; Laminating; Flocking.

Characteristics and application of nonwovens: Nonwovens for hygiene; The use of nonwovens in medicine and safety aspects; Nonwovens for cleaning and household products; Dry and damp-cleaning products; Nonwovens for home textiles; Nonwovens for apparel; Nonwovens for technical applications.

FE 408: Nonwoven (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Preparation of nonwoven sheet by using various nonwoven technique. Designing of various nonwoven sheet. Various finishing process of nonwoven.

FE 409: Special Fabric Production

Credit	Hour / Week	Total Hour
3	3	45

Narrow fabrics: Introduction to narrow fabrics. Discussion on Tape, webbing, ribbon, belt, label, braid, lace, etc.

Lappet and swivel fabrics; Gauge and leno fabrics, Flocked fabric, Biaxial Fabrics; Triaxial Fabrics.

Traditional Textile: Discussion on Muslin, Jamdani shari, Benarashi shari, etc.

Woven Pile Fabrics: Introduction to pile fabrics; Weft pile fabrics; Warp pile fabrics: Carpet; Terry Towel and Tufted carpet.

Multi-component fabrics: Introduction to multi-component fabrics; Discussion on Bonded, laminated and quilted fabrics.

FE 410: Special Fabric Production (Practical)

Credit	Hour / Week	Total Hour
1	2	30

General procedure for the analysis of special fabric, Determination of specifications for the reproduction of special fabrics. Operating principle and mechanism of braiding, narrow loom, terry towel and related machineries.

FE 411: Technical Textiles

Credit	Hour / Week	Total Hour
3	3	45

Introduction to Technical Textiles: Denition and scope of technical textiles, Applications summary, Technical textiles market, Future of

the technical textiles industry.

Technical Fbres: Introduction, Conventional ?bres, High strength and high modulus organic ?bres, High chemical- and combustion-resistant organic ?bres, High performance inorganic ?bres, Ultra-?ne and novelty ?bres, Fibre selection criteria for specialized application.

General Application of Technical Textiles: Technical textiles as protection equipment, Construction textiles, Industrial textiles, Medical textiles, Textiles used in transport, Packaging textiles, Agro-textiles, Environmentally-friendly textiles, Sports textiles, General approach to selection of fabric structure.

Durability of Technical Textiles: Introduction, General durability issues, Function and end of life, Required and available properties, Design lifetimes, Dominant factor, Modes of degradation, Chemical degradation and oxidation, Hydrolysis, Weathering, Tensile creep, Compressive creep, Mechanical damage, dynamic loading and abrasion, Life-time prediction tools.

Detailed Application:

Geotextiles: Introduction to geotextiles and Geosynthetics, Scope, Essential properties depending on application, Form of geotextiles and geosynthetics, Problem identification in application field, Parameter Study, Product design from fibre to finishing, Application method, performance evaluation.

Medical textiles: Introduction, Non-implantable materials, Extracorporeal devices, Implantable materials, Healthcare hygiene products, Form of medical textiles, Problem identification in application field, Parameter Study, Product design from fibre to finishing, Application method, performance evaluation.

Protective Textiles: Introduction, constituents for ?ammability, Application field, Selection of ?bres suitable for thermal and ?ame protection, Fire-retardant ?nishes.

Textiles in transportation: Introduction, Scope, Essential properties depending on application, Form of technical textiles in passenger cars, road vehicles, Rail applications, aircraft, Marine applications, Problem identification in application field, Parameter Study, Product

design from fibre to finishing, Application method, performance evaluation.

Nano Technology: Definition, History, Nano scale, Nanotechnology in Textile

Latest innovation in technical textiles.

FE 412: FE Industrial Attachment (2 months)

Credit	Hour / Week	Total Hour
3	2 month	--

The students must undergo 2(two) months intensive Industrial Training program in the relevant area of specialization.

FE 414: FE Project Work

Credit	Hour / Week	Total Hour
3	--	--

During the Level-IV of study each student will be required to complete a Project Work in the relevant field of his/her specialization. For such a work the students will be guided by a Supervisor of the concerned Department.

FE 416: FE Comprehensive Viva

Credit	Hour / Week	Total Hour
3	--	--

The Comprehensive Viva will cover the contents of entire 4 years courses of study. Departmental subjects will bear 60% weightage and all other subjects will bear 40% weightage. No specific class hour will be assigned for the comprehensive Viva.

Department of Wet Process Engineering

Detailed outline of courses offered for B. Sc. in Textile Engineering (Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

WPE 101: Polymer Science and Engineering

Credit	Hour / Week	Total Hour
3	3	45

Introduction and historical development of polymer chemistry; Basic concept of polymer science (Terms, definitions and scope); Classification of polymers and their description (Linear, branched, cross-linked, homo-polymers, co-polymers etc.); Raw materials (sources and their derivatives).

Synthesis of Polymers (Mechanism of polymerization, Methods of polymerization); Examples of commonly used fiber forming polymers, etc.

Types of molecular weights (number average molecular weight, weight average molecular weight), distribution and measurements of molecular weights and study of molecular weight dependent properties (end-groups, viscosity etc.).

Chemical and geometrical structure of polymer molecule (crystallization and melting of polymers, amorphous state-rheology, glass transition temperature, crosslinking, stereochemistry, transition, entropy elasticity etc.).

Properties of polymers (mechanical, thermal, chemical, electrical, degradability, etc.).

Study of commonly used fiber forming polymeric materials (Nylon, PET etc.)

Bio Polymer, Liquid Crystalline Polymer, Depolymerization, Polymer recycling.

WPE 201: Wet Preparatory Process

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Introduction of chemical processing of textile materials; Impurities in fibres and greige fabrics (Cellulose, Regenerated cellulose, Protein and Man-made fibres); Chemistry and properties of oils, waxes, fats and other impurities present in different fibres; Overview of different preparatory sequences required for their removal, preparation of different textile materials; prelims of preparation: (greige testing, stamping, mending, stitching, etc.).

Preparatory wet processes: Chemistry and technology of different preparatory wet processes (e.g. Shearing, Singeing, Desizing, Scouring, Bleaching (Protonic treatment, Combi-bleach), Mercerization, etc.) on different textile materials; Engymetic pretreatments of textiles.

Pretreatment of different textile materials:

Preparation of Cellulose and regenerated cellulose goods: Impurities present, degumming/scouring, bleaching, optical whitening, etc.

Preparation of silk and wool goods: Impurities present, degumming/scouring, bleaching, optical whitening, etc.

Preparation of jute goods: Impurities present, scouring, bleaching, optical whitening, etc.

Preparation of synthetic fibers and blends goods: Impurities present, heat-setting and singeing of man-made fibers and their blends; scouring, bleaching, optical whitening: objectives, methods, merits and demerits of different methods, wherever applicable.

Faults and effects of pretreatments: Faults in different preparatory processes and impact of improper preparation of fabric on dyeing, printing and finishing process.

Effectiveness/Competitive Preparatory process: Estimation of effectiveness of desizing, scouring and bleaching process. Methods

used for determination of degradation during scouring and bleaching. Determination of oxi-cellulose and hydrocellulose. Combined preparatory processes and energy conservation. Economics of preparatory processes.

WPE 202: Wet Preparatory Process (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Estimation of water hardness; Study of different preparatory processes such as desizing, scouring, bleaching, mercerizing, etc. on cellulose, protein and man-made fibers; Evaluation of pre-treated textile materials (Absorbency, Whiteness, Residual chlorine, Peroxide, etc.)

WPE 203: Chemistry of Textile Chemicals and Auxiliaries

Credit	Hour / Week	Total Hour
3	3	45

General concept of textile chemicals and auxiliaries;

Water and its uses in wet processing: importance, sources, purification, hardness, different water softening treatments (lime soda, ion exchange, chelation, etc.); consumption and reuse of water in wet processing; sequestering agent.

Chemicals and auxiliaries used in different chemical processes:

Pretreatment chemicals:

Surfactants: general concept, physical chemistry of detergent and surface active agents, surface tension, concept of critical micelle concentration, HLB, cloud point, specific gravity, their classification according to chemical nature, action; mechanism of wetting, leveling, detergency, antifoaming, and emulsification.

Detail study (type, properties, physical chemistry, and interaction with fibres, etc.) of desizing, scouring and bleaching chemicals.

Chemistry, properties, and uses of water, solution and colloids.

Chemistry, properties, and uses of optical brightening agents.

Dyeing chemicals and auxiliaries: Chemistry, properties, functions and uses of acids, alkalis, salts, oxidizing agents, reducing agents, buffering agents, leveling agents, anti-crocking agents, anti-foaming agents, dispersing agents and other auxiliaries used in textile dyeing.

Printing chemicals and auxiliaries: Chemistry, properties, functions and uses of different ingredients used in textile printing.

Finishing chemicals and auxiliaries: Chemistry, properties and uses of different types of softeners used in textile finishing. Study of silicon based finishing agents.

WPE 205: Wet Processing-I

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Introduction of textile wet processing treatment and its process flow; Importance of water in wet processing; Water hardness and removal of hardness; General concept and classification and functions of surfactants and other auxiliaries such as acids, alkalis, oxidizing agents, reducing agents, etc. used in textile wet processing.

Pretreatment: Singeing, desizing, scouring and bleaching; Pretreatment of cellulose, regenerated cellulose and protein fibres; Estimation of effectiveness of desizing, scouring and bleaching.

Dyeing: Elementary concepts of colorants and their constitution, classification etc.; Application of Direct, Acid, Basic, Reactive, Vat, Disperse, Sulphur on different fibres and their blends. Dyeing with pigment and natural colors on different fibres. Stripping process; Discussion about different methods of dyeing (continuous, semi-continuous and discontinuous); colour fastness; Faults in dyeing and their remedies.

WPE 206: Wet Processing-I (Practical)

Credit	Hour Week	Total Hour
1	2	45

Singeing, Desizing, Scouring and Bleaching of Cotton, Jute, Wool and Silk fibres. Practical estimation of Scouring and Bleaching effects.

Dyeing with Direct, Acid, Basic Sulphur, Reactive, Vat and Disperse dyes; Dyeing with Pigment; Dyeing of blended fabrics.

Determination of color fastness of dyed textiles.

WPE 301: Textile Coloration - I

Credit	Hour Week	Total Hour
3	3	45

Dyeing: Elementary concept of color and colorants (chromophore, chromogen, auxochrome); classification of dyes and pigments; Structure, properties & application of Direct, Acid, Basic, Vat & Reactive dyes and their application on different fibres. Natural dyes and their application.

Different types of dyeing faults & their remedies.

Printing: Flow chart of printing process; Printing ingredients and their functions; Thickener: Types of thickeners, preparation of thickener paste. Special types of thickeners: Synthetic polymers thickener, Emulsion thickeners, etc, Preparation of print paste.

Methods and styles of Printing; Printing processes for fabrics of different fibres with Direct, Acid, Basic, Vat, Reactive & Natural dyes and their after-treatment.

Methods of screen and roller preparation. Detail study on screen printing and roller printing.

WPE 302: Textile Coloration - I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Dyeing: Dyeing of different textile materials with Direct, Acid, Basic, Vat, Reactive and Natural dyes & their after treatments.

Printing: Screen preparation; Printing on different textile materials with Direct, Acid, Basic, Vat & Reactive dyes in different styles and by different methods.

WPE 303: Application of Computer in Wet Processing

Credit	Hour / Week	Total Hour
3	3	45

Introduction to Textile Software: Scope and uses of Computer in Textiles; Conventional and Computer based product development cycle; Introduction to Textile software; Introduction to Textile CAD and CAM; IT and Web Presence in Textile Business; Investment and Infrastructure analysis for Computer Based Production Unit; Future Trend.

Specialized Software for Wet Processing: Detailed study on Spectrophotometer operating system: Calibration; Database creation; Substrate registration, Colorfile creation and mapping against substrate; Colorant registration; Standard registration; Recipe generation; Control points; Costing; Strength assessment; Grey Scale assessment; Whiteness assessment; Assessment of color fastness etc. Programming a PLC based dyeing machine; Auto Dispensing System, Online monitoring tool for process control and quality management. Relevant software in Wet Processing.

Detailed study on mostly used CAD and CAM: Cost effectiveness of CAD and CAM; Process optimization; Product development steps and their detailed study; Product costing and consumption

calculation; Reusability;

Data-Management in Wet Processing Industry: Fundamentals of Database Management System, Essential resources, Structured Query language.

Identification of data generating node in Wet Processing; Data flow study and analysis; Developing data flow diagram; Data Layering; Algorithm design for data management; Data security, Data management infrastructure; Comparative study on available data management system in Wet Processing.

WPE 304: Application of Computer in Wet Processing (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical classes will be based on theory topics.

WPE 305: Chemistry of Dyes and Pigments

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Survey and status of dyes and dye-intermediates in the world, Introduction and classification of colorants, history of dyes and pigments, concepts of color, color of organic compounds, Nomenclature of dyes and pigments.

Chemical constitution, properties and applications of the following dyes and pigments: Azo dyes and pigments, Di-and triarylmethane dyes and pigments, Nitro and nitroso dyes and pigments, Anthraquinone dyes and pigments, Carbonyl dyes and pigments, Metal complex dyes and pigments, Sulphur dyes, Reactive dyes, Disperse dyes, Functional dyes, Ink dyes.

Dyes and pigments in biochemistry, biology, medicine, analytical

chemistry. Ecology and toxicology of colorants. Food colors. Health & safety aspects in dealing with dyes and pigments.

WPE 307: Theory of Color Physics

Credit	Hour / Week	Total Hour
3	3	45

Physics of light and color: Nature of light and its interaction with matters. light sources, absorption and scattering concept.

Basic concept of color: basics of color, color wheel, color spectrum, color space. color scales, color difference, etc.

Colorimetry & color specification system: properties and principle of additive & subtractive color mixing, observer, color matching functions. tristimulus values , color appearance, color specification systems. the CIE system, metamerism, color constancy, chromatic adaption & color rendering, attributes of colors.

Color vision: Means. and mechanism of human color vision, modeling of color vision process, defective color vision.

Color Measurements: introduction of color measuring instrument, principle of color measuring instruments, computer match prediction of dyes. pigments and recipe calculation.

Lecture on recently published research & development in color physics.

WPE 311: Wet Processing-II

Credit	Hour / Week	Total Hour
3	3	45

Printing: Flow chart of printing process; Printing ingredients and their properties and functions; Thickeners & their types and properties (Natural. Synthetic Polymers, Emulsion thickeners, etc.); Preparation of Print paste.

Methods and styles of Printing: Printing processes for printing in different styles.

Printing processes for fabrics of different fibres with Direct, Acid, Basic, Vat, Reactive & Disperse dyes and their after-treatments; Printing with pigment; Study of steaming, curing and washing processes; Methods of screen and roller preparation. Detail study on screen printing.

Special printing methods (Transfer Printing, Jet printing, Flock printing, Burn-out printing).

Faults in printing and their remedies.

Finishing: Definition and classification of finishing;

Physical and Mechanical finishing: Different types of calendaring, raising, shearing, sanforizing, hydro-extraction, dewatering, slitting, compacting, stentering, etc.

Chemical finishing: Mercerization and parchmentisation, resin finish, water repellency, flame retardancy. Softening, etc.

Special finishing: rot-proofing, mildew proofing, insect and bacterial finishes, soil release, anti-static finishes etc.

WPE 312: Wet Processing-II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Printing: Preparation of printing paste; Printing on different textile materials (Cotton, Jute, Wool, Silk, nylon, polyester etc.) with direct, Acid, Basic, Vat, Reactive, Disperse dyes & Pigments with block, transfer, screen printing.

Finishing: Mercerization of cotton fabric; Estimation of mercerization effect; Crease resistant finish on cotton fabric; performance of crease resistant finish; Water repellent; flame retardant and parchmentization finish, etc. on cotton fabric. Application of optical brightening agent and softeners.

WPE 309: Wet Processing Machinery

Credit	Hour / Week	Total Hour
3	3	45

Working principles, types, different parts, capacity & features of the following wet processing machinery:

Preparatory: Boiler, singeing, desizing, scouring, bleaching, mercerizing & washing machine.

Dyeing: Different batch dyeing & continuous dyeing machinery.

Printing: Different types of screen, transfer, inkjet, flock etc. printing machinery, dryer & Steamer.

Finishing: Stenter, calendar, folding, Raising, suedding, sanforising, compactor, dewatering etc. machine.

Laboratory equipments: Different types of lab-dying machinery, computer color matching equipment, different types of color fastness testing apparatus, washing machine, color matching cabinet, automatic lab dispensing system.

WPE 310: Wet Processing Machinery (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical study of different pretreatment machinery (Boiler, Singeing, Desizing, Scouring, Bleaching, Mercerizing , Washing). Study on different type of dyeing machinery (Winch, Jigger, Jet, Package dyeing, Padding mangle). Printing machinery (Screen, roller etc.). Study of various type of finishing machinery (dryer, steamer, stenter, calendar and folding machine). Practical Study & application of Color matching equipments and lab dyeing machinery, Study of different color fastness test apparatus.

WPE 401: Textile Coloration-II

Credit	Hour / Week	Total Hour
3	3	45

Dyeing: Dye aggregation, interaction of dyes & fibres, Mechanism of dyeing, Dyeing kinetics (Diffusion, Pore model, Free volume model), Thermo dynamics of dyeing (Dyeing Isotherms, Affinity). Commercial dye-stuffs production (powder, paste, lump, solution, etc.)

Properties, structure and application of Sulphur, Azoic & Disperse dyestuffs, Pigments. Detailed study on their application. Dyeing of synthetic and blended fabrics with related dyes.

Quality of Dyeing: Selection of dyestuffs and dyeing process for commercial production considering cost, quality and other related factors. Causes of different types of faults in dyeing and their remedies. Shade correction and level dyeing. Stripping and washing-off for redyeing.

Printing: Printing process for fabrics of different fibres with Azoic & Disperse dyestuff and their after treatments. Detail study of printing with pigment and its after-treatments. Printing of synthetic and blended fabrics with related dyes. Printing methods (Transfer printing, InkJet printing, Flock printing, Burn-out printing, Plastic printing etc.).

Faults in printing and their remedies.

WPE 402: Textile Coloration-II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Dyeing: Dyeing of related textile substrate with sulphur, azoic, disperse dyes and pigments. Dyeing of combination shade, shade matching and stripping process. Dyeing of blended synthetic and fabric, dye indentification.

Printing: Printing for different fibres with azoic, disperse dyes and pigments. Application of special printing methods (Transfer printing, InkJet printing, flock printing & burn-out printing).

WPE 403: Textile Finishing

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Introduction to textile finishing and its importance; Definition and classification of finishing.

Physical or Mechanical Finishing: Shearing and cropping, calendaring, raising, sueding, beetling, breaking, folding, sanforising, hydro-extraction, dewatering, slitting, compacting and stentering etc.

Chemical finishing: Mercerization, parachmentisation, resin finishing, water repellency, flame retardancy, softening, soil release etc.

Detail study of functional finishes (rot-proofing, mildew proofing, antimicrobial finishes, anti-static finishes. Application of optical brightening agents.

Lectures on recently published research and development in wet processing.

WPE 404: Textile Finishing (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Application of different finishes on textile materials such as water repellent, flame retardant, rot-proofing, soil release, antistatic, antimicrobial finishes, crease resistant finish, softening; Knit finishes; Uses of Hydro-extraction, various drying systems in wet processing. Performance evaluation of different finishes (flame retardant, water repellent, crease resistant fabrics etc.) in fabrics.

WPE 405: Technical & Functional Textiles

Credit	Hour / Week	Total Hour
3	3	45

Introduction of Technical and functional textiles, smart textiles, high performance textiles. History and development of Technical and Functional textiles. Theory behind the development and construction of functional textiles, their challenges and opportunities. Functionalities of textile materials. Development of various functional textiles, production, evaluation, and performance. Nanotechnology and surface modification in textiles. Identify current trends, uses and applications of functional textiles. Applications and construction of functional textiles in areas such as clothing, sports & recreation, medical, protective, transportation, etc. on basis of comfort, protection, thermal regulation, stimulus responding conductive, etc.

WPE 407: Environmental Studies

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Introduction about environment; Definition and types of environmental pollution and pollutants; Climatic changes and their effects on environment; Green house effect, Environmental related health issues.

Types of textile pollution and their control:

Air pollution: Emission and control technology, air quality pollution and its pollution, and criteria setting.

Noise pollution: General consideration, Industrial noise sources evaluation, methods and techniques to control and reduce noise level.

Water pollution: Biodegradation (aerobic and anaerobic); Textile waste water analysis; Effluent in wet processing, description of waste

water treatments, various types of effluent treatments (Physical, Chemical and Biochemical, etc.) and disposal systems; Use of electro-chemical technology to remove color and other contaminants from textile mill effluents, cost comparison; reduction of textile waste water using automatic process control, recycle, filtration and new methods.

Solid waste management: Different forms of solid waste, composition of wastes; Principles of waste management, waste handling, collection systems and alternatives for treatments and re-use, benefits and challenges; solid waste in textiles, their characteristics, impact and disposal systems; Sludge management, sludge characteristics, treatment (thickening, stabilizing, conditioning, dewatering, volume reduction, landfill, etc.)

Regulatory issues: Hazardous chemicals, Risk and Hazard communication, penalties and compliances, etc. Environmental policy and law: Environmental law of Bangladesh, Role of the governmental and non-governmental organizations. International strategies for Health and Industrial safety, Environmental regulatory affairs for dyes and pigments, Risk VS Hazard communication, penalties and compliance etc.).

WPE 409: Special Wet Processing

Credit	Hour / Week	Total Hour
3	3	45

Introduction of special/novel chemical processing of textiles and its comparison with conventional processes.

Solvent and bio-scouring: Features and properties, process description, advantages and disadvantages over conventional processes.

Solvent dyeing (properties of different types of solvent used, application, advantages and disadvantages).

Dyeing under hypercritical condition: supercritical fluids, features and properties of different supercritical fluids, application on textile

materials, comparison with conventional processes, etc.

Foam technology: definition, importance of foam technology in wet processing, foam generation, application, advantages and disadvantages).

Ammonia Mercerization: Features and properties, process description, advantages and disadvantages over conventional processes.

Bio-polishing: Features and properties, detailed study of enzyme, types, mecha ⁻ of enzymatic action on cellulose materials, process descriptior .ages and disadvantages, enzymatic pretreatment of textile n.

Special pri .ıg: Carpet printing, 3D printing, Laser Printing.

Special printing: Development of various special effects using different chemical treatments (e.g. Seer sucker finishing, Coating, etc.).

Lectures on recently published research and developments in wet processing.

WPE 411: Testing and Quality Control of Finished Textiles

Credit	Hour / Week	Total Hour
3	3	45

Dyed textiles assessment: Inspection and assessment of dyed fabric dimensions; Fabric inspection system;

Fibres identification from dyed fabrics;

Identification of dyes from dyed textiles;

Chemical analysis: Assessment of purity and strength of different chemicals such as acids, alkalis, peroxide, etc. used in wet processing.

Color fastness: Importance, Grey Scales, Measurement of different types of colour fastness such as light, wash, rubbing, perspiration, chlorine, etc. using different international standards.

Quality Standards and Compliances: Quality Management, Quality Management principles; Quality Standards and their compliances; International test standards and methods such as ISO, AATCC, ASTM, BSTI, Indian Standards, British Standards, etc.; ISO Standards; ISO 9000; ISO 26000; ISO 14000, and other relevant ISOs; Social Responsibility.

WPE 412: Testing and Quality Control of Finished Textiles (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Assessment of purity and strength of different chemicals such as acids, alkalis, peroxide, etc. used in wet processing;

Measurement of different color fastness for dyed & printed goods. Comparison of fastness properties of fabrics dyed with different dyes.

WPE 414: WPE Industrial Attachment

Credit	Hour / Week	Total Hour
3	2 month	--

The students must undergo 2 (two) months intensive of Industrial Training program in the relevant area of specialization after completion of Level-III, Term-II.

WPE 416: WPE Project Work

Credit	Hour / Week	Total Hour
3	--	--

During the Level-IV of study each student will be required to complete a Project Work in the relevant field of their specialization.

For such a work the students will be guided by a Supervisor of the concerned Department.

WPE 418: WPE Comprehensive Viva

Credit	Hour / Week	Total Hour
3	--	--

The Comprehensive Viva will cover the entire 4 years courses of study. 60% weightage will be on the departmental subjects. 40% weightage will be on all other subjects. No specific class hour will assigned for the comprehensive Viva.

Department of Apparel Engineering

Detailed outline of courses offered for B. Sc. in Textile Engineering (Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

AE 101: Introduction to Apparel Engineering

Credit	Hour / Week	Total Hour
3	3	45

Introduction to apparel industry and historical background, overview and current scenario of the apparel industry in Bangladesh and other countries of the world;

Apparel industry management organogram, role of textile engineers in apparel industry;

Flow process of apparel manufacturing, various manufacturing units, sample apparel making, tailoring and industrial production, backward linkage and challenges for the apparel industry in Bangladesh, importance and present scope;

Apparel terms and definitions;
Fabrics used for apparel products;
Apparel components of woven shirt, T-shirt, polo shirt, pant;
Introduction to foreign and local apparel brands and product types;
Quota and category numbers of different items with export quantity;
Introduction to apparel quality control;
Introduction to CAD/CAM in apparel industry with application fields;

AE 201: Apparel Production - I

Credit	Hour / Week	Total Hour
3	3	45

Sizing system and range: Standard body measurement for gents, ladies and children,

Details of apparel manufacturing processes;

Pattern Making: Concepts of pattern making, pattern making tools and materials, methods of pattern making, pattern grading principle of pattern making for shirt and pant.

Marker Making: Definition, objectives, constraints, efficiency, methods, drawing and duplicating of marker making, marker utilization variation, fabric losses outside & inside of marker.

Fabric Spreading: Definition, objectives, requirements, method, splicing, fabric packages, quality issues in fabric spreading.

Fabric Cutting: Definition, cutting objectives, requirements, cutting machines and cutting methods, quality issues in cutting.

Trimmings and Accessories:

Definition, trim lists, swatch card, zipper, button, lining, hook and loop fastening, shoulder pad, velcro tape, lace, braid, elastic, etc.

Interlining: Definition, types, advantages of fusible interlining, conditions of fusing, properties of fusible interlining, fusing machineries, methods of fusing, quality control and fusing performance.

Sewing Thread: Types, properties, constructions, finishes sizing, packages and inspection of sewing thread.

Label and Motif: Various labels, International care labeling codes, motif and appliqué, quality issues and performances of trimmings and accessories.

AE 202: Apparel Production - I (Practical)

Credit	Hour Week	Total Hour
1	2	30

- Study on layout plan of Apparel Engineering Laboratory

- Study on standard body measurement for Men's, women's and children.
- Study on fabric spreading machine.
- Study on straight knife cutting machine.
- Study on band knife cutting machine
- Swatch card making for woven shirt, T-shirt, Polo shirt and Pant.
- Attaching different types of interlining.
- Practical study on fusing machine.
- Practical study on embroidery machine.
- Industrial Visit.

AE 204: Pattern Making- I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

- Study on size chart for woven shirt.
- Pattern making for basic woven shirt
  - o Front part and back part
  - o Sleeve, collar, yoke, cuff and pocket.
- Pattern grading of woven shirt.
- Marker making for woven shirt.
- Design and pattern making for various types of collar.
- Design and pattern making for various types of cuff.
- Design and pattern making for various types of pocket.
- Design and pattern making for various types of sleeve.

AE 205: Apparel Manufacturing-I

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Apparel industry with its historical background, overview and current scenario of the apparel industry, Importance's, presents scopes and challenges of textiles and apparel industry.

Structure of Textile and Apparel Industry: Nature of industry, management system, role of textile engineer in textiles and apparel industry; Flow process of apparel manufacturing, Sample apparel making, various manufacturing units, tailoring and industrial production, backward linkage.

Category and Quota system.

Apparel terms and definitions.

Sizing system and sizing ranges: Standard body measurement for gents, ladies and kids;

Apparel Manufacturing sequences; Sample apparel making;

Pattern Making: Concepts of pattern making and Grading, Rules for developing basic patterns, Pattern making tools and materials, Computer aided pattern making and Grading, Principle of pattern making for shirt and pant.

Marker Making: Definition of Marker, objectives, constraints, efficiency, methods, drawing, duplicating of marker making; Marker making mode, Marker utilization variation; Fabric loss outside & inside of marker.

Fabric Spreading: Definition of fabric spreading, spreading objectives, requirements, fabric packages, spreading methods; Quality issues in fabric spreading.

Fabric Cutting: Discussion of fabric cutting, cutting objectives, requirements, Cutting machines, cutting methods; Quality issues in cutting.

Interlining and Lining: Definitions; types and advantages of fusible interlining; Conditions of fusing, properties of fusible interlining; methods of coating; fusing machineries; quality control in fusing; fusing performance.

Trimmings: Definition, trim lists, swatch card, label and motifs, zippers, button, lining, hook and loop fastening, shoulder pad, velcro

tape, lace, braid, elastic; quality issues of trimmings.

Stitch: Definition, Types of stitch with features, sketch and applications.

Seam: Definition, Classification of seam with features, sketch and applications.

Garments Inspection & Quality Control: Definition, Inspection loop; Inspection system, Raw materials inspection, In-Process Inspection; Garments defects; AQL; Final inspection.

Latest development and research works in apparel production.

AE 206: Apparel Manufacturing-I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

- Study on layout plan of Apparel Engineering Laboratory
- Study on standard body measurement.
- List and draw the components of a basic shirt.
- Preparation of pattern for a basic woven shirt.
  - o Front part and back part, sleeve, collar, yoke and cuff
- Pattern grading of woven shirt.
- Study on Marker making for a woven shirt.
- Study on fabric spreading and cutting system.
- Study on straight knife fabric cutting machine.
- Study on band knife fabric cutting machine.
- Attaching different types of interlining.
- Practical study on different types of seams and sample making.
- Practical study on different types of stitches and production of sample stitches.

AE 301: Apparel Production - II

Credit	Hour / Week	Total Hour
3	3	45

Sewing Technology: Sewing elements, needle, feed dog, pressure foot, throat plate;

Sewing machines with details;

Stitch: Definition, types with features and applications, principles of lock stitch and chain stitch formation;

Seam: Definition, types with features and applications, performance of seams, seam strength, seam slippage;

Work Aids: Objectives, types and application.

Sewing problems and remedies: Feed mechanism, sewing defects, problems of stitch formation, seam puckering, and damages of the fabric etc.

Alternative Methods of Sewing: Definition, methods, welding, adhesives, molding and their comparison.

Apparel Embroidery: Introduction, objectives, types, embroidery m/c, embroidery threads, quality issues in embroidery.

Pressing and Finishing: Objectives, types, methods; various pressing machineries.

Folding and Packing: Types; methods; equipments, symbol and markings;

Testing for Apparel Product: Introduction, physical and chemical tests;

Apparel Inspection & Quality Control: Definition, inspection loop, inspection system, raw materials inspection, in-process inspection, defects, AQL and final inspection, responsibilities of quality control officers.

AE 302: Apparel Production - II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

- Study on all sewing machines in apparel lab.
- Study on thread path of basic sewing machines.
- General sewing practice with different sewing machines:
  Plain machine, over-lock machine, flat lock m/c, bar-tack machine, blind stitch m/c, Button holing m/c, button attaching m/c, feed off the arm m/c, etc.
- Study on different types of seams and practices on various seam preparation.
- Study on different types of stitches and practices on various stitch preparation.
- Practical study of various working Aids.
- Assembly of basic woven shirt in the sewing machine.
- Assembly of basic pant in the sewing machine.
- Practice of fusing machine.
- Practice on needle detector machine.
- Industrial Visit.

AE 304: Pattern Making- II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

- Study on size charts for pant and T-shirt
- Pattern making for woven pant.
  -Front part, back part, waist band, pocket facing, fly piece and pocket bag.
- Pattern grading for woven pant
- Marker making for woven Pant
- Pattern making for T-shirt

- Pattern grading for T-shirt
- Marker making for a T-shirt

AE 305: Apparel Washing, Dyeing & Printing

Credit	Hour / Week	Total Hour
3	3	45

Apparel washing: Concept of washing, requirements, washing equipment and machines, chemicals used in apparel washing;

Types of washing:

Wet process: Normal wash, caustic wash, bleach wash, pigment wash, enzyme wash, stone wash, acid wash, stone-enzyme wash, super white wash, etc

Dry process: Sand blasting, whiskering, hand scrapping, wrinkles, tagging, grinding & destroy, PP spray and PP sponging, etc.

Apparel dyeing: Definition, Objectives, advantages and disadvantages, apparel dyeing machinery; Basic theory of apparel dyeing, apparel dyeing with reactive dye, direct dyes, pigments dyes, sulpher dye and other dyes; Problems associated with apparel dyeing.

Apparel tinting: Apparel tinting by reactive dye, direct dye and other dye.

Apparel printing: Concept, various styles, methods, applications techniques & areas, latest trends.

Apparel washing, dyeing and printing costing;

Quality issues in apparel washing, dyeing and printing

Latest trends and development.

AE 306: Apparel Washing, Dyeing & Printing (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical study on apparel washing and dyeing machinery;
Practical study on normal washing
Practical study on enzyme washing
Practical study on stone-enzyme washing
Practical study on bleach washing
Practical study on caustic washing
Practical study on pigment wash
Practical study on acid washing
Study on different dry processes of apparel products
Practical study on apparel dyeing, using direct dyes and reactive dyes;
Practical study on apparel tinting using reactive and direct dyes;
Quality issues on washed, dyed and printed apparel products.

AE 308: Pattern Making- III (Practical)

Credit	Hour / Week	Total Hour
1	2	30

- Study on Size chart for Skirts and Dresses
- Pattern making for Skirts
- Pattern grading for Skirts
- Pattern making for Dress
- Pattern grading for Dress
- Pattern making for Polo-shirt
- Pattern grading for Polo-shirt

AE 309: Apparel Manufacturing-II

Credit	Hour / Week	Total Hour
3	3	45

Production system in apparel industry.

Inventory Control; Material Management; Material handling systems.

Cutting room, Sewing room and finishing room management: layout planning, Line balancing;

Apparel Washing: Concept of washing, requirements; washing equipment; dyeing and drying machines; chemicals used in apparel washing and dyeing.

Types of Apparel washing:

Wet Process: Normal wash, Caustic wash, Bleach wash, Pigment wash, Enzyme wash, Stone wash, Acid wash, Stone-Enzyme wash, Super white wash.

Dry Process: Sand Blasting, Whiskering, Hand scrapping, Whiskering, wrinkles, Tagging, Grinding & Destroy, PP spray and PP sponging.

Apparel Dyeing: Definition, objectives, advantages and disadvantages of apparel dyeing; garment dyeing machinery; basic theory of apparel dyeing; garments dyeing with reactive dye, direct dyes, pigments, sulpher dye; problems associated with garments dyeing.

Apparel Tinting: Apparel tinting by reactive dye, direct dye and other dye.

Special Apparel Production: Definition, purpose, materials and functions of special apparel etc.

Protective clothing: Definition and types, Fire proof clothing, Heat and flame retardant apparel, Naval and Armed forces clothing, Bullet proof vest, Water proof breathable fabric, Thermal clothings, Antimicrobial protection, Rain coats, Racing driver's apparels, Jogging suits, chemical hazards protective clothes; Smart textiles and apparels, Sportswear, Electronic textiles,

Latest development and research works.

AE 310: Apparel Manufacturing-II (Practical)

Credit	Hour/Week	Total Hour
1	2	30

- General machine maintenance, thread path, main adjustment

points and sample making with industrial sewing machine.

- Practical study on fusing m/c.
- Practical study on various types of Apparel washing. (Normal wash and Enzyme wash, Bleach wash, Acid wash etc.).
- Practical study on various dry wash process for apparel products.
- Practical study on apparel dyeing with reactive and direct dye.
- Practical study on computerized embroidery m/c.
- Study on CAD /CAM for apparel production.
- Practical study on line balancing (Layout plan, operation breakdown and SMV determination of apparel products).

AE 401: Apparel Merchandising

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Definition of merchandising, knowledges and skills required for merchandiser, activities involved in merchandising, negotiation skill and process of negotiation, supply chain concepts & its importance and relationship to merchandising, merchandising commercial terminology.

Order collection: Introduction, ways, and types of order.

Product package: Technical package/Tech-pack study and analysis for various products like T-shirt, Polo-shirt, woven shirt, pant, jacket, dresses etc.

Sample development: Merchandising activities on sample development; development of various sample apparels.

Merchandising sourcing: Need for sourcing, sourcing strategies, manufacturing resources planning and principles of MRP, supply chain and demand chain analysis, materials management for quick response, JIT.

Consumption and costing: System of fabric consumption and

apparel costing, factors influences price determination, determination of sewing thread and accessories consumption, direct and indirect costs, preparation of cost sheet for T-shirt, Polo-shirt, woven shirt, pant, dresses, jacket etc.

Visual merchandising: Importance's, key issues, principles of visual merchandising, merchandising techniques; Schedules: Seasons, promotions, special sales.

trends forecasting, marketing, sales, store management, buying, planning and distribution.

Latest development in apparel merchandising.

AE 403: Commercial Issues in Apparel Business

Credit	Hour / Week	Total Hour
3	3	45

Local and international apparel trade: Global scenario, Importance of apparel international trade in the world economy; International apparel trade & production trends, Trends of export & import in Bangladesh, Bangladesh position in the World; USA, EU, & Community of developing countries, Major trade partners of Bangladesh with Prospects.

Economic issues in apparel business: Interest on capital, Costs of Utilities, Road Communication & other infrastructure, Transport facilities and cost, Port facilities, Clearing and forwarding formalities, Banking and exchange rate, Law and order situation, Bi-lateral multi-lateral trade agreement, Cash incentives Export incentive, Export-import policy.

Govt. of Bangladesh's export entitlement policy on garment, Export Promotion Bureau (EPB) role in export entitlement policy; Export promotional activities of EPB for garment exporters, Cash compensatory support; Duty drawback, Export finance through banks, Export credit guarantee corporation, Market Development Assistance.

Import and export knowledge: Documents required for RMG business, Registration procedure, Procedure in export import trade, Types of L.C, Steps in L.C opening; Import procedure of raw materials, industrial and commercial goods; Execution of apparel export order; Export intermediaries, export marketing communication and barriers, export advertising & sales promotion, tools of public relation, trade fairs and exhibition, Freight forwards and their Functions, Export financing, Government Incentives.

Import and export documentation: Documents required in export transaction, types of export documents, invoice, packing list, bill of exchange, bill of lading, types of B/L, certificate of origin, certificate of Analysis; Pre-shipment Inspection (PSI), Shipments, Import strategy, Delivery and negotiation, clearing agent and their functions in customs clearance; Technology transfer, Technical assistance; Export incentives.

Custom duty: Authorities, Customs Port, Customs Airport, Land Customs Station & Customs-House; Warehousing Station & Public/Private Warehouses, Prohibited Goods or piece goods, Exemptions from Customs Duty, Value of Imported and exported goods for imposing customs duty; General Custom Duty, Countervailing Duty, Anti-dumping Duty and Safeguard duty, Duty Drawback, Infrastructure Development Surcharge, Offences and Penalties.

AE 404: Pattern Making- IV (Practical)

Credit	Hour / Week	Total Hour
1	2	30

- Practices on whole syllabus of Pattern making-I, Pattern making-II, Pattern making-III by CAD
- Practice on CAD based pattern designing, pattern grading and marker making for woven shirt, T-shirt, polo shirt.
- Practice on CAD based pattern design, pattern grading and marker making for Pant, skirt dress.

AE 405: Apparel Production, Planning & Control

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Definition of planning and functions; product life cycle; process planning and design.

PPC functions; Capacity planning and capacity strategy.

Facility location; Facility layout, Plant location methods.

Products and process layout, Production studies, Machine utilization and operator performances, Scheduling Techniques, Forecasting techniques.

Cutting Room Management: Production processes in the cutting room, Internal and external costs, Cut order planning, laying up techniques and procedures, Cutting techniques and equipment, Sorting and bundling, Control of fabric usage, Cutting instructions, Materials reconciliation.

Sample and Sewing Room Management: Activities & responsibility of sample room management; operating conditions & sewing room design.

Production management: Production systems (UPS, PBS, JTS etc.); Productivity and causes of low productivity; Technique of productivity improvement; KPI's in garments industry, Line balancing.

Resource and Materials Management: Definition and purpose of materials management; Inventory system, Inventory costs, Storage of materials; Record system of store management; Inspection, Costing, Pricing, Principles of purchasing.

Materials requirements planning system (MRP), Purpose advantages and disadvantages of MRP, Demands for products, BOM file, Inventory records file, Economic order quantity (EOQ), Enterprise resources planning (ERP) and MRP, Management of quality and quality assurance.

Waste management in apparel production:

Various tools and techniques in apparel waste management.

Latest development in apparel Production, Planning & Control.

AE 407: Application of Computer in Apparel Manufacturing

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Scope and uses of Computer in Textiles and Apparel; Conventional and Computer based product development cycle; Software used; CAD and CAM; IT and Web Presence in Apparel Business; Investment and Infrastructure analysis for Computer Based Production Unit; Future Trend.

Database Management System: Basic concepts - character, field, record, file, database; Benefits and limitations; Levels of abstraction; Instances and schemas; Data manipulation language (DML); Data definition language (DDL); Structured query language (SQL); Entity-relationship (ER) model; Transaction management; Database administrator; Relational database - concept, definition, properties; Basic SQL statements - CREATE, DROP, SELECT, INSERT, UPDATE, DELETE, COMMIT, ROLLBACK; Database connectivity;

Data-Management in Apparel Industry: Identification of data generating node in apparel; Data flow study and analysis; Developing data flow diagram; Data Layering; Algorithm design for data management; Algorithm for computer production garment parts; Data security, Data management infrastructure; Comparative study on data management system, system analysis, system design, Documentation & planning, Linear programming, Critical Path analysis.

CAD/CAM in Pattern and Marker making: Working with elements in a Pattern; Pattern development; Setting allowances; Dart, Pleat and Notch; Fine tuning a pattern; Optimization parameters; Pattern Grading; Designing; Shrinkage and Orientation; Interoperability; Marker definition in CAD; Cutting plan; Automatic

marker generation; Plotter configuration and plotting.

Comparative study on available used CAD and CAM: Cost effectiveness of CAD and CAM; Process optimization; Product development steps; Product costing and consumption calculation; Reusability; Online monitoring tool for process control and quality management; Computer in purchase, inventory control and sales, quality control; computerized production planning and control; Finite scheduling concept and fast react software; Creating product and order planning, Electronic Data Interchange (EDI) technology; Enterprise Resource Planning (ERP), MRP and computerization in exports /import documentation.

Information Technology and Automation in Apparel Business: Application of IT-Electronic commerce, data warehouses and data marts, Data mining, Online analytical Processing (OLAP) Internet & intranet, Intelligent systems; 3D scanning technology; Use of Microcomputers for garment production control; Imaging techniques for designs.

Latest development and research works on application of computer in apparel engineering.

AE 408: Application of Computer in Apparel Manufacturing (Practical)

Credit	Hour / Week	Total Hour
1	2	30

- Draw a complete E-R Diagram.
- Usage of DDL (Date Definition Language) statements.
- Usage of DML (Data Manipulation Language) statements.
- Usage of DQL (Data Query Language) statements.
- C Program that will read several years' investment and profit values and analysis of its financial feasibility.
- Write a C program that will read the project activity table and show the critical path along with project completion time.

- Introduction to available CAD software, operation tools and technique with functions.
- Pattern making for T-Shirt, Polo-Shirt.
- Patterns grading for T-Shirt, Polo-Shirt.
- Variant Creation, editing and marker processing.
- Marker making for T-Shirt, Polo-Shirt, lay lot planning.
- Pattern making, grading and marker making for apparel product using CAD from Spec sheet.
- Study on the consumption report by CAD Software.
- Cost/benefit analysis using spreadsheet.
- Practice on database management software.

AE 409: Clothing Comfort

Credit	Hour / Week	Total Hour
3	3	45

Human physiology and role of clothing: Definition of Comfort, Human physiological aspects, Perception and variables of clothing comfort, Comfort properties of fibers, yarns and fabric structures and their effects on clothing comfort properties.

Thermal comfort: Thermal balance of human body, Process of maintaining constant body temperature and role of clothing, heat transfer through clothing, Measurement of thermal resistance of clothing, Parameters influences heat transfer; Moisture management and comfort: Liquid water transfer, Wicking, Water absorption and principles of moisture vapour transfer, Factors influencing heat and mass transfer through fabrics.

Tactile comfort: Tactile comfort sensations, Fabric characteristics and tactile attributes, Clothing parameters influencing tactile sensation; Fabric prickliness, Itchiness, Stiffness, Softness, Smoothness, Roughness, and Scratchiness.

Clothing fit and comfort: Aspects, Construction Factors, Body

dimensions and pattern, Tight-fit and loose-fit clothing, Clothing fit and pressure, Factors related to Clothing fit and body movement.

Aesthetic comfort: Psychological aspects of aesthetic comfort, Analysis of clothing aesthetics, Aesthetic concepts of clothing, Change in Aesthetic behavior.

Improving comfort in clothing: Approaches for improving comfort of clothing, Improving moisture transport and moisture management, improving textile surface properties for tactile sensation, Materials and design strategies for improved fit and movement; multiple layer structures and membranes - Gore-Tex.

Comfort properties of apparel products: Water and wind resistance clothing, Layered clothing and comfort, Breathable fabrics, Comfort for active sportswear, Comfort of summer and winter clothing;

Latest development in clothing comfort.

AE 411: Special Apparel Production

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Definition, Purpose, Materials used and functions of special apparels.

Protective clothing: Definition and types, requirements and features of protective clothing; Thermal characteristics; Water proof breathable fabric, Thermal undergarments, Heat flame retardant apparel, Fire proof clothing, Bullet proof vest, Naval and Armed forces cloth; Chemical and Biological protective clothing, Antimicrobial protection, Coal miners suite, Rain coats, Racing driver's apparels, Parachute, Jogging suits, chemical hazards protective clothes.

Medical Textiles: Definition, importance's, Classification, Sterilization; Production procedure, Protective Healthcare products.

Miscellaneous Special Apparel Products: Smart technology for

textile and clothing. Application of smart textile, Nano technology, Electronic textiles, Sportswear; Wearable technology for snow clothing. Electromagnetic radiation protective clothing.

Apparel Design and Fashion: Basic concept, materials, accessories, elements and fashion trends; Theory of Fashion, Fashion cycles, stages of fashion cycle, Fashion marketing, Movement of fashion, factors influences fashion movement, Leader of fashion, Fashion designer's role.

Fundaments of Fashion: Fashion, Fad, Classic, Style, Design, Trends; Raw materials of fashion.

Trend Forecasting: Fashion forecasting process, Trade shows.

Element of Design: Shape, Form, Value, Line, Color, Texture, Space.

Principle of Fashion: Balance, Proportion, Silhouettes, Emphasis, Rhythm, Harmony Unity.

Color Theories in Fashion Design: Properties of Color/Color Dimension; Color Theories; Color Wheels; Color systems use of color in designing.

Latest development in special apparel production.

AE 413: Industrial Engineering in Apparel Production

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Definition and scopes, Role of industrial engineers in apparel industry; Productivity and Production systems; Causes for low productivity and ways to productivity improvement.

Work study and method study: Work content, Method study, Professional approach. Operation analysis; Motion economy, Design of work plan layout. Stop watch procedure and standard data.

Work measurements: Work measurements, its purpose and techniques; elements, timing errors; Time study, Motion study, Efficiency and Performance, Performance Rating, Relaxation and

other allowances and standard time, Basic time and standard time calculation; Predetermined motion time system (PMTS); Calculating SMV and setting target production, Element sheets methods and mathematical models for assessing work.

Garments analysis for production: Line balancing and its importances; Determination of SMV and production capacity for apparel products; Operation breakdown and machine layout for apparel products; Preparation of CM cost sheet (T-Shirt, Woven shirt, Pant, Kids Item).

Plant layout: Purpose, importance and types of facility design, Stable Vs. Changing products and styles, plant location, Plant Patterns: Process, Products, Product Analysis, Parts list, Assembly chart, Factors for selecting machinery and space requirements; learning curve.

Introduction to modeling & simulation and its major application to apparel production.

Ergonomics aspects in apparel industry: Calculation of building space requirements, Balancing production lines, Relationship of activities to Physical Plant Services: Types of activity, Stores, Health, Safety, Feeding, and Convenience related services, activity relationship chart.

Materials handling: Objectives, methods and classification of materials and handling equipment's, Descriptions and characteristics, drafting techniques, plant measurement methods.

Latest development in industrial engineering for apparel production.

AE 415: Compliance in Apparel Industry

Credit	Hour Week	Total Hour
3	3	45

Introduction: Purpose, Importance of compliances, ILO & Apparel business Compliance:

Social compliance: Corporate Social Responsibility (CSR), Goals of CSR, Coverage areas, CSR Pyramid CSR: UN Global Principles; Different Global Standards; Arguments for CSR; CSR in Apparel Industry: Business Social Compliance Initiative (BSCI) and its Impact. BSCI Principles; WRAP (Worldwide Responsible for Apparel Production), Principles of WRAP, Social Accountability (SA)-800. Ethical Trade Initiative (ETI), Clean Cloth Campaign (CCC), Fairtrade (Fair for Life), Fair Wear Foundation (FWF).

Environmental compliances: General overview and control of pollution of water, land, air and optimum use of water, energy and other resources; ISO 14001, Oeko Tex Standard 1000 and 100, EU eco-label, GOTS (Global Organic Textile Standard), Bluesign.

Compliances and sustainable development: Sustainability of apparel industry and products; integrating issues for sustainable development; Eco textiles & labelling; Oeko-tex standards; Sustainable Apparel Coalition: Environmental and Social Regulations etc.

Other miscellaneous: Quality management systems, General requirements: Documentation Requirements: General manual, Control of documents, Control of records, Management responsibility, Management commitment, Customer focus, Quality policies. Planning Quality objectives, Planning, responsibility, Authority & Communication, Management review; Resource management. Provision of Resource, Human resource competence, Awareness & training; Infrastructure work environment; Review & requirements of the product; Customer communication,

Purchasing and compliances issues: Process, information, verification of purchased products. Production & service provision; Validation of processes for production & service provision, Identification & traceability, Customer property, Preservation of product. Customer identification, Internal audit, Monitoring & measurement of processes product, Control of non-conforming product, continued improvement, corrective action, Preventive action.

Latest development in compliance for apparel industry.

AE 416: AE Industrial Attachment (2 months)

Credit	Hour / Week	Total Hour
3	2 month	--

The students must undergo 2 (two) months intensive of Industrial Training program in the relevant area of specialization after completion of Level-III, Term-II. The Industrial Attachment will cover 50% weightage from Continuous Assessment and 50% weightage from Final Examination.

AE 418: AE Project Work

Credit	Hour / Week	Total Hour
3	--	--

During the Level-IV of study, each student will be required to complete a Project Work in the relevant field of their specialization which would be selected and approved by the department. For such a work the students will be guided by a Supervisor of the concerned Department. The Project Work will cover 50% weightage from Continuous Assessment and 50% weightage from Final Examination.

AE 420: AE Comprehensive Viva

Credit	Hour / Week	Total Hour
3	--	--

Every candidate shall be required to appear for Comprehensive Oral Examination on a date fixed by the department and must satisfy the examiners. The Comprehensive Viva will cover the entire 4 years courses of study. The Comprehensive Viva will cover 60% weightage from the departmental subjects and 40% weightage from all other subjects. No specific class hour will be assigned for the comprehensive Viva.

Department of Textile Engineering Management

Detailed outline of courses offered for B. Sc in Textile Engineering (Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

TEM 101: Fundamentals of Management

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Definition of Business, nature & scope of business, different forms of business organization, ownership & their formation, social responsibility of business & business ethics,

Definition of Management, Nature, Scope, Principles of Management, Need for Management, organizations & Managers, Managerial Responsibility, Types of Manager, Management Process, Skills, Roles, Productivity, Effectiveness, Efficiency, Managerial & Organizational Performance.

Organizational Culture, changing the culture, Factors affecting the OC, Corporate Etiquette.

Environment of Management: Internal and external environment of organization, components of environment, International environment and managing environment

Objectives: Nature of objectives, Vision, Mission, MBO, Process of MBO, Benefits & Weakness of MBO

Planning: Nature of Planning, Types of Planning, Steps in Planning, Tools & Techniques of Planning, etc.

Decision Making: Decision Making Process, Problems & Opportunity finding, Nature of Managerial Decision Making, Other factors of decision making, Decision Support System

Organizing: Organizational Structure, Division of Works, Span of Management, Departmentation, Line & Staff Management,

Delegation of Authority, Centralization & Decentralization, Coordination, Committee and group decision making, staffing the organizational structure

Leading: Direction-importance & Principles of Direction, Consultative Direction. Communication & its importance, main element & process, requirements of successful communication, Human Factors in Managing, Relevant theories of Motivation and leadership, creativity & innovation

Controlling: Meaning & importance of Controlling, Types of Controlling, Controlling Process, Requirement of effective controls, Information System & Control.

TEM 201 : Fundamentals of Marketing

Credit	Hour / Week	Total Hour
3	3	45

The Field of Marketing: Nature and scope of marketing - Historical development of marketing - Marketing management and its evolution - Marketing concept - Role of marketing in the society.

Marketing Systems and the Marketing Environment : System approach to marketing - External environment of marketing systems- Internal variables of marketing systems.

Marketing and Buyer's Behavior: Definition - Market segmentation, targeting and positioning - Classifications of market - Psychological influences on buyer behavior - Cultural and social-group influences of buyer behavior - Model of buyer behavior.

Elements of Product Planning: Definition of product- Classification of product - Marketing considerations of product - New product development - Product life cycle - Understanding of branding, packaging, labelling.

Place and Distribution Structure: Retailing - Wholesaling - Channels of distribution and logistics Management,

Price System: Pricing objectives and price determination - Methods of setting price.

Promotional Activities: Promotion Mix Integrated Marketing communications strategy , Advertising Sales Promotion, Personal Selling and sales management. Direct and on line marketing New marketing model.

Managing Marketing: Competitive strategies, Attracting, Retaining and growing customers.

Marketing and society: Social Responsibility & Marketing ethics.

TEM 203 : Operations Management

Credit	Hour / Week	Total Hour
3	3	45

Introduction to Operations Management: Definition of Process and Operations Management, Differences and Similarities between Manufacturing and Services, Trends in Operations Management, Three Views in Operations Management (Function, Profession, Decisions).

Operations Strategy and Competitiveness: Corporate and Operations Strategies, Service Strategies, Market Analysis, Mass Customization.

Product Design and Competitive Priorities: Product Planning, Competitive Priorities, Time-based Competition, Positioning Strategies.

Process Management: Process Design in Manufacturing and Services, Facets of Process Design, Process Analysis, Workforce Management.

Textile Production management: Production management in spinning, weaving, knitting, dyeing-printing, garments manufacturing.

Inventory Management: Inventory Concepts, Pressures for Low and High Inventories, Types of Inventories, Inventory Reduction Tactics, Placement of Manufacturing Inventories, Economic Order Quantity

(EOQ), Calculating EOQ, Non-instantaneous Replacement, Quantity Discounts, One-period Decisions.

Material management: objectives, functions, types of textile materials, technique.

Aggregates Planning and Scheduling: Purpose of Aggregate Plans, Process of Aggregate Plans, Scheduling in Manufacturing- Gantt Charts, Performance Measures, Job-shop Dispatching, Sequencing Operations for Single and Multi Machines, Scheduling in Service-Customer Demand and Workforce, Just-In-Time (JIT) Operations-Pull Method of Material Flow, Small Lot Sizes, Uniform Workstation Loads, Standardized Components and Work Methods, Close Supplier Ties; Flexible Workforce.

Location Analysis: Factors affecting Location Decisions, Locating a Single Facility, Locating within a Network of Facilities, Applying Load-Distance Method, Using Break-even Analysis, Globalization of Operations.

Layout Analysis: Layout Planning, Strategic Issues, Hybrid Layouts, Designing Process Layouts, Process Layouts for Warehouses and Offices, Product Layouts, Line Balancing and other Considerations.

TEM 301: Human Resource Management

Credit	Hour / Week	Total Hour
3	3	45

Introduction to Human Resource Management: The concept of human resource management - Early stages of development - Contemporary developments - Human resource management as a profession.

Organization Considerations in Managing Human Resources: The organization as a system - Responsibility and authority within the organization- Organization structures- The human resource department in an organization- The personnel program.

Job Requirements: The role of jobs- Job design -Job analysis - Job requirements and personnel functions- Job descriptions.

Human Resource Planning and Recruitment: Human resource planning recruiting within the organization - Recruiting outside the organization - EEO AA in recruitment.

Recruitment and Selection: The steps in recruitment- The exit interview - Reaching a selection decision - Considerations that shape selection policies.

Job Evaluation: The reasons of job evaluation schemes- Problem areas - Procedure-Techniques-Non-analytical methods-Analytical methods-New methods-Other methods.

Compensation Systems: Job choice-The influence of compensation on behaviors- Compensation and satisfaction-Administration- Types of systems- Compensation evaluation - Incentive pay systems.

Training and Development: The purpose of training - The identification of need - Training programs- Types of training - Management development - Evaluation - Government intervention - Psychological principles of learning.

Career Development: Phases of a career development program- Career development programs for special groups - Personal career development.

Evaluation and Improving Performance: Objectives- Performance evaluation programs- Performance evaluation methods- Feedback of evaluations- Improving performance.

Motivation: Objects, Characteristics of motivation. Motivations, Satisfaction, Sources of motivation. Different theories of motivation. Special motivation techniques.

Safety and health Management: Concepts, programs, Occupational diseases & their preventive measures. CSR in the factory, CSR as occupational safety & health.

TEM 303: Accounting & Cost Management

Credit	Hour / Week	Total Hour
3	3	45

(A) Accounting

Definition of Accounting, Users of Accounting Data, The Accounting Profession, Financial, Cost & Management accounting, Accrual vs. Cash Basis of Accounting, Generally Accepted Accounting Principles, Accounting Assumptions.

The Accounts- Debits and Credits, Basic Accounting Equation, Expansion of Basic Equation along with Transaction Analysis

Steps in the Recording Process- The Journal; the Ledger, Cash book, the Trial Balance, Adjusting the Entries for Prepayments & Accruals

Accounting for Merchandising Operations- Recording Purchases of Merchandise; Determining Cost of Goods Purchased; Determining Cost of Goods on Hand; Computing Cost of Goods Sold; Gross Profit; Trading Account, Profit & Loss Account

Accounting for Manufacturing Operations specially differences arising from Cost of Goods Sold/manufactured Calculation and its sub components

Preparing Financial Statements- Income Statement, balance sheet, cash-flow statement, statement in changes in owner's equity, financial disclosures, Reading the financial statements including Ratio analysis

(B) Cost Management

Meaning: scope, objective, advantages, Financial Accounting vs. Cost Accounting, Factors influencing the design of a cost limitation of costing system- steps, difficulties, Measures to overcome the difficulties, Cost unit, Methods of costing types, Development of Cost Accounting.

Cost Behavior and Terminology: Basic cost behavior patterns, Economic, Accounting and other cost pattern, product Costing concept Need for Knowledge of cost behavior, Methods of estimating cost relationship.

Cost Elements- Costing for materials, Costing for labor, and costing for Overheads

Cost Accounting system- Job order costing, Contract Costing and Process costing

Costing Techniques: Standard Costing, Costing of by products and joint products, Direct Costing

Analysis of Cost Behavior- variable, Fixed and mixed

Cost - Volume - Profit Analysis

Analyzing cost for Pricing and short run decision- BEP Analysis, Cost for decision making, Differential cost analysis

TEM 305: Financial Management

Credit	Hour / Week	Total Hour
3	3	45

Introduction: The Role and Environment of Finance- Finance and Business. The Managerial Finance Function, Goal of the film, Financial Institutions and Markets, The function of financial Manager; The Goal of the Financial Management, Value maximization as a goal; the Agency problem - Financial Decisions- Functions of the financial officers.

Financial Statements and Ratio Analysis- The Stockholders' Report. Using Financial Ratios, Liquidity Ratios, Activity Ratios, Debt Ratios, Profitability Ratios, Market Ratios, A Complete Ratios Analysis

Cash Flow and Financial Planning- Developing the Statement of Cash Flows, The Financial Planning Process, Cash Planning: Cash Budgets, Profit Planning: Pro Forma Statements, Preparing the Pro Forma Income Statement, Preparing the Pro Forma Balance Sheet, Evaluation Forma Statements

The Time Value of Money: Future value; Present value, Future value vs. Present value, Future value of a annuity; Present value of an annuity; Installment payment of Accumulation of a future sum.

Risk and Return: Risk, uncertainty and return; Probability distribution and Expected return; Total Risk analysis for assets in isolation; Variance, Standard Deviation and Coefficient of variation;

Introduction to Portfolio theory and Capital Asset Pricing Model (CAPM) to analyze risk.

Cost of Capital: Capital components and their costs: Cost of debt, Cost of preferred stock, Cost of Common Equity; Cost of Retained Earnings- The Dividend Discount Model Approach and the CAPM Approach; Cost of Newly issued Common Equity; Weighted Average Cost of Capital (WACC), Rationale for WACC, Marginal Cost of Capital.

Financial Institutions: Roles, functions and interrelationship of the monetary authorities of Bangladesh and commercial banks. Credit policy and public debt management, Problems of commercial banking with respect to lending, investment, deposit taking check clearance.

TEM 307: Managerial Economics

Credit	Hour / Week	Total Hour
3	3	45

Introduction to Economics: Basic Concepts in Economics- Utility of goods, wealth, value, price and want. Theory of utility of supply and demand, Elasticity of supply and demand. Problems of allocation and investment study capital, Managerial Economics defined; Managerial Economics model; Interrelationship with other disciplines; Role of Managerial Economics.

Objective/Goal of the firm: Profit defined; Profit maximization objective; multiplicity of objectives; Profit and non-profit objectives; Economic analysis and managerial efficiency in growth; survival.

Theory of Demand: Demand Schedule; Demand Curve; Demand Function, Shift in demand; Income effect and substitution effect; Elasticity of Demand-Types and measurement; Managerial implication of elasticity of demand in practice, Methods of demand estimation; Estimating the demand of consumer and industrial goods in macro and micro level.

Theory of Cost: Meaning and measurement of cost; Cost function; Long run and Short run cost function; Total, Average and Marginal Cost; Managerial implication of marginal cost.

Theory of Production: Production defined; Production functions; Production elasticity; Law of Diminishing return; Stage of production; Production function with one and more variable inputs; Determination of optimum use of input variables; Managerial implication of production function; Scale of production; Measurement of returns to scale.

Price and Output Determination: Price and output determination under monopoly, monopolistic competition and Perfect competition-Short run; Long run price and output determination; Determining optimum selling and promotion expenses, Condition required for successful price determination.

Macro economic analysis: Introduction to macro economics, Aggregate supply and demand, Measuring economic activities, National income determination.

Macro Economic policy; Monetary policy; Fiscal policy; Inflation and baking policy.

Aggregate income and spending policy for growth and stability National budget and public debts.

National Income: Definition of National Income; Concepts of National Income, Gross National Product (GNP); Net National Production (NNP), Gross Domestic Product (GDP); National Income Computation; Problems faced in National Income Computation (Reference should be made to Bangladesh)

TEM 309 : Quality Management

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Meaning and measurement of quality; quality assurance, duties & responsibilities of quality control officer,

emergence of modern quality & its management, Deming Principle on quality & productivity, quality cost & their interpretation.

Management approaches: Management approaches, concepts, and techniques for the monitoring and improvement of product and process quality; developing standards for quality of product, process, and service.

Statistical Approach to Quality Management: Control & measurement concept of quality, elementary SPC tools-PDCA cycle, Pareto's law, cause & effect (fishbone), control charts- attribute control charts & variable control charts, measurement of variation & process capability analysis, design of experiments - identification of key variables for major variations.

Total Quality Management: Concept of total quality management (TQM); origins and growth of TQM, Benefits of TQM, and Philosophies of TQM-quality circle approach, developing a corporate orientation for TQM

Quality & Reliability: Quality & Reliability, Survival probability, hazard rate, components and system reliability and its prediction, failure mode and fault tree analysis, reliability testing

Continuous Improvement: Benchmarking, Continuous Improvement, Lean Management, Operational Quality Management, Six Sigma, Quality Management System

Standards and compliance: Quality standards and their compliance, ISO Standards, ISO 9000 - Quality management, Quality management principles, ISO 26000 - Social responsibility, ISO 14000 and other relevant ISOs , Environmental Management System (EMS), Benefits of EMS, Implementation, Documentation, ISO Certification Procedure in Bangladesh, Limitations of BSTI on ISO in Bangladesh.

TEM 311 : Application of Computer in Textile Management

Credit	Hour Week	Total Hour
3	3	45

System Analysis & Design: System analysis; System design; Difference between analysis and design; System analysts and their role; System development life cycle (SDLC) - SDLC stages, feasibility study, cost/benefit analysis, Data flow diagram (DFD).

Project Management: Introduction; Critical path analysis; Linear programming; Computerized production planning and control.

Database Management System: Basic concepts - character, field, record, file, database; Benefits and limitations; Levels of abstraction; Instances and schemas; Data manipulation language (DML); Data definition language (DDL); Structured query language (SQL); Basic SQL statements - CREATE, DROP, SELECT, INSERT, UPDATE, DELETE, COMMIT, ROLLBACK; Database connectivity;

Information Technology: Introduction to IT; Scope and importance of IT in business and management; Security issues in data management and networking; Management Information System: Basic concepts; Advantages; Types of management information system (MIS) - manufacturing information system, transaction processing system, human resource information system, marketing information system, financial information system; E-commerce and E-business: Introduction to e-commerce and e-business; Benefits of e-commerce and e-business, current trends.

TEM 312 : Application of Computer in Textile Management (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Cost/benefit analysis using spreadsheet; Drawing DFD using drawing software; Installation of database management software; Creation and dropping of database tables; Retrieving records from database tables in different ways; Adding new records to the database tables in various ways; Changing existing values of records in database tables fulfilling the conditions; Removing records from database tables; Completing and revoking transactions; Connect database through

programming; Developing MIS application; Usage of e-commerce and e-business software,

Ledger and Journal: Creating Company, Ledger creation and modification, Group or control ledger creation. Various transactions entries like purchase, payment, receipt, sales, contra, journal etc. Showing various reports such as profit and loss, balance sheet etc.

Inventory management: Creating stock groups, Unit measure, stock item, Godown. Creating Purchase voucher, stock journal and Sales voucher. Show various types of Inventory reports.

Payroll in Accounting Software: Creation Pay Head, Department/ Group, Designation, Payroll structure, Attendance type, Payroll voucher. Show various payroll related reports.

TEM 313 : Industrial Management

Credit	Hour / Week	Total Hour
3	3	45

Management & Organization: Definition, Function and role of management, Nature and scope of business, Direction and Communication-budgetary control, Organization structure, Type of structure, Work measurement and Wage plan operational research, Span of Supervision, Motivation, Leadership, Nature of Behavior, Personality, Psychology of labor/ management reactions from different types of companies.

Personnel Management: Concepts, Policy, Structure and Functions of personnel department, Line and staff organization, Recruitment, Training, Job evaluation. Methods of remuneration, Organization of employers and work people, ILO, Trade union organization, Collective Bargaining, Labor Welfare, Disputes, Job specifications, Job descriptions, Disciplinary actions, show cause, charge sheet etc. Health, safety and working conditions.

Production Economics: Basic concepts in economics- utility of goods, wealth, value, price and want, Theory of utility of supply and

demand. Elasticity of supply and demand. Problems of allocation and study capital.Production- factors of production -division of labor, location of industries, specialization. The economics of scale small and large scale production. Production curves and production function.

Investment decisions: Feasibility studies to set up a new Mill-Economic, Market, Financial and Technical feasibility studies. Economic evaluation and comparison of alternative investments-Capital budgeting technique.Project Management through CPM/PERT.

Marketing Basics: Concept of Market and Marketing; Marketing Process, Marketing Mix; Marketing Environment-Inland & Foreign; Buyers' Behavior; Market Segmentation, Targeting, Positioning; Product & its Life Cycle management, Branding; Pricing; Distribution Channel, Promotion.

Legal issues for Industrial Management: Contract Act, 1872-definition of contract, agreement, promise, essential of a valid contract, offer, acceptance, consideration and other relevant issues. Industrial policy 2010(prevailing one)-definition & classification of industries, thrust sector, investment incentives, diversification of industries, etc. Bangladesh Labor Law 2006-conditions of service & employment, health & hygiene, welfare & safety, working hours & leave, trade union & industrial relations, etc.

TEM 401 : Business Ethics & Legal Environment

Credit	Hour / Week	Total Hour
3	3	45

Law of Contract: Nature of contract and essential elements of valid contract. Offer and Acceptance, Consideration, Capacity to contract and free consent. Legality of object. Unlawful and illegal agreements, Contingent contracts, Performance and discharge of contracts, Remedies for breach of contract, contract through agents.

The Sale of Goods Act,1930: Define goods and its classification.

Distinction between sale and agreement to sell, price, conditions and warranties, negotiable instruments, Transfer of property, Transfer of title, unpaid seller and his rights, Delivery and its rules, Auction sale, Law of insolvency.

Carriage of Goods: Common Carrier, essentials of a Common Carrier, Rights, and Duties of a common Carrier, Restricted Liability of Railway Carriage as common carriage and by Sea.

Companies Act, 1994: Steps and procedure for incorporation of the company, Company Management-Appointment of Directors, Powers, duties, & liabilities of Directors, Company Meetings, Resolutions, Winding-up of a Company.

Partnership Act-1932: Constitution of partnership, Rights, duties and Liabilities of partners, Dissolution of partnership.

Other Acts: Trade Marks Act 1940, Patent Design Act, 1911, Standard Weight and measure Ordinance, 1982

Industrial Law:

Factories Act, 1965: Health, Hygiene, Welfare and Safety measures, Working Hourse, Employment of young persons, Leave and Holidays, etc.

Industrial Relations Ordinance, 1969: Importance of study of Industrial Relations, Trade Unions, Unfair Labour practice, Collective Bargaining Agent(CBA), Strikes and Lock-out, Labour Court and Labour Applellate Tribunal.

Labour Law 2006: Conditions of Employment, Recruitment procedure, Classification of workers, Leave and Holidays, Stoppage of work, Calculation of period of continuous service, Lay-off, etc; Retrenchment, Dismissal, Punishment, Termination, Penalties and Provident Fund Rules.

BFPZ Act 1980.

TEM 403 : Entrepreneurship & Project Development

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Concept and Meaning of Entrepreneurship, characteristics, functions, and roles, classification- Entrepreneur and Entrepreneurship, entrepreneur- definition, features, qualities, classification, difference from mangers- Intrapreneurship - concept - features and difference from Entrepreneurship. Theories, model and environment of Entrepreneurship.

Entrepreneurial Motivation: Definition, theories of motivation, characteristics associated with achievement oriented entrepreneurs, Competence motivation, personal entrepreneurial competencies.

Entrepreneurship Process: self-analysis- legal issue settlement- selection of legal forms, Start-up strategies: scratch- buying and franchising strategies.

Entrepreneurial Process: Business plan- marketing plan- financial plan and venture management plan, Entrepreneurship Development program, Entrepreneurship assistance in Bangladesh and case histories of successful entrepreneurs.

Understanding SME business - Practical importance and role of SME business through out the world and in Bangladesh, Starting a SME Business,

SWOT analysis: understanding of strength, weakness, opportunities and threats of the environment.

Start-up a Business: Idea generation: methods of idea hatching and process of idea validation and implementation- Developing business plan, Necessary List of Documents for an Entrepreneur.

SME Business Support Services: Financial Support, technical support, accounting support and other support-Understanding SME business support services required at various stages of business growth-Government and non-government support services in Bangladesh.

Project Identification and selection: Meaning of project, project classification, project identification, project selection.

Project Formulation: Meaning of project report, significance of project report, contents of a project report, Formulation, Planning, commissions, guideline, project profile, common errors in project formulation.

Feasibility studies to set up a new Mill- Economic, Market, Financial and Technical feasibility studies.

Economic evaluation and comparison of alternative investments- Capital budgeting technique Pay back period, Net present value, internal rate of return, Benefit cost ration. Project Management through CPM/PERT.

TEM 404 : Project Development (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Project Development Process, Initiating Process:

Planning Process: Project Scope Management, Plan Communications Management, and The concept of the Triple Constraint.

Feasibility Study: Commercial, Technical, Environmental

Network Analysis: elements, activity,

Project Risk Management:

Monitoring and Controlling Process: Project Integration Management, Project Time Management, Project Quality Management,

Project Completion & Final Evaluation:

Project presentation:

TEM 405 : Market Research & Product Development

Credit	Hour / Week	Total Hour
3	3	45

Marketing Research:

Introduction to Marketing Research: The Nature of Marketing Research, A Classification of Marketing Research, The Role of Marketing Research in MIS and DSS, Marketing Research Suppliers, Selecting a Research Supplier, Marketing Research Process.

Research Design: Exploratory, Descriptive and Causal Research; Relationships among Exploratory, Descriptive, and Causal Research; Potential Sources of Error, Budgeting and Scheduling the Project, Marketing Research Proposal.

Exploratory Research Design: Secondary Data:

Primary versus Secondary data, Advantages and disadvantages, Criteria, Methodology used to collect the data, Classification of secondary data, Syndicated data from institutions.

Exploratory Research Design: Qualitative Research:

Primary data: Qualitative versus quantities research, classification of qualitative research procedures, Focus group, depth interviews, projective technique, comparison.

Measurement and Scaling: Primary scale of measurement, scaling technique, Comparison.

Questionnaire and Form Design: Questionnaire Design Process : Overcoming Inability to Answer, Overcoming Unwillingness to Answer, Choosing Question Structure, Choosing Question Wording, Determining the Order of Question; From and Layout, Reproduction of the Questionnaire, Pre-testing; and Observational Forms.

Sampling: Design and Procedures: The Sampling Design Process, A Classification of Sampling Techniques, Nonprobability Sampling Techniques and Probability Sampling Techniques, Choosing Nonprobability versua Probability Sampling, Uses of Nonprobability

and Probability Sampling.

Field Work: The Nature of Field Work, Field Work and Data Collection Process, Selecting Fields Workers, Training Fields Workers, Supervising Fields Workers, Validating Fields Work, and Evaluating Fields Workers.

Data Preparation: Data Preparation Process, Selecting data analysis strategy, Classification of statistical technique, Data analysis technique with SPSS, SAS, Minitab, Excel.

Report Preparation and Presentation: Report Preparation and Presentation Process, Report format, Report writing, guidelines for tables and graphs, report presentation.

Product Development:

Developing Product Strategy: Elements of a Product Strategy, Setting Objectives, Selection of Strategic Alternatives, Positioning: Choices of Customer Targets, Positioning; Choice of Competitor Targets, Positioning; The Core Strategy, Managing Brand Equity, Customer Strategy, Product Strategy Overt the Life Cycle.

New Product Development and Management: Overview Introduction, Innovation; Strategy Strategic Planning for New Prouct, Process and Management; Organization Concepts and Options Implementation of Concepts; Generation Creative Process and People New Product; Concept-Generating Process, Stimulating Techniques, Collecting and handling new Product Ideas, Evaluation Concepts, Tools, Economic Analysis, Commercialization Prelaunch Control, The Launch Cycle, New Product Marketing Plan, Commercialization Tolls, Controls.

TEM 406 : Product Development (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Idea Generating: utilizing basic internal and external SWOT analyses, current marketing trends or select an existing textile,

clothing or fashion company.

Screening the Idea: Analyze the current situation of the company and produce a vision that you believe is realistic but also ambitious.

Business Analytics: Create a product strategy for one of the existing or totally new product groups of the company. During the New Product Development process, build a system of metrics to monitor progress.

Marketability Tests: Arranging private tests groups, launching beta versions, and then forming test panels after the product or products have been tested will provide you with valuable information allowing last minute improvements.

Product Design by using CAD: Knit, weave, print, garments pattern design.

Technicalities + Product Development: Provided the technical aspects can be perfected without alterations to post-beta products.

Commercialize: At this stage, your new product developments have gone mainstream, consumers are purchasing your good or service, and technical support is consistently monitoring progress.

Product Launch: Launch a project for developing a new and innovative product for your company Analyze the success possibilities of the project and define your strategy for protection.

TEM 407: Supply Chain Management

Credit	Hour / Week	Total Hour
3	3	45

Introduction to supply chain: Definition, objectives, decision phases in supply chain, process views of supply chain, supply chain macro process in a firm, examples of SC.

Supply chain drivers and metrics: Drivers of supply chain performance, framework for structuring drivers, Facilities; Inventory; Transportation; Information; Sourcing; Pricing; components and

Related Metrics, obstacles to achieving strategic fit.

Supply Chain Logistics Management: Logistics of Business-The Logistical Value Proposition-The Work of Logistics-Logistical Operating Arrangements-Flexible Structure-Supply Chain Synchronization-Customer Accommodation -Procurement and Manufacturing.

Supply Chain Logistics Operations: Inventory Management Policies and Practices- Just-in Time and Lean operations and Total Quality Management Issues in Supply Chain Management-Transportation Infrastructure-Transportation Operations-Warehousing-Packaging and Material Handling-Operational Integration.

Information Technology Framework: The Importance of Information in an Integrated Supply Chain Management Environment- Information System Functionality-Comprehensive Information System Integration-Communication Technology

Coordination in a supply chain: A Conceptual Model of Alliance Development-Developing a Trusting Relationship with Partners in the Supply Chain-Resolving Conflicts in a Supply Chain Relationship, Bullwhip effect, effect on performance of lack of coordination, obstacles to coordination, managerial levers to achieve coordination, building strategic partnerships and trust, Continuous replenishment and vendor-managed inventories, Collaborative planning, forecasting and replenishment.

MRP and ERP: Requirements for MRP, MRP System, Product structure, MRP logic, Management Information from MRP , Manufacturing Resource Planning (MRP II), Capacity Requirement Planning (CRP), Enterprise Resource Planning (ERP), Evolution of ERP, ERP Modules and Functions, Rationale for ERP Implementation- ERP (Enterprise Resource Planning) System Design-Supply Chain Information System Design., Advantages and disadvantages of ERP Systems, ERP software, Application of MRP and ERP in Textile and Apparel industry.

TEM 408: Supply Chain Management (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Material Requirement Planning (MRP) software application: Demand forecasting, Bill of materials, production planning, Master Production Schedule, Inventory management, purchase order, order release, MRP-II; Plant scheduling and production controls, tracking employee attendance, labor contribution and productivity.

Enterprise Resource Planning (ERP) software application: Material Management; Procurement, inventory management, Operation management, Performance analysis, Human Resource Management, Employee attendance, Financial management, Quality management, Plant Maintenance, Sales and Distribution, Supplier Relationship Management (SRM), Customer Relationship Management (CRM).

TEM 409 : Textile & Apparel Merchandizing

Credit	Hour / Week	Total Hour
3	3	45

Introduction to merchandising; definition. A background to merchandising, the structure of merchandising, main area of merchandising, the role and responsibility of merchandiser, the key merchandising competence.

The role of the fashion buyer and garments technologist; buying and merchandising, structures, the role & responsibility of a buyer, negotiation skills, garments technology. Art of order negotiation.

Fashion designing and fashion trend: Definition, the role of fashion designer, the key tasks of a designer, contribution of fashion designer, designing benefits into fashion customers, fashion trends, tapping into the changing external environment, technological innovations in fibers

and fabrics, fashion forecasting, the importance of shows, lead-time.

Merchandising Planning: Importance of planning, planning and profitability, creating the initial seasonal sales patterns, sales planning and fashion business.

Technical Package and Information Investigation: Product package, Technical information in product package (Tech Pack).

Consumption and Costing: Garment measurement, yarn & fabric consumption of woven and knit and sweater garments, Accessories consumptions, cost sheet preparing and pricing.

Sampling: Definition, types, sampling process, types of garments and descriptive measures.

Apparel production planning and control: Functions of PPC, calculation of production capacity, productivity in apparel industry, line planning, line loading, Efficiency calculation of a production batch or line, calculation of machine our rate. Product development and sample management.

Sourcing strategy; Sourcing definition, need for sourcing, sourcing materials, Materials requirement planning (MRP), principles of MRP, Material management for quick response, JIT technology, overseas sourcing, different way to buying a garment, general agreement on Tariffs and Trade, general sourcing issue. Critical path management and order follow-up.

L/C and other Commercial documentation: International commercial terminology (incoterms), L/C, commercial documentation.

TEM 411 : International Business

Credit	Hour / Week	Total Hour
3	3	45

Definition of International trade: Importance of international trade in the world economy- Trend of international trade with reference to Bangladesh.

International Trade and the Theory of Comparative Advantage: Economic basis for international trade, The source of international trade. The principle of comparative advantage, Economic gain from trade. Effects of trade quotas - Heckscher - Ohilion Theorem.

Protectionism and Free Trade: Arguments/economics of protectionism - Instruments of protectionism - Multilateral trade negotiation - Removing barriers to free trade - GATT as an initiative for liberalizing trade. Controlling the international business.

The economics of foreign exchange: Balance of international trade- International financial system.

International Trade Transaction: International transfer of bank deposits resulting from international transactions- How foreign trade is carried out - Export and import transactions.

Foreign exchange markets- Equilibrium exchange rates- Determinants of foreign exchange rates- Nominal and real exchange rates - Appreciation and depreciation of currencies. International balance of payments - Current accounts, capital accounts.

Export and Import Practices: Export Strategy, Export intermediaries, Locating foreign markets, Freight forwards and their Functions, Export Financing, Other government Incentives.

Import & Export Procedure: Registration procedure, Procedure in export import trade Import procedure of industrial goods and commercial goods.

Documentation - Invoice, packing list, bill of exchange, bill of lading types of B/L, certificate of origin, certificate of Analysis. Pre-shipment Inspection(PSI), Shipments, Import strategy, Delivery and negotiation. retirement of documents from bank, clearing agent and their functions in customs clearance. Technology transfer, Technical assistance. Procedure for realization of export incentives, Back to back L/C,

Issues of International Economics: The Bretton Woods System - The International Monetary Fund (IMF) - The World Bank (WB) - world Trade Organization (WTO) & other institutional arrangement.

Bangladesh and International Textile & Apparel Trade: World Textile

& Apparel Trade & Production trends, International Trade in Textile Clothing, Trends of export & import of Bangladesh with special reference to Textile & apparel. Bangladesh's position in the World USA,EU, & community of developing countries - Trade intensity and terms of trade of Bangladesh with the SAARC countries - Trends and composition of exports and imports of Bangladesh - Major trade partners of Bangladesh .

Export Processing Zone in Bangladesh: Bangladesh Export Processing Zone Authority (BFPZA) - Reasons for setting EPZ in Bangladesh - Performance of the EPZ in Bangladesh.

TEM 413 : Production Planning & Control

Credit	Hour / Week	Total Hour
3	3	45

Introduction to PPC & Manufacturing: Production System, Necessity of PPC, Objectives, Functions, Phases, Activities in PPC System, Information required, Categories of Production System, Comparison, Discrete Parts Manufacturing, Alternative Classification, Customer Order Decoupling Point (CODP).

Productivity, Efficiency and Effectiveness: Production and Productivity, Calculations, Dynamics of Productivity Changes, Factors, Benefits, Improvement Technique, Efficiency, Efficiency Ratio, Effectiveness, Comparison.

Forecasting: Definition, Applications, Importance, Types (Approaches), Methods, Time series models, Characteristic Pattern of Time Series, Naive Method, Simple Moving Average (for constant process), Exponential Smoothing (ES), Simple Linear Regression.

Capacity Planning: Measurement, Capacity Planning Process, Factors, Long-range capacity Planning, Short-range Capacity Planning, Aggregate Planning, Aggregate Planning Using Linear Programming , Graphical Method.

Production Planning and Process Planning: Definitions, Types of

planning. Production Planning, Objectives, Functions, Determination of Capacity, Division of Capacity, Information Required for Production Planning, Process Planning, Process Analysis, Process Selection. Production planning and process planning of spinning, weaving, knitting, dyeing and garments manufacturing.

Loading and Scheduling: Definition, information Necessary for scheduling, Types, Master scheduling, Short-term Scheduling, Mathematical Loading and Scheduling, Slotting Technique, Short Interval Scheduling (SIS), Even flow Scheduling Technique, Critical Ratio Scheduling.

Scheduling through Networks:

Network- A way of thinking, PART and CPM, Difference between network and bar chart, Advantages and limitation of network, Application of network, Gantt chart, Bar chart, Line of balance method. Network analysis, Activity and event relationship, Network logic, network drawing, examples.

Work Study: Definition, Purpose, Importance, Work Measurement; Time Study, Steps in Making a Time Study, Recording Time, Performance Rating, Rating factor, Allowances, Calculation of Standard time, Pitch time, Pitch diagram and bottleneck process, Principle of motion study, Method study; process analysis and drawing a analysis chart, making a process diagram.

Operation Research:

Characteristics, Scope, advantages disadvantages and characteristics of model, line balancing, queuing, classification of queuing, simulation, applications of simulation.

TEM 414 : TEM Industrial Attachment (2 months)

Credit	Hour / Week	Total Hour
3	2 month	--

The students must undergo 2(two) months intensive of Industrial

Training program in the relevant area of specialization after completion of Level-III, Term-II.

TEM 416: TEM Project Work

Credit	Hour / Week	Total Hour
3	--	--

During the Level-IV of study each student will be required to complete a Project Work in the relevant field of their specialization. For such a work the students will be guided by a Supervisor of the concerned Department.

TEM 418: TEM Comprehensive Viva

Credit	Hour / Week	Total Hour
3	--	--

The Comprehensive Viva will cover the entire 4 years courses of study. 60% weightage will be on the departmental subjects. 40% weightage will be on all other subjects. No specific class hour will assigned for the comprehensive Viva.

Department of Textile Fashion & Design

Detailed outline of courses offered for B. Sc in Textile Engineering (Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

TFD 101: Basic Fashion Studies

Credit	Hour / Week	Total Hour
3	3	45

Fashion and its importance; Classification of fashion; Factors affecting Fashion; Fashion cycle and length of fashion cycle; Sources of Fashion concept; Factors influencing Fashion; Forecasting Fashion - fabric, trend, style, color; Brands and their influence on Forecasting; Fashion Terminology: Style, Change, Trend, Fashion Cycle, FAD, Classic, Fashion Trend, Silhouette, Texture, Color, Design, Couture; Develop Fashion Styling & Fashion Story, Develop ideas and communicate by using story boards, mood boards, and Concept Board. Visual Presentation, Writing Caption and Team Production ideas. Accessing styles and trends; Elements of style, Achieve visual balance, Making Trends; Working with Color-Color Combination, Color Wheel, Color characteristics, Simultaneous Contrasts, Lights and Color; Color schemes; Color psychology & visual effects; Basic properties of textiles required to know about for developing a fashion product. Types of lines; Psychological & visual association Introduction of the element; Psychological effect of the element; Visual effect of the element; Application in creating Designs;

Types of textures; Categories of texture; Psychological & visual association

Aesthetic qualities of Design Elements: Formal qualities; Expressive qualities; Symbolic qualities

Principles of Design: Rhythm; Harmony; Emphasis; Balance; Repetition; Gradation; Radiation; Application to Design; Various ways of using Principles in Fashion (Functional/ Decorative)

TFD 102: Fashion Design - I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Introduction to design courses: In the practical course basic introductory look into the fashion. It includes the element and principles of design. The basic drawing is necessary as a foundation for fine art. All design courses. Basic drawing skills- visualization skills- Line, perspective, 2D,3D, Texture, Color, Use of Templates etc. Design Foundation, understanding individuality and source of creativity; Design as creative thinking and problem solving.

Element of design: Line, Shape, Form, Space, Color, Texture and Value etc.

Principles of Design: Balance, Contrast, Emphasis, Proportion/Scale, Pattern, Harmony, Rhythm/Movement etc.

Nature study: Form, Print and texture etc. Sketching of natural forms and its conversion into design forms; using various textures from nature;

Introduction to perspective: 1 point perspective, 2 point perspective, 3 point perspective.

TFD 103: Fashion History

Credit	Hour / Week	Total Hour
3	3	45

This course is an informative journey through the costume and fashion from the ancient time to today's historical, social and cultural contexts in fashion of both national and international aspect.

Effect of Historical Evolution on Culture, Local Craft & Heritage during the key movements of: Early Greek, Roman, Medievel, Renaissance, Chinese, Mughal, Shonatan religious time, Islamic

religious key movements. Political history of South Asian zone (Different times: Ancient time, pre-British period, British period and Liberation period of Bangladesh & other neighbouring countries) and its effect on fashion and culture .

The emphasis will be given on the evolution of dress, costume silhouette recognition and vocabulary of historical clothing. The geological, social and political aspects and the influences on fashion and trends. Understanding the period of fashion within the context of artistic, cultural and religious attitudes of the period. Also have to examine the fabrics, hairstyle and accessories of the period accordingly.

History of the Handloom Industry of Bangladesh: History of Muslin, Dhakai Jamdani,Tangail Taant, Mirpur Benarashi & Katan, Rajsahi Silk, Khaddi of Comilla, Monipuri Textiles of Sylhet, Bain Textiles of Chittagong hill-tract areas, Home textile products of Narshingdi & Kustia, Nakshi Kantha Stitch & Jessore Stitch products. Have to study these different types of traditional weaving belongs to various indigenous races and elements of their distinctive culture related to the products.

Philosophical and Historical background of casual, official, occasional and festive dresses of men, women and children of Bangladesh and the background of its continuous changes till today.

(Sari,Blouse,Dhuti,Lungi,Pajama,Panjabi,Salwar,Kamij,Kurta,Fatua, Fusion dresses & Western dresses).

TFD 104: Fashion Illustration - I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

This course introduces fashion sketching techniques to communicate the ideas, concepts and details of garments by visually interpreting fashion apparel.

Practical study on: Face analysis

Figure analysis; regular vs fashion figures.

Draw features eyes, nose, ear, lips, face hands, arms, feet, legs and hairstyles.

Fashion figure- 8 ½ heads, front, back and side (Male, female, kids fashion figure)

Body line reading through different poses, moving figure etc.

Making geometric figure

Fleshing on block figure

Illustrating a figure using texture in the garment.

Figure composition

TFD 202: Fashion Design - II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Introduction to Color: Practical study on the vocabulary and grammar of color.

Color Wheel Construction: Primary, Secondary and Tertiary; Flat application of color (Hue, value, intensity)

Basic Color Schemes: Achromatic Scheme; Analogous Scheme; Clash Scheme; Complementary Scheme; Monochromatic Scheme; Neutral Scheme; Split Complementary Scheme; Primary Scheme; Secondary Scheme; Tertiary Scheme

Aspects of Color: Hot, Cold, Warm, Cool, Light, Dark, Pale, Bright etc

Mood and Color: Powerful, Rich, Romantic, Vital, Earthy, Friendly, Soft etc.

The psychology of Color: Red, Yellow, Orange, Green, Blue, Purple, Pink, Brown, Gray, White Black etc.

Introduction to various color media: Dry color media, Wet color media.

TFD 204: Pattern Drafting - I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical Study on Measurements from mannequin as Horizontal Measurement. Front & Back, Vertical Measurement, Front & Back; Relationships of sizes and measurements; Tools of pattern making; Common terms used in pattern development; Standard Measurement charts.

Practical on Basic Dress Foundation:

- Front & Back Bodice Draft
- Fitting of Bodice, Neckline, Armhole etc.

All types of darts (i.e. French dart, Tuck darts, Curve darts, Center front neck and waist dart, Parallel dart, Radiating dart, Dart cluster, Asymmetric darts) and their manipulation procedures; Mechanism of shifting darts from one position to another or into a seam by Slash-spread and Pivotal-transfer method; Pleats (Box pleat, Inverted box pleat etc); Flares and gathers; Style lines; Classic princess style line variation; Armhole princess style line variations; Empire line variation.

Basic Sleeve Draft preparation. Various Sleeve variations practice: (Cap sleeve, Puff sleeve; Roll-up sleeve; Petal sleeve; Lantern sleeve; Leg-of-mutton sleeve; Cowl sleeve; Wedding sleeve; Bishop sleeve etc.)

TFD 206: Fashion Illustration - II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

To develop skills in Fashion Model drawing and Fashion illustration to make the translation of Fashion ideas more comprehensible.

Introduction to fashion model drawing to understand the proportion

volume, balance and basic anatomy of garment components details and garment categories.

Use of color and mixed media, different texture and techniques, fabric prints, cottons fabric (matte) silks (smooth glossy) cheeks fabric, heavy texture etc.

Flat sketches (line and silhouettes):

Basic sleeve, necklines, belts, cuffs, pockets, skirts, T-shirt, pant, dresses and formal suits etc.

Dressing fashion figure and garments details.

TFD 208 : Pattern Drafting - II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Basic Skirt draft preparation. Various Skirt variations practice (A-line skirt; Flare skirt; Narrow shaped skirt; 4,6,8,12 Gore skirt; Godet skirt; Yoke skirt; Panel skirt; Full circle skirt etc.);

Adjusting sleeve to armhole of bodice; Elbow dart variation; Shoulder pad, waist band preparation; Basic Necklines and variations; Marking of garment details (i.e. Armholes, Necklines- V, U, round, boat, square etc); Various Collar, Cuff, Yoke, Facing preparation and adjustment.

Full dress preparation: Drafting & preparing for men's and women's- (Trousers ; Shirts & Blouses formation; T-shirt; Salwar-kameez; Kurta; pajama; Double breasted coat, jacket; Torso foundation; Panel dress formation; Empire, Tent foundation; Jumper preparation; Caps and Hoods preparation etc);

Bias-cut dresses preparation; Kimono, Caftan, Raglan and their variations etc.

TFD 301 : Textile Coloration and Surface Ornamentation

Credit	Hour / Week	Total Hour
3	3	45

Introduction of Surface Ornamentation of fabric and appar Assessing the nature of product, Assessing the scope of surfa ornamentation.

Color applying techniques: Air brush painting, Spraying or Splatt Stippling & Hatching, Dry Brushing, Sponge Painting, Marblin Batik, Tie-Dyeing, Ikkat, Kalamkari, Block Printing, Screen Printi (flat screen, rotary screen), Stencil Printing, Transfer Printin Flocking, Discharge Printing. Different types of Natural D application.

Enhancements and Decorative Techniques by Embroider Stitch, Cutwork, Patchwork: 3D Embroidery & CAD Embroider Embroidery techniques, themes, & Classifications, Selecting materia techniques & machine; Different types of lace: Needle lace/Whi work, Hardanger a contemporary white work technique, St. Galle Embroidery; Appliqué, Patchwork, Embellishment (beads, button metal & mirror work), Quilting & Felting, Pin tucks.

Mechanical & Chemical Finishes: Techniques of finishing depend on the factors, Aesthetic & Functional finishes, According to quality Temporary, Semi Permanent, Permanent finishes, Chemical & Mechanical finishes; Mechanical finishes: Calendaring, Texturisin Different types of calendaring effects: Surface Glazing, Cire Effec Moire Effect, Schreiner Effect, Embossing Effect. Texturisin Shearing, Brushing, 3D or Raised embossing, Pleating, Flockin Embroidery, Expanded Foam, Napping. Felting & Tufting, Beetle Burn out, Apparel/Denim Wash, 3D effect & different mechani finishes. Finishes used to change the drape: Parchmentizing, A designs, Burnout, Sizing and Weighting.

Functional Finishes: Water Proof, Water Repellant, Crea Resistant, Flame Retardant, Soil Resistant, Antimicrobial finishe Moth Proof & Antistatic finishes.

TFD 302 : Textile Coloration and Surface Ornamentation (Practical)

Credit	Hour / Week	Total Hour
1	2	30

This course introduces surface decoration techniques, ideas and concepts.

Coloring Technology: Block Print, Traditional Techniques, modern interpretations, Boutique, Tie-Dye, Dispersion, screen print, Transfer Print, computerized Digital printing, Natural Dyeing; Furnishing Fabrics, wallpaper patterning Repeat, Design layout, Drop devices, Abstract, decorative geometrical nursery, shirting's, scarves, saris, western dress.

Embroidery Techniques: Bangladesh craft Industries- design and manufacturing parameters and constrains professional practices.

Embroidery and surface decoration by hand and machine, metallic, Mirrored work, Appliqué, Decouple, cut-work, Bead-work. Bangladesh cultural scene, Embroidery for Fashion, Theatrical costume, Liturgical and conservation.

TFD 303 : Application of Computer in Fashion Design

Credit	Hour / Week	Total Hour
3	3	45

System Analysis & Design: System analysis; System design; Difference between analysis and design; System analysts and their role; System development life cycle (SDLC) - SDLC stages, feasibility study, cost/benefit analysis, Data flow diagram (DFD); Introduction to project management.

Database Management System: Basic concepts - character, field, record, file, database; Benefits and limitations.

Fashion Image: Fashion image: types, construction, usage, format,

export and import process, image manipulation, image masking, color adjustment, color mode, layer masking, vector masking, image resolution, scanning process;

Fashion Design: Creative fashion design concept; Digital fashion design process; Difference between manual and digital process; Dress illustration, figure illustration and fabric, fabric motif design; Custom vector shapes, color swatches, symbols and variety of brushes; Gradient color and gradient mesh color; Path segment and its modification by different process; Presentation types and personal profile making process.

TFD 304 : Application of Computer in Fashion Design (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Implementation of the creative design concept for fashion in it; Exploring the tools and techniques of computer applications for professional fashion design; Introduction to Adobe Illustrator; Use of various tools of this software; Creating innovative garment design or developing existing design; Manipulation of fabric, creative various motif design (i.e. flower, folk, geometric motif etc); Neck design variations; Saree design; Check, stripe, shaded fabric motif preparation; Filling a dress illustration as a fabric pattern, presenting color shade by color wheel and color chart digitally; Creation of various clothing accessories like as buttons, zipper, pocket, company logo, tag, label etc; Creation of various dress (i.e. t-shirt, polo shirt, trouser, jacket, pant, gown etc) and figure illustration by using solid color and mesh fold (silk). Illustrating various types of fashion accessories (i.e. handbag, ladies and gents shoe, cap, tie, hat, jewelries etc).

Introduction to Adobe Photoshop; Use of various tools of this software; Basic selection techniques; working with layers compositions; working with colors, paintings and retouching; introducing with various types of effects; Correcting and Enhancing Digital Photographs; Masks and Channels; Typographic Design;

Vector Drawing Techniques; Advanced Compositing; Creation of digital mood board by manipulating various fashion accessories, composite artwork for various garments, digital surface design, backgrounds etc.

TFD 306 : Fashion Design - III (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical Study on:

- Mood board preparation
- Fashion market and trend research
- Clients profile study, specification sheet study, flat sketch preparation etc.
- Researching major areas of specialization
- Sources of inspiration and fabrication
- Acquiring skill for clothing composition of fashion figure.
- Developing skills for communicating a design for production.
- Fabric drapes and rendering (to study clothing drapes, frills, folds, etc.)
- Selecting ideas to develop distinctive designs.

TFD 308 : Fashion Draping (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Introduction to draping; application of draping in fashion designing; Various techniques to drape muslin on mannequin.

Draping basic front and back bodies, basic skirt, full dress; Truing the

muslin with mannequin for establishing the correct seam lines and allowances. Bodice and blouse designs; Dartless designs; Skirt designing by draping; Cowl designs; Corset draping; Various Gown preparations; Body fitting methods; Draped fabric cutting and sewing to get final dress.

TFD 310 : Creative Design Analysis & Collection (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Design research process analysis.

Design Sources: Historic and Ethnic Costume, Historic Inspiration, Folk Influences, Libraries and Bookstores the Art- Films, Music, Television, Fabrics, Travel, Seasons, Animals, Insects, Birds, Nature, Flower & Trees, sea under water life, Architecture, Historical periods, Materials, Art and the work of painters, Sculptors, Technology etc.

Design Development: Concept Boards, Research work (Color research, Texture, Details) Color chart & Fabric Swatch, Flat Sketch of garments.

Design Element:

Colour: Colour Dimensions, Hue, Value, Intensity, Warm Color, Cool Color, Neutrals, Color Relationship, Color Naming, Basic Color Schemes.

Fabric: Fabric Selection, Fabric Characteristics, Texture, Performance, Weight and Hand.

Silhouette: Natural Silhouette, Slim Silhouette, Rectangle Silhouette Wedge Silhouette, A-line Tent Silhouette, Hourglass Silhouette.

Line: The internal structure symmetrical line, asymmetrical line, vertical line, horizontal line, diagonal direction, repetition of elements, graduate development.

Design Principles: Proportion & Balance, Symmetrical Balance, Asymmetrical Balance, Repetition, Emphasis, Sequence, Alternation

Variation, Gradation, Rhythm.

Successful Design: Sketching ideas.

TFD 312 : Professional Studio Practice (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Student in this course develop skills necessary to create final finish sample garments.

Development cycles: Searching for new concept, Name of the concept, Mood board, Research work (Color research, Texture, Details) color chart & Fabric swatch, flat sketch of garments design collection.

Sample Development: Flat sketches with design specification (From the final collection) Detail, Trims & Accessories Measurement chart, Pattern drafting cutting & Manufacturing alternation / Modification (if needed) sample approval, costing / estimating, creating and maintain office directory customer specifies and time management.

TFD 401 : Fashion Merchandising & Retailing

Credit	Hour / Week	Total Hour
3	3	45

Fundamental Concepts of Fashion Trends: Economic factors that affect fashion trends; Motives/goals for consumer buying;

Fashion Retailing: Types of retail stores; Merchandising of products and services; Buying plan; Fashion promotion; Visual marketing;

The Retail Environment: Retail External environment; Retail Internal Environment; Five forces model; SWOT analysis;

Identifying and; Understanding Retail Consumer: Factors affecting retail strategies; Consumer Demographic and lifestyles;

Social factors; Consumer needs and desires; Shopping attitudes and behavior; Consumer decision making process; Retailers' actions;

Legal issues in Retail: Ethical and legal issues in retailing; Retailer's social responsibilities; Legal frame work in retailing; Legal implications of law; Employee relations; Retail Seasons: What is seasonality?; Seasonality and seasons; Retail seasons; Seasons of fashion retail industry; Seasons influence on consumer buying decisions; Factors affecting seasonality;

Competitive behavior of retail Institutions: Component of retail Strategies; Forms of retail competition; Retailers classification;

Relationship of the Textile Industry to the Fashion Industry: Sources of fibers; Mills and converters; Interrelationship of the textile and fashion industry;

Formats based on Merchandise selection: Merchandise selection as a competitive advantage; Specialty store retailing; Department store retailing; Super specialist; Niche specialist; Category killers; Mini department specialist;

Formats based on Pricing: Pricing as a competitive advantage; Discount retailing; Super Store retailing; Off Price retailing;

Formats based on Operations: Operations as a competitive advantage; Chain store retailing; Contractual retailing; Ware house retailing;

Formats based on Convenience: Time /Place convenience as a competitive advantage; Formats based on convenience; Food related retailing; Vendor retailing; Direct selling;

Formats based on Direct marketing: Direct marketing as a competitive advantage; Formats based on direct marketing; Direct mail retailing; Mail order retailing; Direct response retailing.

TFD 402 : Fashion Composition & Accessories (Practical)

Credit	Hour / Week	Total Hour
1	2	30

This course focuses on dressing fashion figure on garments details and fashion accessories

To co-relate fashion accessories to clothing to create a desired "fashion outlook"

Illustrating fashion accessories: Scarves, hats, shoes, jewelers and hand bags, key chains, mobile case etc.

Rendering of texture and fabrics; Velvet, fur, leather, sateen knit, twill and different printing effect.

Decoration and detailing: Belts, cuffs, waist bands, hemline, bias, drape, gather, draw, strings, feathering, frills, pleats, pockets, seams, embroideries, slits and zips etc.

Final fashion figure and accessories.

TFD 403 : Special Clothing & Materials

Credit	Hour / Week	Total Hour
3	3	45

Introduction to modern and traditional techniques in clothing and fashion sector; Use of Special Materials : Interlinings, Linings, Reasons and techniques of using different types of Lining & Interlining, Interfacings, Narrow Fabrics, Leather, PVC, Fur.

Special effects by using different types specialized fibre, yarn, fabric and wet processing.

Special clothing production:

- Haute Couture
- Draped clothing
- Strapless clothing

- Fire-fighting suit
- Space suit
- Medical textiles
- Smart textiles
- Ballistic / Military clothing
- Chemical resistant PC
- Antimicrobial PC
- Rain proof wear, Winter wear, Survival Clothing etc.

TFD 404 : Computer Aided Design & Manufacturing (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Introduction of CAD & CAM; Importance & implementation of CAD & CAM in fashion and garments sector; Learning the functions of various tools of CAD software; Illustrating the ideas of any type of fashion product by using CAD software; Preparing patterns (Tops, Bottoms and other parts for men, women and children) according to different body measurement and different style by the software; Digitizing procedure of hard patterns to get digitized copy with maintaining accurate measurements of those patterns; Pattern Manipulation; Pattern Grading procedure; Marker planning & making; Prepared marker plotting on marker paper; Computer aided automatic pattern, marker & fabric lay cutting; Spec sheet preparation.

TFD 405: Fashion Forecasting & Trend Analysis

Credit	Hour / Week	Total Hour
3	3	45

Defining Fashion, Defining Fashion Trends: Evolution of a Trend, Trend Movement, Trend Contagion, Trend Management.

Defining Fashion Forecasting: Visualization & Forecasting, Steps in

Developing a Forecast.

Fashion Forecasting: Forecasting Specialties, Fashion Watchers, Consumer Research & Sales Forecasting, Cultural Indicators, Competitive Analysis.

Forecasting in the Textile & Apparel Industries: Short term Forecasting, Long Term Forecasting, Forecasting in Apparel Planning & Scheduling, Manufacturing Cycle, Scouting for Fashion trends.

Innovation: Diffusion of Innovation, Diffusion process, Diffusion Curve, Characteristics of Innovation.

The consumer Adoption Process.

Fashion change Agents: Innovators, Fashion leaders, Celebrities and Influential's, Fashion Followers, Media influences.

Forecaster's Toolbox: Monitoring change Agents, Targeting Innovators, Targeting Leaders, Determining Marketing Strategies, The Forecasters observation Post, Mapping Celebrity-Consumer Interaction, Visualizing the diffusion Process, Visualizing the target market.

The direction of fashion Change: Trickle Down theory, Trickle Up Theory, Trickle Across Theory.

Color Forecasting: Color of Season, Color in Marketing, Consumers and the Psychology of color, Color cycles and cultural shifts, Forecasting with color cycles, Color Relationships across product categories, Sources for color Ideas, Techniques of color Trend Analysis.

Textile trend observation: Fashion in fiber &fabric, Researching Seasonal Trends.

The role of Forecasters: Avoiding Traps in the Forecast, Avoiding traps in Trend Analysis, Factors involved in planning and presenting the forecast.

Emphasis on use and role of the print media, internet and broadcast information in fashion forecasting.

TFD 406 : Product Development Preparation & Presentation (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Purpose of this course is to equip each students with the ability to analyze and determine the value added products for the international Fashion market, with innovative product diversification students will find out which product Bangladesh can offer to the world fashion market.

This course include introduction to production development. Product development process, Fashion sources, dress and trims, The theme and developing research material, dress design, principles of dress design, Drawing and lay out flats, Template Fashion Illustration, Net pattern, Template pattern, Pattern problem and solution, sewing layout, Fit sample, sample Approval, Pre production sample, mood Board, Illustration, Trims and Swatches, garments specification, production display. Student will present their developed product through professional presentation.

TFD 407: Consumer Behavior in Fashion

Credit	Hour / Week	Total Hour
3	3	45

Comprehensive analysis of the factors in human behavior, Factors influence the choice and the use of products, Consumer Segmentation.

Consumer Research: Demand activated product development, Consumer identification with fashion cycles : Consumer groups, Fashion Leaders, Fashion Innovators, Fashion Motivators or Role Models, Fashion Victims, Fashion Followers, Fashion leaders in Manufacturing & Retailing, Media influences.

Adoption of Fashion: Traditional Fashion Adoption, Trickle down Theory, Reverse/ Trickle up Theory, Mass Dimension / Trickle across

Motives for consumer buying: Being Fashionable, Being Attractive, To impress others, Accepted by Others, Emotional Need.

Fashion Selection: Aesthetic Appeal, Practical Aspects in Consideration.

TFD 408 : Portfolio Development (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Preparing a final, comprehensive and innovative portfolio encompassing a collection of designs with relevant documented visual, creative and technical information to fulfill the sourcing of idea, formulated concept, design brief, color theme & color story, and which must demonstrates strategic and creative thinking of the individuals.

Here, Portfolio should illustrate innovative garment designs prepared using different themes picked from various sources (magazines, books, films, nature, surroundings, handicrafts, paintings, etc.) and presented using different presentation skills and mediums.

- A portfolio will be prepared by each student, in which he she shall display his collection of themes, using different presentation skills.
- Each theme will be accompanied by a line of costumes designed using that particular theme as an inspiration.
- Different mediums and presentation skills should be used.
- The portfolio should have at least 12 lines of costumes.
- To justify the theme of the dress, the theme could be seen in the color of the dress/ silhouette of the dress surface texture of the dress/ surface ornamentation of the dress accessories accompanying the dress.

TFD 409 : Fashion Brand Analysis and Development

Credit	Hour / Week	Total Hour
3	3	45

The Fashion brand Analysis & Development is designed to develop the intellectual understanding of the principles of brand development and analyzing their application in connection with the fashion brand development.

Steps to establish a Brand Message, Mission Statement, Motto and Brand Aesthetic & Philanthropy.

The history of International Fashion Brand's development; Successful fashion Brand Company's market analysis to determine its business model and study of recently launched brands also; Aspects of the fashion brand analysis, management and its purpose, economic management. productive and distribution channels of a brand to be explored & enter into the market; Studying the role of fashion brand manager: The international fashion house's ability to work out creative solutions with the purpose of improving the brand.

Defining the style of a collection, how to decide the price range, the target and the market references. Items to consider before deciding on the brand product to be launch

Determining a brand's niche and how it can stand apart from the rest; Determining the target consumer; The process of development of new products for different brands, How to plan the promotion and sales in collaboration with the style, production and marketing departments of fashion; Market research: the interrelationships between branding strategies and corporate strategies, business strategy and the functional strategies of an organization; Studying critically published work in the area of branding for fashion, brand management and successful independent design.

Analyzing brand's competition;

How different organizations in fashion goods manage their brands and their market offerings in order to compete in different market

environments; The current issues including new technologies and the changing role of the consumer, social responsibility, Impact on the competitive strategies of organizations involved in fashion branding; Systematic and creative solutions for a range of problems in the world of business and real management, Theories, Frameworks and practices relevant to the branding of fashion and brand management;

Studying the history of Fashion brand development in Bangladesh;

Cats Eye, Ecstasy, Westecs, Amber Lifestyle, Sailor, Yellow, Le ReVe, Pride, Aarong, Kay Craft, Nipun, Anjans etc.

TFD 410 : Final Dress Submission & Presentation (Practical)

Credit	Hour / Week	Total Hour
1	2	30

In this practical course, few garments design will be shortlisted from the lines of previously prepared final portfolio and students will produce the final outfit of the shortlisted costume lines for presentation. The garments will be produced under the supervision of regarding course teacher from pattern drafting to clothing finishing.

Students also have to illustrate a detailed report on the prepared garments. As for example- he/she must describe its working details & layout, different patterns used in the defined garment producing, draping procedures (if applied), specification sheet etc.

TFD 412 : TFD Industrial Attachment (2 months)

Credit	Hour Week	Total Hour
3	2 month	--

The students must undergo 2(two) months intensive of Industrial Training program in the relevant area of specialization after completion of Level-III, Term-II.

TFD 414 : TFD Project Work

Credit	Hour / Week	Total Hour
3	--	--

During the Level-IV of study each student will be required to complete a Project Work in the relevant field of their specialization. For such a work the students will be guided by a Supervisor of the concerned Department.

TFD 416 : TFD Comprehensive Viva

Credit	Hour / Week	Total Hour
3	--	--

The Comprehensive Viva will cover the entire 4 years courses of study. 60% will be on the departmental subjects. 40% will be on all other subjects. No specific class hour will assigned for the comprehensive Viva.

Department of Industrial & Production Engineering

Detailed outline of courses offered for B. Sc. in Textile Engineering (Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

IPE 101: Engineering Materials

Credit	Hour / Week	Total Hour
3	3	45

Properties of metals, ceramics and polymers, processing of materials from liquid, solid and paste, choosing materials for products, atomic, molecular, crystalline and amorphous structures for metals, ceramic and polymers. Elastic and plastic behavior of materials in service: fracture, ductile-brittle transition, fatigue, creep, oxidation and degradation, corrosion and corrosion protection. Materials as mixtures of elements: mixtures nears and far from equilibrium, phase diagrams, phase changes.

Non-ferrous metals: production and uses. Iron and steel production: production and uses.

Types of cast iron, effects of impurities, plain carbon steel: the iron-iron carbide phase diagram, constituents and structures of plain carbon steels, heat treatment of steels, alloy steels: principles and effects of alloying, different alloy steels and their uses.

Ceramic: ceramic raw materials, preparation, characterization and processing, principles and mechanisms of ceramic drying and firing processing, principles and mechanisms of ceramic drying and firing process, defects and properties of ceramics: glazing and decoration, conventional and engineering ceramics, newer industrial ceramics.

Glasses: kinetics of crystallization and phase separation of glass transition, viscosity, chemical durability and thermal, electrical, optical, and mechanical properties of commercial glasses, relation of physical properties to glass structure and composition, tests of glass,

Polymers: structure and properties of polymers and copolymers, thermoplastics and thermo sets, product design, commercial processing of polymers: properties and testing polymers, polymers and the environment.

Composites: theory of composites, fabrication and uses.

IPE 102: Machine Shop Practice (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Identification and use of hand tools and measuring instruments, reamers, taps and dies, bench vice and carpentry tools, makings of models.

Identification, use and practices on Lathe, Drill, Grinder, Shaper, Planner. Circular saw and milling machine.

Sheet metal work-Cutting of sheet material to make some useful objects.

Metal joining processes-soldering, brazing, riveting, gas welding and electric arc welding.

Heat treatment of steel such as annealing, normalizing, quenching, tempering and surface hardening, sand moulds, core molding, pattern for casting, sand casting

Gear Cutting. Thread Cutting

IPE 104: Engineering Drawing (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Engineering Drawing Instruments and their uses, first and third angle projections. orthographic drawings, isomeric views, missing lines and views. sectional views and conventional practices, auxiliary views. Application of computer software for Engineering Drawing.

IPE 106: Engineering Graphics (Auto CAD, Solid Works) (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Product graphics: drafting codes as per ISO, tolerances and dimensioning, ensuring co-axiality, perpendicularly and parallelism compatible to manufacturing and assembly requirements, schematic product symbols for welding and piping systems.

System graphics: working drawings of cumulative and non-cumulative assemblies, dimensioning of assembled parts, use of standard parts threads, fasteners and springs, detailing of assembled parts.

CAD: constructing geometry, transformation.

Viewing and clipping perspectives, modeling: generation of curves and surfaces, an introduction to solid modeling, automatic dimensioning.

Solid Works Software Introduction, study of different parameters in Solid Works

Solid Works Project Work.

IPE 201: Manufacturing Process

Credit	Hour Week	Total Hour
3	3	45

Selection of manufacturing processes on the basis of product characteristics and manufacturing economy.

Casting: sand, dies, centrifugal and other types of casting, casting design and casting defects.

Chip-less metal forming process: different types of hot and cold working processes.

Welding: Arc, gas, TIG, MIG, resistance, Thermit, and special types, brazing and soldering. Special welding processes: LASER, electron beam, submerged arc etc. Precision and non-precision surface finishing operation, hot and cold extrusion, press working operations etc.

Theory of metal cutting: tool geometry, chip breakers, cutting forces, metal cutting dynamometers, economics of metal cutting, chip formation & tool design, tool life.

Metal removing processes: turning, drilling, shaping, planning, milling broaching, grinding, precision and non-precision finishing processes.

Manufacturing of ceramic and glass products, powder metallurgy.

Plastics: plastic product manufacturing processes: compounding, extrusion, injection molding, compression molding, blow molding, vacuum forming and hand layup.

Characteristics of machine tools, recent development in the design of machine tools, drive system of machine tools, design of mechanical drive, speed gear boxes, feed gear boxes, infinitely variable drives, PIV and other mechanical step less drives, hydraulic drives, electrical drives, bearings, spindles, slide ways of machine tools, machine tool structure.

Location principles and locators, clamps.

Detailed case study of engine, turret and automatic lathes, drilling machines, shaper machines, planer machines, milling machines, grinding machines, gear shaping and gear hobbing machines, forging machines, dynamics of machine tools, installation and acceptance tests of machine tools, automatic transfer lines.

IPE 202: Manufacturing Process (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Study of Arc Welding and an Arc Welded Joint and Testing of Welding Joint , Study of TIG, MIG and Resistance Welding, Study of

Gas Welding, Gas Cutting, Soldering and Brazing, Manufacturing of a Sheet Metal Job (Elbow), Study of Pattern Design and Manufacture, Study of Mold Making and Mold Casting, Study of Chips and Cutting Zone Temperature in Turning Medium Carbon Steel by Uncoated Carbide Insert., Manufacturing of a Machine Component (Jack) by using Lathe, Shaper, Milling, Drill and Grinding Machine, Manufacturing of a Spur and Helical Gear on a Column & Knee Type Milling Machine., Study of Electrical-Discharge Machining (EDM) Process, Study of Injection Molding Machine and Determination of Dimensional Deviation of the Product.

IPE 203: Fundamentals of Mechanical Engineering

Credit	Hour / Week	Total Hour
3	3	45

Fluid Mechanics: Fluid properties, fluid statics, basic hydrostatic equation, manometer, pressure variation in static incompressible and compressible fluids. Bernoulli's equation, fluid flow measurement, frictional losses in pipes and fittings, compressed air

Mechanics of Solids: Stress analysis: statically indeterminate axially loaded member, thermal and centrifugal stresses, stresses in thin and thick walled cylinders and spheres.

Beams: Shear force and bending moment diagrams, various types of stresses in beams: flexural formula, deflection of beams: integration and area moment methods, introduction of reinforced concrete beams and slabs.

Torsion formula, modulus of rupture, helical springs, columns: Euler's formula, flexure formula of curved beams. Introduction to experiment stress analysis technique, strain energy, failure theories.

Engineering mechanics: Basic concepts of mechanics, force in trusses and frames, friction, centroids and moment of inertia, kinetics of particles and rigid bodies.

Mechanisms: displacement, velocity and acceleration, static and

dynamic balancing of rotating components. Whirling of shafts and rotors, power transmission by ropes, belts, chain, gears and gear trains, study of cams.

Thermodynamics and Heat transfer: Basic concept and definitions, sources of energy: conventional and renewable

Thermodynamics: fundamental concepts and laws, thermodynamic cycles, introduction to: steam generating units, types of steam, Detail study of Boiler, internal combustion engines, steam turbines, gas turbines, refrigeration and air conditioning systems. Characteristics and application of reciprocating and centrifugal pumps. Measurements and Automatic control mechanism.

Introduction to heat transfer, modes of heat transfer, steady and unsteady state heat conduction and radiation heat transfer, convection heat transfer, natural and forced convection, heat exchangers.

IPE 204: Fundamentals of Mechanical Engineering (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Study of steam generating unit, centrifugal pumps, reciprocating Pump, compressor, power generator, Engines, (petrol, diesel and gas), Turbines. Study of power transmission by ropes, belts, chain gears & textile machineries. Study of cams.

Measurement of Tensile properties of a rod/bar, Study of Universal Testing Machine.

Fluid Flow Measurement.

IPE 301: Automation and Control Engineering

Credit	Hour / Week	Total Hour
3	3	45

Automation : Introduction to robotics, definition, plane, rotational and spatial motion with applications to manipulators, geometric configurations; structural elements, linkages, arms and grippers, motion characteristics, trajectories, dynamics and control of manipulators, actuators for manipulators, application of industrial robots and programming.

Control Engineering: Introduction to control systems, system response, control action, system types, frequency response, system analysis, system compensation, analogues of control systems, hydraulic and pneumatic control systems, elements of electromechanical controls, introduction to digital computer control.

IPE 303: Measurement, Instrumentation and Control

Credit	Hour / Week	Total Hour
3	3	45

Introduction to fundamentals of engineering measurements, study and use of instrumentation, and control systems. Linear measuring system, instruments limits, fits and gauges: ISO system of limits and fits.

Precision dimensional measurement of length and angles, roundness profiles and flatness, surface roughness and texture, wear Taylor's principles on limit gauges, Abbey's principle, measuring threads, gears, measurement, ultrasonic measurement, measurement by light-wave interference, electrical and electronic measurement, digital recording by LASER beam dimension measuring system, optoelectronic, dimensional gauging, non-destructive testing methods (NDT methods), inspection and kinds of inspection, testing and calibration testing of gauges, dynamic measurement.

The characteristics and use of analogue and digital instrumentation applicable to industrial engineering problems, statistical methods for developing system specifications, basic concepts of modern instrumentation.

Concepts and importance of control system, control system

description, state variable and transfer unction representation, sensitivity, concepts of feedback-the feedback control system, electromechanical controls, digital computer control.

IPE 304: Measurement, Instrumentation and Control (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Check the normality by X2 (Chi Square) test, Measurement of angle of Template by,

a) Bevel protractor. b) Angle gauge., Measurement of Splines, Determination of radius of Convex arc, Determination of radius of Concave arc. Measurement of Screw thread by wire, Design and Implementation of a Lot By Lot Acceptance Sampling Plan, Calibration of Slip Gauges using Super micrometer, Measurement of propeller by using Pitchometer, Measurement of angles by

a) 3 rollers and b) 2 rollers, Measurement of gear teeth by gear teeth Vernier Calipers. Measurement of Bore by, a) Two balls, b) Pin gauge. Measurement of Tapers:

i) By rollers. Slip gauges and Micrometer ii) Ring gauge measurement by unequal Balls iii) Taper Plug measurement by Sine Bar and Dial Gauges

IPE 305: Product Design

Credit	Hour / Week	Total Hour
3	3	45

Functional aspects of a product, environment and human factors in design, value engineering, design morphology, standardization, ISO 9001, understanding customer needs, establishing product function specification, development, concept generation and evaluation.

Designing of machine parts for strength, deflection, stiffness, fatigue impact etc., designing of shaft, key and power screw, coupling, clutches and brakes.

Reverse engineering, alternative solutions and their evaluation, designing for assembly and disassembly, reliability, product life cycle, cost analysis, use of standard parts, application of CAD software.

Prototype design, designing of engineering systems involving shafts, bearings, linkages, couplings, clutches brakes, gears, power transmission etc.

IPE 306: Product Design (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Value Engineering, Reverse Engineering, Concept of design Modern Product development process, Understanding Customer needs, Gathering & prioritizing needs, Incorporating the Voice of Customer in product design with Quality Function Deployment (QFD), Functional decomposition, Modular design-Basic Clustering method, Design analysis of a product, Alternative material selection & select best with weighted average method. Alternative manufacturing process selection & select best with weighted average method, Cost Analysis.

Finite Element method & introduction to Ansys Software, Ansys Software Practice, Fatigue Test.

IPE 401: CAD, CAM & CIM

Credit	Hour / Week	Total Hour
3	3	45

CAD: Fundamental concepts, application, hardware and software, types of CAD systems, common 2D CAD software features, basic 3D

CAD features.

CAM: fundamental concepts, trend of development of NC, principles of NC, types of NC systems and machines, NC manual part programming, CNC part programming using APT language, interfacing CAM software with CNC machines, implementing the CAD CAM system principles of FMS.

Robotics: industrial Robots, robot anatomy (structure) and robot configuration, robot drive and control systems, robot sensors, robot applications.

Role of computers in manufacturing, computer aided process planning, hardware and software components of computer automations: PLC, robots and software: automated material handling and storage systems, computer control of manufacturing systems, flexible manufacturing system, factory of the future.

IPE 404: Engineering Graphics (CATIA) (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Part Drawing:

Plane selection

Sketch: point, different types of lines, circles, rectangle, spline, ellipse, profiles

Corner, chamfer, trim, mirror, project 3D element

Constraint, contact constraint, fixed together, auto constraint, animate constraint, edit multi constraint,

Pan, rotate, normal view, create multi-view, isometric view, shading with edges, Hide, Show, swap, measure, cut part by sketch plane

Exit workbench

Assembly Drawing:

Part Design Assembly, Assembly of sub-assemblies, Offset, Surface

Constraint, Manipulation, Snap, explode, coincident constraint, Contact Constraint, Angle Constraint, Fix Component, Flexible-Rigid Sub-assembly, Split, Symmetry, Associativity

CATIA Project Work

IPE 405: Material Handling & Maintenance Management

Credit	Hour / Week	Total Hour
3	3	45

Issues and importance of handling of materials: analysis of material handling problems, classification of materials, unit load, bulk loads, study of material handling systems and their efficiency, selection and classification of material conveying equipment.

Product handling: design system configuration conforming to various kinds of product features and layout characteristics.

Designing concepts of common handling and transfer equipment, different types of conveyors such as belt, screw, chain, flight, bucket elevators, pneumatic hydraulic cranes and forklifts, design of ware house facilities appropriate for relevant handling and transfer device.

Automatic packaging devices: testing procedure of packages: vibration test, drop test, performance limits and testing machines, algorithms to design and analyze discrete parts material storage and flow system such as automated storage retrieval system (ASRS), order picking, automated guided vehicle system (AGVS).

Maintenance management: concept of maintenance and value of maintenance management, maintenance organization and department structure (resource and administration), types of maintenance, fixed time replacement, condition based maintenance, preventive and corrective maintenance, replacement strategies, documentation and computer control in maintenance management, Implementation of maintenance planning, plant asset management, human factors in motivation skills in a maintenance environment.

IPE 406: Material Handling & Maintenance Management (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Determination of Angle of Repose (Static and Dynamic) for different materials. Study and determination of the capacity of a screw conveyor. Study the layout plan of Central Machine Shop, Development of Replacement Plan of tube light in BUTEX campus

IPE 407: Operations Management

Credit	Hour / Week	Total Hour
3	3	45

Integrated purchase-production-marketing system, production systems, product service life cycle, Demand Management &forecasting models, bill of materials, material and inventory management: inventory models. ABC analysis, coding and standardization, MPS, MRP.

Work Measurement, Capacity Planning, Facility Location, Facility Layout. Aggregate Planning, Operations Scheduling, Line Balancing. LEAN Manufacturing.

Work study: MRP II, optimized production technology, group technology, TQC and JIT.

IPE 409: Operation Research

Credit	Hour / Week	Total Hour
3	3	45

Introduction and scope of operations research, introduction to mathematical modeling: different kinds of modeling and their characteristics.

Classical optimization techniques involving single variable and multiple variables with and without constraints.

Linear models: simplex algorithm, duality, sensitivity analysis, transportation and assignment algorithm, game theory.

Integer programming, dynamic programming, queuing models, introduction to simulation, application: engineering, business and other sectors of economy.

IPE 411: Ergonomics and Safety Management

Credit	Hour / Week	Total Hour
3	3	45

Man-machine-material interfaces in manufacturing: physical and cognitive aspects, comparative advantages of man and machine, physical work and human muscular effort, bio-mechanics and bio-engineering.

Anthropometry, work place design and work place layout, human performance under environment temperature, illumination, vibration, noise, pollution radiation static and dynamic conditions.

Evolution of modern safety concepts, industrial hazard, safety and risk management, productivity, worker health and safety, proactive management techniques for safety management, safety standards and regulations for engineering works, case studies.

IPE 412: Ergonomics and Safety Management (Practical)

Credit	Hour Week	Total Hour
1	2	30

Anthropometry measurement , Design of a workstation by applying ergonomic principles, Study and Design of different type of hand tools, Study of manual lifting operation and determination of tire

recommended weight limit using the NIOSH lifting equation, Preparation of Hazard Evaluation Worksheet (task- based) for a workstation, Determination of Light and Sound level in different workplaces.

IPE 413: Project & Environment Management

Credit	Hour / Week	Total Hour
3	3	45

Project: identification, planning, appraisal, project implementation, project organization, budgeting, scheduling, using bar diagram, CPM, PERT, resource allocation, information system and project control, project termination, project organizations, matrix organization, project manager, contract negotiation and conflict resolution, case study, planning and evaluation of an investment project.

Environmental impact assessment of projects.

Source of degradation of earth's ecosystem, technological development, greenhouse gases, ozone layer depletion, toxic gases and industrial wastes, Montreal protocol, remedies Noxious China-sun refrigerant technologies and use of catalysts, environmental economics and accounting system.

IPE 416: Industrial Simulation (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Introduction to Simulation Systems, Models & Simulation: Discrete-Event System Simulation, Simulation of Queuing Systems, Simulation of Inventory System, Simulation of Reliability Problem, Introduction to Computer Simulation, Problem solving with Computer simulation, Computer Simulation Practice

IPE 418: IPE Industrial Attachment (2 months)

Credit	Hour / Week	Total Hour
3	2 month	--

The students must undergo 2(two) months intensive of Industrial Training program in the relevant area of specialization after completion of Level-III, Term-II.

IPE 420: IPE Project Work

Credit	Hour / Week	Total Hour
3	--	--

During the Level-IV of study each student will be required to complete a Project Work in the relevant field of their specialization. For such a work the students will be guided by a Supervisor of the concerned Department.

IPE 422: IPE Comprehensive Viva

Credit	Hour / Week	Total Hour
3	--	--

The Comprehensive Viva will cover the entire 4 years courses of study. 60% weightage will be on the departmental subjects. 40% weightage will be on all other subjects. No specific class hour will assigned for the comprehensive Viva.

Department of Textile Machinery Design & Maintenance

Detailed outline of courses offered for B. Sc in Textile Engineering (Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

MDM 101: Computer Programming

Credit	Hour / Week	Total Hour
3	3	45

Basic programming concepts and notations; Problem analysis, algorithm, flow chart, debugging, coding and documentation; Overview of C, variables, data types, constants, operators, expressions, control structures; Functions and program structures: parameter passing conventions, scope rules and storage classes, recursion; Header files; Preprocessor; Pointers and arrays; Strings; Multidimensional array; User defined data types: structures, unions, enumerations; Input and Output: standard input and output, formatted input and output, file access; Variable length argument list; Command line parameters; Error Handling; Graphics; Linking; Library functions.

Introduction to Object Oriented Programming (OOP); Advantages of OOP over structured programming; Concepts and Techniques of OOP

MDM 102: Computer Programming (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Writing of simple C programs; Usage of C variables, data types and constants; Write C program using different operators; Usage of C decision control statements and conditional operators; Usage of C loop control statements; Writing C programs using library functions

and user-defined functions; Usage of recursion to call a function itself; Basic usages of pointers and arrays; Writing C programs using user-defined data types; Exception handling of C programs; Usages of C graphics to develop a game software.

MDM 103: Textile Process and Machinery

Credit	Hour / Week	Total Hour
3	3	45

Introduction to yarn manufacturing process and machinery, carded yarn manufacturing (spinning) process, rotor yarn manufacturing process, blowroom, spinning process, staple length, lot, ginning, bale, opening, cleaning, mixing, jute process, machinery related to yarn manufacturing process.

Introduction to fabric manufacturing process and machinery, winding, warping, sizing, looming, picking, beating, warp knitting, weft knitting, stich density, gauge, drawing and denting, weaving, inspection, woven fabric, machinery related to fabric manufacturing process.

Introduction to apparel manufacturing process and machinery, fabric inspection, fabric relaxation, pattern design, sample making, production pattern, grading, marker making, spreading, fabric cutting, sorting, sewing or assembling, pressing, final inspection, sticker tagging, bundling, packing, washing section, finishing, folding, metal check, ETP, shipment, flow chart of apparel manufacturing process, CAD, CAM, different types of sewing machine, stich, seam, overlock, niddle, pattern, marker, bend, round, noucher, drill, and machinery related to apparel process.

Introduction to dyeing process and machinery, woven fabric dyeing process, yarn dyeing process, soft winding, beleching, dyeing, hydro extractor, dryer, hard winding, knit fabric dyeing process, slitter, tabular compactor, singeing, desizing, scouring, bleaching, mercerizing, printing, finishing, chemical finish and mechanical

finish, calendaring, shrinking, and machinery related to dyeing process.

Introduction to textile testing process and machinery, fiber fineness tester, comb shorter machine, moisturizer regain, thrust tester, yarn tester, yarn length tester.

MDM 105: Textile Machine Metallurgy

Credit	Hour / Week	Total Hour
3	3	45

Iron and Steel: Pig iron manufacturing, properties and uses, wrought iron manufacturing, properties and uses. Manufacturing of steel, properties and uses of steel, different types of alloy steels, specification of steel, characteristics of tool steel, stainless steel and heat resisting steel. Cast iron manufacturing, properties and uses. Different types of cast iron, their properties and uses, alloys of cast iron.

Heat Treatment of Steel: Types of heat treatment, normalizing, annealing, hardening, tempering. TTT diagram and different types of case hardening processes.

Crystal Structure of Metals and Alloys: Types of crystal lattices, solidification as process of crystallization and grain growth, cooling curves, phase diagrams, iron-carbon alloys. Iron-iron carbide equilibrium diagram, plain carbon steel and their micro-structure, crystal defects, dislocation theory.

Non Ferrous Metals and Alloys: Composition, properties and uses of copper, Aluminum, Nickel, Tin etc.

Rubber, TEFLON, Polyester, NOMEX, Ceramics: Composition, properties and uses in wire, cable and textile machinery.

Fibers and Composite materials: Carbon fiber, Glass fiber, aramid fiber and their composites and nano-composites. Uses in textile machinery.

MDM 106: Machine Drawing (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Introduction; Instruments and their uses; First and third angle projections; Orthographic drawings; Missing lines and views; Sectional views and conventional practices; Auxiliary views, Isometric views.

Fasteners, gears, joints, keys and springs, Specifications for manufacture; working drawings, assembly drawing, part drawing. Application of computer software for Engineering Drawing.

MDM 201: Fundamentals of Electrical & Electronic Engineering

Credit	Hour / Week	Total Hour
3	3	45

Electrical Engineering: Laws of electric circuit: Ohm's law, Kirchhoffs voltage and current laws, delta-wye transformation. Electrical networks: network analysis-methods of branch and loop currents, method of node-pair voltages, network theorems.

Magnetic concepts and units, Characteristics of ferromagnetic materials, theory of ferromagnetism, hysteresis loss, eddy-currents and eddy-current loss, total core loss, Electromagnetic forces: forces upon a current carrying conductor, Electromagnetic torque: electric motor, electromagnetic induction and emf: A/C generator.

General concepts and definitions: Instantaneous current and power, R-, L-, C-, RL and RLC-branches. Effective current and voltage: average values, form factor, crest factor, power real and reactive. Sinusoidal single phase circuit analysis, Impedance in series, parallel branches, series-parallel circuits. Balanced polyphase circuits: three-phase, four wire system of generated emfs, three-phase, three-wire system, balanced wye loads, balanced delta loads, power in balanced

systems, power factor.

Purpose and types of Sub-station, substation equipments (HT, LT switch gear), distribution board and sub distribution board. Transformer and PLC system. Principles of protection for transformer and motors, protective devices: circuit breaker, switches, starter etc., protection against shock and fire, earthling and its importance,

Electronic Engineering: Semiconductor diode, transistor characteristics, equivalent circuits, self-biasing circuits, emitter-follower amplifiers, push-pull amplifiers, introduction to silicon controlled rectifier, and its application, Oscilloscope, Photo sensor and transducers, strain, temperatures, pressure, speed and torque measurements.

MDM 202: Fundamentals of Electrical & Electronic Engineering (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Study on D.C circuits, A.C. circuits, Induction Motor, A.C & D.C generators. Single phase transformer, 3-Phase transformer, Star-Delta starter. Half-wave and full-wave rectifier, Transistor amplifier circuit, Transduction and sensor application. House wiring and layout & single line diagram of a factory (Electrical)

Study of electrical circuit diagram of a typical textile machine. Types of wires and cables.

Practical study/visit of a Sub-station.

Practical study of Generators.

MDM 203: Engineering Mechanics

Credit	Hour / Week	Total Hour
3	3	45

Basic concepts of mechanics: free body diagram, concurrent / coplanar / non coplanar force systems, resultant of forces, and resolution of forces.

Statics of particles and rigid bodies: Centroids of lines, areas and volumes; Moments of inertia of areas and masses; Relative motion. Analysis of structures: Forces in truss, frames, and cables; Friction.

Kinetics of particles: Newton's second law of motion; Principles of work, energy, impulse and momentum; System of particles; Kinematics of rigid bodies; Kinetics of plane motion of rigid bodies: forces and acceleration; Principles of work and energy.

Beams: shear force and bending moment diagrams; various types of stresses in beams; Flexure formula; Deflection of beams: integration and area moment methods.

Torsion formula: Angle of twist; Modulus of rupture; helical springs.

Combined stresses: principal stress, Mohr's Circle; Columns: Euler's formula, intermediate column formulas, the Secant formula; Flexure formula of curved beams.

MDM 204: Engineering Mechanics (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Study and Experiments based on

Friction, Beams, Lifting devices, Belt and chain drives, Gear, Bearing, Flywheel

Pure Mechanisms Cam and Roller Mechanism, Geneva Mechanism, Ratchet Mechanisms.

Crank Mechanism Simple crank Mechanism, Toggle Mechanism, Quick Return Mechanism.

Tensile test, Compression test, Hardness test, Impact test, Fatigue test

MDM 301: Utility Machinery

Credit	Hour / Week	Total Hour
3	3	45

Transformer: Ideal transformer- transformation ratio, no-load and load vector diagrams; actual transformer- equivalent circuit, regulation, short circuit and open circuit tests.

Three phase induction motor: Rotating magnetic field, equivalent circuit, vector diagram, torque-speed characteristics, effect of changing rotor resistance and reactance on torque-speed curves, motor torque and developed rotor power, no-load test, blocked rotor test, starting and braking and speed control.

Single phase induction motor: Theory of operation, equivalent circuit and starting.

Synchronous Generator: Excitation systems, equivalent circuit, vector diagrams at different loads, factors affecting voltage regulation, synchronous impedance, synchronous impedance method of predicting voltage regulation and its limitations.

Parallel operation: Necessary conditions, synchronizing, circulating current and vector diagram. Synchronous motor: Operation, effect of loading under different excitation condition, effect of changing excitation, V-curves and starting.

DC generator: Types, no-load voltage characteristics, build-up of a self excited shunt generator, critical field resistance, load-voltage characteristic, effect of speed on no-load and load characteristics and voltage regulation.

DC motor: Torque, counter emf, speed, torque-speed characteristics, starting and speed regulation. Introduction to wind turbine generators Construction and basic characteristics of solar cells.

Special machines: Series universal motor, permanent magnet DC motor, unipolar and bipolar brush less DC motors, stepper motor and control circuits. Reluctance and hysteresis motors with drive circuits, switched reluctance motor, electro static motor, repulsion motor,

synchros and control transformers.

Permanent magnet synchronous motors. Acyclic machines: Generators, conduction pump and induction pump. Magneto hydrodynamic generators. Fuel Cells, thermoelectric generators, flywheels. Vector control, linear motors and traction. Photovoltaic systems, Wind turbine generators: induction generator.

Circuit Breaker and Fuses: Miniature circuit breakers and fuses. Circuit breakers, principle of arc extinction in DC and AC circuit breakers. Recovery voltage, rate of rise of recovery voltage and other transient phenomena. Speed of circuit breaker. Construction, operation, rating and testing of bulk oil and minimum oil breaker, SF6 circuit breaker, Selection of circuit breaker.

Mechanical machines: Introduction to pumps, blowers and compressors (Screw type compressor, operation, cooling and applications).

Cooling system: Open cycle and closed cycle cooling system. Cooling tower, Types of cooling tower, Basic terms, Important properties of water, System calculation, System concerns, Treatment options.

MDM 302: Utility Machinery (Practical)

Credit	Hour / Week	Total Hour
1	2	30

DC dynamo construction, characteristics of DC generator, characteristics of DC motor, short circuit test and open circuit test of transformer, open circuit test and short circuit test of synchronous generator, practical visit to power station and substation. Practical study on pump, blower and compressor. Industrial wiring and single line diagram of a system, types of wires and cables, study on switch, fuse and circuit breaker, study on electrical earthing, star delta starter.

MDM 303: Machinery Production Process

Credit	Hour / Week	Total Hour
3	3	45

Casting: sand, die, centrifugal and other types of casting, Casting design and casting defects.

Selection of machining.

Metal removing processes: turning, drilling, shaping, planing, milling, broaching, grinding, precision and non-precision finishing processes. Chipless metal forming process: different types of hot and cold working processes.

Welding: arc, gas, TIG, MIG, resistance, thermit, and special types, Brazing and soldering. Modern welding processes.

Plastic, ceramic and glass product manufacturing processes.

Modern manufacturing processes: electro-discharge machining (EDM), electro-chemical machining (ECM), electron-beam machining (EBM), LASER-beam machining (LBM), ultrasonic machining (USM), plasma arc machining (PAM), abrasive jet machining. (AJM) and related machines. Protective coatings and hard facing. Automatic and semi-automatic machine tools and automatic transfer lines. Introduction to NC and CNC

MDM 304: Machinery Production Process (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Study and experiments on casting, lathe operations, milling, shaping, grinding: various welding machines.

Experiment on CNC operations and coding.

MDM 305: Machine Control Engineering

Credit	Hour / Week	Total Hour
3	3	45

Introduction to control systems, Linear system models: transfer function, block diagram and signal flow graph (SFG). Feedback control system: Closed loop systems, parameter sensitivity. Analog computer solution of system equations; System response, control action and system types; Frequency response; System analysis; System compensation; Analogues of control systems; Hydraulic and pneumatic control systems; Elements of electro-mechanical controls; Introduction to digital computer control. Controller design: On-off, fuzzy, P, PI, PD and PID Controller, their applications in control system design, introduction to programmable logic controllers (PLC), temperature, position and speed control systems. Electrical control instrument (Transducer): Resistive, strain gauges, thermal, magnetic, LVDT, capacitive, piezoelectric, and optical. Electronic measuring instruments: Oscilloscope, DMM, digital meters. Mechanical measurement: Measurement of speed, frequency, pressure, temperature, flow, force, level detector and shaft encoder.

MDM 307: Textile Testing and Machinery

Credit	Hour / Week	Total Hour
3	3	45

Introduction to textile testing: Properties of fibres, yarns and fabrics and their relevance in assessing the performance of textiles during and after manufacture, selection of samples for testing, random and biased samples, review of statistical techniques (estimation of population characteristics from samples and the use of confidence intervals, determination of number of tests to be carried out to give chosen degree of accuracy, significant testing of means, quality control charts and their interpretation.).

Fibre Testing: Measurement of fibre length, fibre fineness: technical significance, determination of maturity of cotton, tensile testing of fibres, moisture in fibres, foreign matter content of fibres.

Yarn testing: Yarn dimensions and numbering, special testing of interlaced and textured yarns.

Fabric testing: Fabric parameters and dimensions, fabric strength, comfort properties, durability.

Textile chemical analysis: Chemical methods of identification of fibres, analysis of blends, estimation of damage to fibre materials, determination of amount of size and filling material in fabrics, analysis of oil soaps and softners, identification of dyes in substances and on fibres, colour fastness tests.

Analysis of test results: Concept of statistical techniques, designing of tests, interpretation of results, preparation of reports and presentation.

Testing Machinery: Yarn, fabric, apparel, dye testing machineries & equipments accessories, feature, construction, working process, troubleshooting.

MDM 308: Textile Testing and Machinery (Practical)

Credit	Hour / Week	Total Hour
1	2	30

To become familiar with textile testing machinery maintenance tools and their functions, safety practice.

Practical study of testing machineries operation mechanism, testing and measurement process.

Yarn count measurement, Abrasion tester, water resistance measurement tester, thickness tester for fabric, Carpet thickness gauge, Horizontal and vertical strength tester for fabric, yarn strength tester, Stiffness tester, crease recovery tester and comb sorter, Determination of moisture regain and moisture content of cotton, Fibre length and length characteristics.

Identification of fibres. Estimation of constituent fibre content of a blended material.

Assessment of yarn, fabric and dyeing quality of a sample. Comparison of yarn, fabric and dyeing quality of more than one supplied sample.

MDM 401: Principles of Machine Maintenance

Credit	Hour / Week	Total Hour
3	3	45

Electrical Maintenance: Familiarization with AVO meter; electric switches; electric tools; electrical fittings and fixtures, electrical single line diagram and symbols and also to learn maintenance work of electric switches; electric tools; electrical fittings and fixtures.: wire wrapping; soldering; electrical symbols; connection of tube light, staircase lighting, flickering lighting, moving lighting, simple traffic signals, calling bells, etc.

Wire specification: Flexible wire: Electrical cables: T&T cables: fuse wire, etc. Safety devices: Fuse wires; MCCB; fuse distribution board (FDB); oil circuit breaker, air circuit breaker, etc.

Testing: Megger test, fan and transformer test, earthing and its testing. Familiarization and maintenance of different types of instrumentation and control elements.

Electrical wiring: Illumination, house wiring, industrial installation wiring, estimation for electrical wiring system, safety rules, wiring of air conditioning, designing underground cable, erection estimation, electricity rules, electricity codes, tariff of PDB and REB. Electrical installation: substation, BBT and protection, air-conditioning, heating and lifts. Design for intercom, public address systems, telephone system and LAN. Design of security systems including CCTV, fire alarm, smoke detector, burglar alarm, and sprinkler system. A design problem on a multi-storied building.

Mechanical Maintenance: Familiarization with P&ID and basic learning for maintenance of pump, bearing, filter, boiler auxiliaries,

cooling system, torque converting gears, lubrication system, greasing, chain block system for heavy equipment lifting, HVAC system and different types of valves, belts, sprockets, shaft alignment, conveyer maintenance, correct use of associated hand tools. To learn the basic function of hydraulic and pneumatic components, and fault finding techniques.

MDM 403: Yarn Manufacturing Machinery & Maintenance

Credit	Hour / Week	Total Hour
3	3	45

Blow room, Carding and Draw frame, Mixing, simplex, Ring frame of Cotton Spinning, jute spinning machinery, Material passage diagram gearing, setting and draft, twist & Production calculation, Rotor and Airjet Spinning machine, Precomb drawing machine, Lap former, Comber machine, Winding machine, conditioning machine.

Material passage diagram and Production calculation.

Schedule for routine maintenance for all spinning machinery.

Operations activities carried out during routine maintenance (including cleaning, oiling, lubricating & creasing tighten & looseing of nut bold, fitting of belts, setting change etc.).

Dismantling and reassembling of machine parts

Replacement strategies for different spares & accessories.

Overhauling and erection of spinning machine, inventory management.

Maintenance tools and their functions, Safety practice, preventive and corrective maintenance.

Computer control of maintenance management.

MDM 404: Yarn Manufacturing Machinery & Maintenance (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical study of Mixing, Blow room, Carding and Draw frame, simplex, Ring frame of Cotton Spinning. Practical study of jute spinning machinery. Material passage diagram gearing, setting and draft, twist & Production calculation. Practical study of Rotor and Airjet Spinning machine. Material passage diagram and Production calculation.

To become familiar with maintenance tools and their functions.

Safety practice

To prepare schedule for routine maintenance for all spinning machinery.

To practice operations/activities carried out during routine maintenance (including cleaning, oiling, lubricating & creasing tighten & looseing of nut bold, fitting of belts, setting change etc.).

Dismantling and reassembling of machine parts

Replacement strategies for different spares & accessories.

Practice of overhauling and erection of spinning machine.

Computer control of maintenance management.

Practice of inventory management.

Practice of preventive and corrective maintenance.

MDM 405: Fabric Manufacturing Machinery & Maintenance

Credit	Hour / Week	Total Hour
3	3	45

Fabric manufacturing machineries operation and construction mechanism, development of machines.

Weft knitting machine: classification of weft knitting machinery; Plain circular latch needle machine - Description, Knitting action, Cam system, Sinker timing.

Circular Rib machine - Description, knitting action, needle timing etc.

Circular Interlock machine - Description, knitting action, interlock cam system, etc.

Single jersey circular knitting machines: Features, Main parts, Knitting action, Cam system and sinker timing.

Purl knitting machine: Features, Knitting action and cam system.

Flat knitting machine: Features, Classification, Main parts, Knitting action and cam system.

Calculation related to weft knitting; weft knitted fabric faults with causes and remedies.

Warp knitting machinery: Classes of warp knitting machinery.

Tricot warp knitting machines: Features, knitting elements and knitting action on bearded and compound needle.

Raschel warp knitting machines: Features, knitting elements and knitting action on latch and compound needle.

Two fully threaded guide bar structures: Features, lapping diagram, chain notation and end uses

Calculation related to warp knitting. Warp knitted fabric faults.

MDM 406: Fabric Manufacturing Machinery & Maintenance (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical study of different fabric manufacturing machineries, operation and construction mechanism.

Practical study of weft knitting machine, Plain circular latch needle machine - Description, Knitting action, Cam system, Sinker timing.

Practical study of Circular Rib machine, Circular Interlock machine - Description, knitting action, interlock cam system, etc.

Practical study of single jersey circular knitting machines, purl knitting machine Flat knitting machine: Features, Knitting action and cam system.

Calculation related to weft knitting; weft knitted fabric faults with causes and remedies.

Warp knitting machinery, Tricot warp knitting machines, Raschel warp knitting machines

To practice operations/activities carried out during maintenance (including cleaning, oiling, lubricating & creasing tighten & looseing of nut bold, fitting of belts, setting change etc.).

Replacement strategies for different spares & accessories.

Practice of overhauling and erection of fabric machine.

Computer control of maintenance management.

Practice of preventive and corrective maintenance.

MDM 407: Wet Processing Machinery & Maintenance

Credit	Hour/ Week	Total Hour
3	3	45

Design: Design concept of wet processing machinery, accessories and spare parts. computer control system. Working principles, types, different parts, capacity & features of the following wet processing machinery:

Preparatory: Boiler, singeing, desizing, scouring, bleaching, mercerizing & washing machine.

Dyeing: Different batch dyeing & continuous dyeing machinery.

Printing: Different types of screen, transfer, inkjet, flock etc. printing machinery, dryer & Steamer.

Finishing: Stenter, Calendar, Folding, Raising, Suedding, Sanforising, Compactor, Dewatering etc. machine.

Laboratory equipment: Different types of lab-dyeing machinery, computer color matching equipment, different types of color fastness testing apparatus, washing machine, color matching cabinet, automatic dispensing system.

Maintenance: Replacement strategies for different spares parts & accessories. Overhauling and erection of wet processing machinery Schedule for routine maintenance for all wet processing machinery. Maintenance tools and their functions Electrical wiring diagram, connection, earthing system.

Risk assessment & Safety practice.

MDM 408: Wet Processing Machinery & Maintenance (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Practical study of maintenance tools for wet processing machinery and their functions. Risk assessment & safety practice, cleaning, oiling, lubricating system, Practice of overhauling and erection, Computer control system. Electrical wiring diagram, connection, earthing system.

Practical study of different pretreatment machinery (Boiler, Singeing, Desizing, Scouring, Bleaching, Mercerizing, Washing). Study on different type of dyeing machinery (Winch, Jigger, Jet, Package dyeing, Padding mangle). Printing machinery (Screen, roller etc.). Study of various type of finishing machinery (dryer, steamer, stenter, calendar and folding machine). Practical Study & application of Color matching equipments and lab dyeing machinery, Study of different color fastness testing apparatus.

Design: Practical knowledge in mechanical design of different wet processing machinery.

MDM 409: Apparel Manufacturing Machinery & Maintenance

Credit	Hour / Week	Total Hour
3	3	45

Introduction to spreading machines and cutting machines- types and functions History of sewing machines and development., Sewing machinery - classification according to bed types, stitch types (hook or looper), material wise (extra light to heavy weight).

Major parts of sewing machinery and functions. Adjustment of major parts of Single needle lock stitch machine: Non-UBT: stand height, pedal, presser foot, height of needle bar, needle to hook relationship, height of feed dog, normal and reverse feed stitch length, feed timing, presser foot pressure, needle and bobbin thread tension, bobbin

winding assembly, belt tension. Sewing machine safety regulations.

Sewing needle and sewing thread, thread consumption, thread routing. Adjustment on SNLS UBT: Needle stop position, wiper, thread timing sequence, timing of thread trimmer cam, positioning the moving knife, installation, sharpening, replacing moving knives, adjusting the floating amount of the auxiliary tension disk.

Parts, functions and adjustments of Over lock: Needle height, feed dog height, differential feed ratio, tilt of the feed dog, position of the upper and lower knives, sharpening of knife and loopers, trouble shooting in over lock.

Work-aids and attachments, functions of pullers, guides and folders compensating presser foots- left, right, double; feller, hemmer etc. Collar turning machines, folding machinery, fusing and pressing machinery.

Welding, adhesives, moulding and their comparison.

Computer controlled cutting, sewing, folding machinery.

Design concept of knives in cutting machine- selection of knives- straight, rotary, band knives, Grinding and cooling systems in cutting machines.

Laser cutting ,Water jet cutting machine, Fabric feeling Systems- top feed and differential drop feed mechanism in sewing machine. Stitching mechanisms -Single needle, multi needle, design of needles Yarn tensioning mechanism in sewing machine.

Yarn tensioning device in single chain lock stitching and flat lock stitching machines, Application of electronic control systems in sewing machines, Design concept of Button holing machines, Button fixing machines, Finishing machineries, auto folding, press buck, auto packing mechanisms

General repairs oiling & maintenance of machine & safety, lubrications.

MDM 410: Apparel Manufacturing Machinery & Maintenance (Practical)

Credit	Hour / Week	Total Hour
1	2	30

1. To become familiar with apparel maintenance tools and their functions.
2. Safety practice
3. To prepare schedule for routine maintenance for all type of sewing, embroidery, fusing & apparel dyeing machinery.
4. To practice operations/activities carried out during routine maintenance (including cleaning, oiling, lubricating & creasing tighten & looseing of nut bold, fitting of belts, setting change etc.).
5. Dismantling and reassembling of machine parts
6. Replacement strategies for different spares & accessories.
7. Practice of overhauling and erection of Apparel machine.
8. Computer control of maintenance management.
9. Practice of inventory management., preventive and corrective maintenance.
10. Study of the hook shuttle assembly in lock stitch machine.
11. Study of needle bar section in lock stitch machine.
12. Study of the mechanisms of over lock and give the threading procedures for three thread machines.
13. Study of the hook shuttle assembly in flat lock machine.
14. Study of the needle bar sections in flat lock machines.
15. Study of the cutting and sharpening mechanisms in straight knife cutting machines.
16. Study of the stitch mechanisms, gears and button fixing machine and set the same various stitch.

MDM 411: Principles of Machine Design

Credit	Hour / Week	Total Hour
3	3	45

Introduction to design; stress analyses; Failure theories, Pressure vessels; Stresses in curved members; Deflection and stiffness considerations; Shock and impact; Column design; Shaft design; Design for static strength; Fracture mechanics in design; Design for fatigue strength; Design of screws, fasteners and connections; Keys and couplings, welded and brazed joints.

Mechanical springs; Rolling contact bearings; Lubrication and journal bearings; Design of spur, helical, worm and bevel gears: Study of gears and gear trains; Design of brakes and clutches; Study of cams and cam followers; Power transmission by belts, ropes and chains;

Undamped free vibrations; Longitudinal, transverse and torsional vibrations; Damped free and forced vibration; Vibration of geared systems; Vibration absorption, isolation and disolation;

Study of governors; Gyroscopes: principles and applications. Dynamometers.

MDM 412: Principles of Machine Design (Practical)

Credit	Hour/ Week	Total Hour
1	2	30

Design and check problems based on MDM 303.

Design using standard simulation software like Proengineer, Solid Works, CATIA.

MDM 413: Marketing of Textile Machinery

Credit	Hour / Week	Total Hour
3	3	45

Introduction to Machinery marketing, nature of textile Machinery marketing. Conventional consumer marketing vs. machinery marketing, understanding machinery demand and customers.

Types of textile machineries: Yarn, fabric, wet process, apparel machinery and accessory equipment, component parts and sub-assemblies. Standardized and non-standardized parts, stand-by parts, services.

Organizational Buying Decision Process, Environmental & organizational Influences, Organizational Influences on Buying Behavior. Buying Roles; The Buy Grid Model, The Organizational Buying Decision Process

Pricing for Machinery, Pricing Objectives, Price Decision Analysis, Breakeven analysis - net pricing, discount pricing, trade discounts, geographic pricing, factory pricing, freight allowance pricing, Terms of Sale, Outright purchase, Factors affecting prices; Pricing Policies and Strategies; Pricing Methods.

Promotion for machinery and supporting salesman, Motivating Distributors. Stimulating primary demand, Sales appeal, Publicity & sponsorships. Trade shows, exhibits, Catalogs, Samples, promotional letters. Promotional novelties.

Export and Import Practices: Export Strategy, Export intermediaries, Locating foreign markets, Freight forwards and their Functions, Export Financing, Other government Incentives.

Import & Export Procedure: Registration procedure, Procedure in export import trade, Import procedure of industrial goods and commercial goods.

Documentation- Invoice, packing list, bill of exchange, bill of lading types of B/L, certificate of origin, certificate of Analysis. Pre-shipment Inspection(PSI), Shipments, Import strategy, Delivery and negotiation. retirement of documents from bank, clearing agent and their functions in customs clearance. Technology transfer, Technical assistance. Procedure for realization of export incentives, Back to back L/C.

Export Processing Zone in Bangladesh: Bangladesh Export

Processing Zone Authority (BFPZA) - Reasons for setting EPZ in Bangladesh - Performance of the EPZ in Bangladesh.

MDM 414: MDM Industrial Attachment (2 months)

Credit	Hour / Week	Total Hour
3	2 month	--

The students must undergo 2(two) months intensive of Industrial Training program in the relevant area of specialization after completion of Level-III, Term-II.

MDM 416: MDM Project Work

Credit	Hour / Week	Total Hour
3	--	--

During the Level-IV of study each student will be required to complete a Project Work in the relevant field of their specialization. For such a work the students will be guided by a Supervisor of the concerned Department.

MDM 418: MDM Comprehensive Viva

Credit	Hour / Week	Total Hour
3	--	--

The Comprehensive Viva will cover the entire 4 years courses of study. 60% weightage will be on the departmental subjects. 40% weightage will be on all other subjects. No specific class hour will assigned for the comprehensive Viva.

Department of Dyes & Chemicals Engineering

Detailed outline of courses offered for B. Sc. in Textile Engineering

(Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

201: Fundamentals of Dyes & Chemicals Engineering

Credit	Hour / Week	Total Hour
3	3	45

Scope of Dyes and chemicals engineering, Principles of chemical engineering calculations: System units, basic concepts of dimensional analysis, process variables, conservation of mass and energy. Laboratory safety, General safety guidelines, Chemical toxicity, Polarity and H-bonds, Solvents, Balancing chemical equations, Concentration units, Basic operations, Handling liquids, Heating, Filtration, Refluxing, Evaporation, Centrifugation, Caring of glass ware, Recrystallization and melting point, Eutectic mixtures, Melting point determination, Sublimation, Recrystallization of acetanilide and urea, Distillation separation and purification of organic liquids, Chromatography, Chromatographic methods, Partition chromatography, Gas Chromatography, Measuring the retention time, Thin layer chromatography, Adsorption process, Selection of TLC conditions, Adsorption Isotherm, Applications of TLC, Column chromatography.

DCE 202: Fundamentals of Dyes & Chemicals Engineering (Practical)

Credit	Hour / Week	Total Hour
1	3	45

Procedure of writing Lab reports and keeping Lab book, Introduction to different glass ware, Caring of glass ware, Introduction of different Solvents, Handling liquids & equipments, Different heating systems, Filtration, Refluxing, Evaporation, Centrifugation of different

chemicals, Chromatographic systems and their uses. Melting points determination of different chemicals planning.

DCE 301: Chemistry of Dyes & Pigments

Credit	Hour / Week	Total Hour
3	3	45

Historical Background of Dye Chemistry, Physical and Chemical Basis of Color, Color Index methods & International Certification, Azo Dyes and Pigments, Carbonyl Dyes and Pigments, Phthalocyanine, Miscellaneous Organic Dyes and Pigments, Metal-Complexed Dyes, Chromic Dyes, Food Dyes, Laser Dyes, Dyes used for Criminal Investigations, Dyes used for Medical Therapy, Hair Dyes, Dyes Used for Ink-jet Printing, Pigment, Textile Dyes. Chemistry of disperse dyes. Reactive Dyes: Introduction, Chemical Constitution of Reactive dyes Systems, Dye Classes (Chromogens) for Reactive dyes, Fluorescent dyes, Sulfur dyes, Leather Dyes.

DCE 303: Chemistry of Textile Preparatory Chemicals

Credit	Hour / Week	Total Hour
3	3	45

Water and its importance, sources, purification, hardness, different water softening treatments (lime soda, ion exchange, chelation, etc.); consumption and reuse of water in wet processing; sequestering agent. Spin Oils, Sizing chemicals, aqueous liquid chemical blending, solvent blending and formulation, Physical emulsion: oil in water, water in oil, wax emulsions.

Basic Chemicals (Acetic acid, Oxalic acid, Soda Ash, Sodium hypo chloride, Sulphuric acid), Bleaching agent, Salt for electrolytes (Glauber salt, Common Salt, Refined salt), Antifoaming agent, Anticreasing agent, Peroxide Stabilizer, Peroxide Killer.

DCE 305: Synthesis of Dyes & Chemicals-I

Credit	Hour / Week	Total Hour
3	3	45

The study of Chemical Reactions, Nucleophilic Substitution and Elimination. Synthesis of (Alkenes Aromatic Compounds, Alcohols and Phenols, Ether and Epoxides, Carbonyl Compounds, Carboxylic Acid and Nitriles, Amines and Heterocyclic Compounds) & all others dye intermediates. Multistep synthesis, Retrosynthetic analysis, planning a multistep synthesis, Linear versus convergent synthesis. Reduction: Catalytic hydrogenation and dehydrogenation, dissolving metal reduction, hydride reduction of functional groups, Meerwein-Pondrof Verley reduction, hydroboration and related reaction, Wolff-Kishner reduction, non metallic reducing agents such as diimide, Oxidation: Oxidation by Cr and Mn compounds, oxidation of alcohol, aldehyde, Bayer-Villiger oxidation. Other types: Prevost and Woodward hydroxylation, cis- and trans- hydroxylation, glycol cleavage reagents, Rearrangement reactions: Formation and stability of carbenium ions, carbanions, carbenes, nitrenes, radicals, yields and arynes. Rearrangement reactions involving carbocation (Wagner-Meerwein, Pinacol-Pinacolone rearrangement), carbenes (Wolff & Arndt-Eistert synthesis), nitrenes (Hoffman, Curtius, Schmidt, Lossen, Beckman), acyl cation, Fries rearrangement.

DCE 306: Synthesis of Dyes & Chemicals-I (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Designing of organic synthesis: Nitration, Alkylation, and Amination, Hydroxyl compounds. 2-Phenyl indole (Fischer indole synthesis), Benzyl alcohol and benzoic acid from benzaldehyde (Cannizzaro reaction), 4-Chlorotoluene from p-toluidine (Sandmayer Reaction), 4-methylbenzophenone (Friedel craft Reaction), Benzopinacol (Photochemical Reaction), 2 and 4-nitrophenol (Nitration and separation by steam distillation), Stilbene from benzylchloride (Wittig

Reaction), Triphenyl or diphenyl methyl carbinol (Grignard Reaction). Recrystallization: Purification of Solids, Melting Points and Ranges, Saponification using reflux, Synthesis of Urea, Extraction: A Separation and Purification Technique, Identification of Organic Compounds, Simple and Fractional Distillation, Paper and Column Chromatography, Thin Layer Chromatography, Vacuum Distillation. Making Soaps and Detergents.

DCE 307: Chemicals Testing & Quality Control

Credit	Hour / Week	Total Hour
3	3	45

Identification of dyes from dyed textiles, Assessment of purity and strength of different chemicals such as acids, alkalis, peroxide etc used in wet processing. Color Fastness: Importance, Grey scales. Measurement of different types of color fastness such as light, wash, rubbing, perspiration, chlorine, etc. Using different international standards. Quality Management, Quality Management Principles. Quality Standards and their compliances, International test standards and methods such as ISO, AATCC, ASTM, BSTI, Indian Standards. British Standards etc, ISO 9000, ISO 26000, ISO 14000 and other relevant ISOs, Social Responsibility. Ink, colorant or coating formulation analysis and impurity identification, Chemical Testing and Analysis for dyes and other formulation ingredients. High resolution microscopy for analysis of: Particulate pigment systems. Surface chemistry analysis for printed substrates, Coated surfaces and multilayer systems. Trace heavy metals and residual inorganic impurities in product formulation. Physical chemistry property determination (pKa, LogP, LogD, solubility etc) for formulation components.

DCE 308: Chemicals Testing & Quality Control (Practical)

Credit	Hour Week	Total Hour
1	2	30

Assessment of purity and strength of different chemicals such as acids, alkalis, peroxide etc. Identification of dyes and pigments, Identification of trace and heavy metals, Determination of pKa, LogP, LogD, solubility etc. Measurement of different color fastness for dyed & printed goods. Comparison of fastness properties of fabric dyed with different dyes.

DCE 401: Synthesis of Dyes & Chemicals-II

Credit	Hour / Week	Total Hour
3	3	45

Syntheis of Azo dyes and pigments, Introduction to heterocyclic compounds. Aromatic heterocyclic compounds containing one heteroatom. Synthesis routes of Anthraquinone dyes and pigments.

Heterocyclic compounds containing two or more heteroatoms: Synthetic methods of preparation, properties and applications in medicinal chemistry e.g. azoles, diazines, benzo-diazines, heterocyclic compounds containing one nitrogen atom and an oxygen or sulphur atom, triazines and tetrazines. Synthesis route of Phthalocyanine.

DCE 402: Synthesis of Dyes & Chemicals-II (Practical)

Credit	Hour / Week	Total Hour
1	2	30

Synthesis of Azo dye, Synthesis of heterocyclic azo dye, Synthesis of Anthraquinone dyes, Synthesis of Phthalocyanine, Synthesis of Miscellaneous dyes, Synthesis of Methyl Orange, Synthesis of Acid Orange-I, Synthesis of Acid Orange-II, Synthesis of Acid Para Red, Synthesis of Reactive dyes, Disperse, Acid dyes. Extraction of Natural dyes from Root (Turmeric, Madder, Onions, Beet-root), Bark/Branches (Purple Burk, Sappan Wood, Khair, Red, Sandalwood), Leaf (Indigo, Henna, Eucalyptus, Tea, Cardamon, Coral Jasmine, Lemon Grass), Flowers (Marigold, Dahlia, Kusum), Fruit (Latkan, Pomegranate rind, Beetle nut, Myrobolan).

DCE 403: Chemistry of Textile Finishing Chemicals

Credit	Hour / Week	Total Hour
3	3	45

Chemistry, properties, functions and uses of oxidizing agents, reducing agents, buffering agents, dispersing agents and other auxiliaries used in textile dyeing. Dye fixing agent, Optical-brightening agent, and Stiffening agent.

Printing Chemicals and Auxiliaries, properties, functions and uses of different ingredients used in textile printing, flocking binder, sizing binder, gold binder, Zari binder, Khadi binder, Synthetic thickener.

Finishing Chemicals and Auxiliaries, Chemistry, properties and uses of different types of softeners (silicone softener, Cationic softener, Anionic softener, Non-ionic softener, Hydrophilic softener, Softener flake) used in textile finishing. Study of silicon based finishing agents.

DCE 405: Instrumental Analysis

Credit	Hour / Week	Total Hour
3	3	45

Absorption Spectroscopy, UV-Vis Spectroscopy, Concept of Chromatography (Partition Chromatography, Paper Chromatography, Adsorption Chromatography, TLC, GLC, Ion Exchange Chromatography, Gel Chromatography, HPLC, Affinity Chromatography, Electrophoresis (Gel Electrophoresis, Paper Electrophoresis). Microscopy- Light microscopy, Bright & Dark Field microscopy, Fluorescence microscopy, Phase Contrast microscopy, TEM, SEM, X-ray diffraction, Spectroscopy- Raman Spectroscopy, FT-IR Spectroscopy, NMR Spectroscopy, Mass Spectroscopy.

DCE 407: Biochemical Engineering

Credit	Hour / Week	Total Hour
3	3	45

Introduction: Molecular logic of living system, Biomolecules and cells. Sugars, Polysaccharides, Lipid-Triglycerides, Phospholipids, Biological Membranes, Proteins: Amino acid, sequences, Primary, Secondary, Tertiary and Quaternary Structures; Classification of Proteins. Enzyme mechanism, Nucleic acid. Metabolism and energy transfer: glycolysis and oxidative phosphorylation; biological high-energy compounds. Oxidation of fatty acids, Photosynthetic phosphorylation. Natural Dyes: Basics of Natural dyes, Methods of Extraction of natural dyes, Standardization of natural dyes, Description of the newer natural dye sources-Anthraquinoid, Indigoid, Anthrocyanin, Betalains, Isolation and characterization of the colorant molecules from each dye plant, Structure-Mordant interactions, Types of Mordants, Metallic Mordants, Brightening Mordants, Dyeing of Textiles with natural dyes. Pigments: Manufacturing of different types of Pigments such as white, blue, red, yellow, green, brown etc, Varnishes. Industrial Coatings, Printing inks, Polishes etc.

DCE 409: Applications of Computer in Dyes and Chemicals Engineering

Credit	Hour / Week	Total Hour
3	3	45

System Analysis & Design: System analysis; System Design; Difference between analysis and design; System analysts and their role: System development life cycle (SDLC)-SDLC stages, feasibility study, cost benefit analysis, Data flow diagram (DFD).

Database Management System: Basic concepts-character, field, record, file, database; Benefits and limitations; Levels of abstraction, Instances and schemes, Data manipulation language (DML), Data definition language (DDL), Structured query language (SQL); Entity-relationship (ER) model; Transaction management, Database

administrator, Relational database-concept, definition, properties; Basic SQL statements-CREATE, DROP, SELECT, INSERT, UPDATE, DELETE, COMMIT, ROLLBACK, Database connectivity.

Automation: Basic automation terminologies; Quality control; Software testing, Verification, Validation, Computerized production planning and control.

Applications: Critical path analysis; Linear Programming. Introduction to CAD/CAM; Development & application of textile wet processing and dye manufacturing related software for inventory control, recipe formulation, machine/process control (in pretreatment, dyeing, printing & finishing section) system analysis, system design, Documentation & Planning.

DCE 410: Applications of Computer in Dyes and Chemicals Engineering (Practical)

Credit	Hour / Week	Total Hour
1	3	45

Introduction to Chem Draw Software, Applications of ChemDraw Software, MATLAB Software, Origin Software, Sigma Plot software for data analysis. Spectrophotometer operating process, Database creation, Colorant registration, Recipe generation, Costing, Strength assessment, Whiteness Assessment, Grey Scale assessment.

DCE 411: Chemical Reaction Engineering

Credit	Hour / Week	Total Hour
3	3	45

Kinetics of homogeneous reactions: variables affecting rate, elementary and non-elementary reactions. Thermodynamics of chemical reactions: temperature and pressure effects. Basic concepts in chemical kinetics: determination of the reaction rate expression, molecular interpretations of kinetic phenomena, multiple reactions,

and autocatalytic reactions. Basic concepts in reactor design: types of reactors, ideal reactors, recycle reactor, autocatalytic reactors, isothermal operation, treatment of multiple reactions, temperature and energy effects in chemical reactors, optimum temperature progression. Kinetics of heterogeneous reactions, mechanism of catalysis, types of catalysis, operation and properties of catalysts.

Structural characteristics of ceramic materials, Kinetics of high temperature reaction including sintering and vitrification, Melting crystallization and glass formations. Ceramic phase equilibrium diagrams. Non-equilibrium phases, Raw materials, manufacturing processes and properties of glass, porcelain.

DCE 413: Chemistry & Application of Functional Colorants

Credit	Hour / Week	Total Hour
3	3	45

Liquid Crystal Dyes. Micro color filters, Flat screen television, Color filter preparation. Laser dyes. Basic theory of laser dyes, Colorants for nonlinear optics. Nonlinear optical effects and their applications, Nonlinear optical molecules. Solar cells, Polysynthesis of solar cells colorants. Luminescent solar cell colorants, Electro chromic dyes, LED printing process. Color copying process, Key chemical components for electrophotography, Organic photoconductors. Colored toners. photoactive pigment electrophoresis, Full color process. Correlation with organic photoconductors. Photo microlithography. Transfer printing toners, Mead photo capsule process. Electronic photography. Dye diffusion thermal transfer process. Ink jet printing. Ink jet inks, Aqueous ink, Solvent ink, Ink-jet colorants. Application of ink-jet printing, Electrography, Ionography. Magnetography. Infrared absorber, Classification of infrared absorber. Applications of infrared absorber, Toxicology.

DCE 414: DCE Industrial Attachment

Credit	Hour / Week	Total Hour
3	2 months	----

The students must undergo 2 (two) months intensive of Industrial Training program in the relevant area of specialization after completion of Level-III, Term-II.

DCE 416: DCE Project Work

Credit	Hour / Week	Total Hour
3	----	----

During the Level-IV of study each student will be required to complete a Project Work in the relevant field of their specialization. For such a work the students will be guided by a Supervisor of the concerned Department.

DCE 418: DCE Comprehensive Viva

Credit	Hour / Week	Total Hour
3	----	----

The Comprehensive Viva will cover the entire 4 years courses of study 60% weightage will be on the departmental subjects. 40% weightage will be on all other subjects. No specific class hour will assign for the comprehensive Viva.

Department of B.Sc in Textile Engineering (Environment)

(Yarn / Fabric / Wet Process / Apparel / Management / Fashion & Design / Industrial & Production / Dyes & Chamical/ Environmental Science & Engineering / Machine Design & Maintenance)

ESE 101: Introduction to Environmental Engineering

Credit	Contact hour/ Week	Total Class
3	3	45

Introduction of Environment and Environmental Science: Definition of environment, classification and effect on the health and society, difference between environmental science and other science, scope of environmental science, relation between environmental science and engineering.

Nature and the environmental ethics: A brief outline on Societal Environmental Ethics, Corporate Environmental Ethics, Environmental Justice, Individual Environmental Ethics and Global Environmental Ethics.

Theories of Environmental Science: Principle of Population, Origin of Species by Means of Natural Selection, Sociology of Nature, Strategy of Ecosystem development, The historical Roots of Our Ecologic Crisis, Gaia etc.

Concepts of Environment: The Earth & its surface, the land use and its cumulative affect etc., The spheres of the earth (lithosphere, atmosphere, hydrosphere and biosphere) and their nature, organization and relationship emphasising on interaction between the physical environment and organisms, Air, water, soil and other aspects of environment and their nature.

Man and Environment: Overview (socio-economic structure & occupational exposures), Scope of Environmental Engineering, pollution problems due to urbanization & industrialization, Foundational principles in environmental engineering, sources of contaminants, general introduction of water, air, soil, concepts and tools for assessing sustainability.

The Environmental Issues: Global Environmental Iss s (Global warming, Climate Change, Ozone Depletion etc Regional Environmental Issues (Acid Rain, Ground and Su e Water Contamination and Pollution, Water Management); Local

Environmental Issues, Case studies (such as oil pollution, radiation pollution etc) and the reaction of environmental scientist with regard to environmental issues.

Ecological and Biological Principles and Processes: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, Food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of different ecosystems (Forest ecosystems, Grassland ecosystems, Desert ecosystems, Aquatic ecosystems).

Basic Concepts of Biodiversity: Definition, significance of Biodiversity and natural resources, Benefits from Biodiversity, Types of Biodiversity, Biodiversity and species concept, Status of biodiversity in Bangladesh.

Environment and Pollution: Environment and environmental pollution & pollutant, characterization of emission and effluents, Major pollutant from textile sources, their characterization and risk identification, Sources of pollutant, Dose response assessment, Exposure assessment, Risk characterization.

Pollution Prevention & control: General concept, strategies and design of Pollution prevention, Process modification, alternative raw material, recovery of co-product from industrial emission effluents, recycle and reuse of waste, energy recovery and waste utilization, Material and energy balance for pollution minimization, Minimization of raw materials, Fugitive emissions/effluents and leakages and their control, housekeeping and maintenance.

Reference Books:

1. Textbook of Environmental Studies by Erach Harucha, Universities Press, India, 2005.
2. Environmental Studies: From Crisis to Cure by R. Rajagopalan

ESE 103: Environmental Chemistry & Biology

Cr.	Contact hour/ Week	Total Class
	3	45

Introduction of Environmental Chemistry: Structure of Environment, Interaction between biological and chemical components, Significance of Environmental Chemistry in Environmental Engineering, Units of Measurement, Stoichiometry, Concepts of General Chemistry, Physical Chemistry, effects and its behavior towards environment, High temperature corrosion, atmospheric corrosion, combustion chemistry, heavy metal and the environment, structural and dynamic in functional oxides and their behavioral nature to the environment etc.

Chemistry of Aquatics: Common organic reactions, Enzymes and factors influencing enzymatic reactions, Pesticides and syndets, Transformation and degradation of pollutants, Chemical transformation of organic molecules in the bio mass and ecosystem, Removal of pathogenic organic molecules from biomass etc.

Atmospheric Chemistry: Structure of atmosphere, chemical and photochemical reactions in the atmosphere, Ozone chemistry-formation and depletion of ozone layer, oxides of nitrogen and sulphur, Acid rain mechanism, formation and effects, Photochemical smog and sulfurous smog, Green house effect/global warming, green house gases.

Environmental Soil Chemistry: Soil and agriculture, Nature and composition of soil, Acid-base and Ion-exchange reactions in soils, Wastes and pollutants in soil, Soil loss and degradation.

Nuclear chemistry: Radioactivity, nuclear processes, nuclear transmutation, nuclear properties and their effect to biomass and environmental issues etc.

Evolution and biology: Evolution, ecology and behavior, pattern on life and ecosystem, effect of biomass, change and the factors, animal behavior, Plants and society, marine biology and their effect on ecosystem. Climate change and biological impact etc.

Biological Systems: Plants, Animals, distribution, interaction, biomass, classification, salient features, nutrients and microorganisms, environmental factors, gram positive and gram negative bacteria, Biochemical ETP and the effect of the microorganism, pathogen their effects and hazards. The risk of the natural balance and mutation, superbug and their activities, effect on producers and microgram etc.

Biological effect: Environmental pollution in textiles, their potential solution analysis, Effect of the elements due to pollution, root cause analysis, identification of potential sources and hazards assessment etc.

Biological Treatment: Anaerobic and aerobic treatment, biochemical kinetics, trickling filter, activated sludge and lagoons, aeration systems, sludge separation and drying.

Microbiology of Environment: Microbiology of water, soil, air; Indicator organisms, coliforms, MPN index, M.F. technique, Applications of microbiology to environmental engineering, Biological indices, Bio-monitoring methods, Eutrophication, Biological treatment of wastewater, bacterial reductions; Algae in water supply systems, problems and control, Macrophytes in water bodies, role and control; Concepts and principles of carbon oxidation, Nitrification, Denitrification, Methanogenesis, etc., Concepts of quantification of degradable pollutants.

Reference Books:

1. Environmental Chemistry, S.E. Manahan, 7th Edition, Lewis Publishers, 2000.
2. Textbook of Environmental Biology. by Author; A. L. Bhatia

ESE 201: Industrial Design and Civil Construction

Credit	Contact hour Week	Total Class
3	3	45

Introduction to Design and Construction: Basics of civil engineering for environmental engineers, Introduction to industrial Design, manufacturing engineering, Design Definitions and Design spectrum, product attributes, Function, Product configurations and Component relationships (component Matrix), Product Analysis, Brief study on advance designing tools and software, Legal and social aspects of design and construction, Juridification, site selection and safety issues, Environmental risk regulatory issues, laws and law enforcing community, their function on the legal and social aspects in Engineering Decisions.

Construction and Construction Materials: Foundations, different types of foundations; brick masonry, framed structures and bearing walls, arches and lintels, details of floors, roofs and stairs, structural joints, pointing, plastering and interior finishing, scaffolding, formwork, staging, shoring and underpinning, thermal insulation and acoustics, House plumbing, Classification of materials, atomic bonds, phase diagrams, elementary crystallography, imperfections and their relationship to mechanical behavior, engineering properties and uses of ferrous and non-ferrous metals, ceramics, cement, concrete, timber and timber products, polymers, composites, smart materials and systems, electrochemical reactions and corrosion, prevention and protection, environmental influences.

Soil mechanics: Descriptive, strength and deformation characteristics of soils, determination and classification of soils, improving the soil characteristics, Design of waste water treatment plant in accordance with the principles of the first, second and third geotechnical category.

Structural Analysis and Design: Stability and determinacy of structures; analysis of statically determinate trusses and arches; influence lines; moving loads on beams, frames and trusses; cables and cable supported structures; Approximate analysis for vertical loading. Lateral loading, Earthquake load calculation as per BNBC; approximate analysis of statically indeterminate structures, portal frames, mill bent and multi storied building frames; deflection of beams, trusses and frames by virtual work method (method of consistent deformation).

Design of Concrete Structure: Fundamental behavior of reinforced concrete; introduction to WSD and USD methods; analysis and design of singly reinforced, doubly reinforced and t-beams according to WSD and USD methods; diagonal tension & shear design of beams; bond, anchorage & bar curtailment according to Code; Design of one way slabs, Two-way Slabs; columns; footings; retaining walls, reinforced concrete floor and roof systems; Yield line method; introduction to pre-stressed concrete; Analysis and preliminary design of pre-stressed beam section etc.

Construction Management and Risk Handle: Aspects of labor employment agreements, project controls (planning and scheduling

the project, developing the cost estimate, monitoring project progress and costs, forecasting final costs and schedule results), and the Constructions Regulations, Principles of risk management, identification of risks and compilation of risk registers, risk probability and impact, risk prioritization matrices, assignment, monitoring and mitigation.

Sustainable Design and Construction: Optimization of complex processes, systems or organizations, Safety in Construction Operations, Social Aspects in Engineering Decisions.

Industrial Design: Design of conventional unit operations and processes of any Spinning/ Weaving / Knitting/ Dyeing-Printing-Finishing/ Apparel operational Plant, Plant design, Layout and Setting of Waste water Treatment, Different aspects of industrial consideration of environmental activities.

Reference Books:

1. Construction Materials-Their nature and behavior, Fourth edition, Edited by, Peter Domone and John Illston.
2. The Mechanics of Soils and Foundations, Second Edition, By, John Atkinson.
3. Structural Analysis and Design, 2nd Edition, By, H.B. Harrison
4. Design of Reinforced Concrete Structures, 1st Edition, By, S Ramamrutham.
5. Modern Construction Management, 7th Edition, By, Prof. Frank Harris, Prof. Ronald McCaffer, Francis Edum-Fotwe (With).
6. Sustainable Architectural Design- An Overview, By, Kuppaswamy Lyengar.

ESE 301: Global Climate Change, Adaptation and Disaster Management

Credit	Contact hour Week	Total Class
3	3	45

Global Climate Change and Adaptation: Introduction to Global climate change, Background on climate and climate change, Background on climate change policy, Science, politics, and science in politics, How

science works, Politics and policy debates, When science and politics meet, Limiting the damage, the role of scientific assessments.

Climate change: present scientific knowledge and uncertainties, Overview of environmental issues from a global perspective, Human activities responsible for global warming, Natural resources depletion, impacts, Urbanization and industrialization, Emerging contaminants, impacts of climate changes on human and environment, Regional Impacts and vulnerabilities to climate change of Africa, Asia, Latin America, New Zealand, Polar Regions (Arctic and Antarctic), small island and developing states.

Expectation towards climate change: Prediction of climate changes over the twenty-first century, The present impasse and steps forward, Climate change politics, present positions, The arguments against action, The present policy debate, use of scientific knowledge and uncertainty, what should be done, Major choices and elements of an effective response.

Climate Change and Adaptation, The need for adaptation, Adaptation and the UNFCCC (United Nations Framework Convention on Climate Change), Adaptation strategies, plans and programmes, Local coping strategies, Funding, Insurance, integration into policy, Capacity building, Education and training, Public awareness, Cooperation and synergies, Implementing adaptation, Assessing the Impacts and vulnerability and adaptation to climate change. Information gathering, systematic observation and monitoring. Information analysis.

Adaptation/mitigation solutions: water resource, land resource, fossil fuels resource, forest resource, food supply issue, clean and renewable energy, low carbon technology, energy efficiency, Issues related to mitigation in the long term context, Energy supply, Transport and its infrastructure, Residential and commercial buildings, Industry, Agriculture, Forestry, Waste management, Mitigation and sustainable development, Geo-engineering, Eco industrial park etc..

Disaster Management:

Introduction: Definition of disaster; Significance of Disaster Management; Types- Natural disasters and man-made disasters; disaster management cycle; Environmental Emergency Vulnerability;

Hazards, Risks, coping and adaptation mechanisms.

Overview of Different Disasters: Land movement disasters- landslides, slope stability, causes of landslides, human use and landslides, river erosion, Avalanches, Lahars and volcanic eruptions; Earthquake, intensity and frequency of earthquakes, earthquake hazard reduction, prediction and control; Floods-types, magnitude and frequency of floods, nature and extends of flood hazards, urbanization and flooding; Limnic eruptions and Tsunamis etc; Blizzards, Storms, Hailstorms, Cyclones, Tornadoes, Drought, Heat waves; Fire disasters; Health and Diseases- Epidemic and Famine.

Disaster management Policy: National Disaster management Policy; Major requirements for coping with disaster; disaster management cycle; Disaster legislation; Counter Disaster Resources.

Disaster Management: Risk assessment, Extreme event analysis, Risk perception, Adjustment to hazards and loss sharing, Hazard resistance, Preparedness, Forecasting, and Warning; analysis of physical characteristics of natural disasters, prediction of their impact on human population; disaster risk reduction strategy; Environmental hazards and disaster management system in Bangladesh.

Disaster Management measures: Prevention, Mitigation, Preparedness, Response, Recovery and Logistic supports (Training, Public awareness, Research).

International response against disaster: International Disaster Assistance; Leadership, plans and utilization of resources.

Reference Books:

1. Global Climate Change- The Science, Economics and Politics. Edited by James M. Griffn. Edward Elgar Publishing Limited, UK.
2. Climte Change and Developing Countries by N.H. Ravindranath and Jayant A. Sathaye.
3. GOB 1999. Standing orders on Disaster, Min of DM & RDMB, Dhaka.
4. Tolley's Handbook of Disaster and Emergency Management, Edited by Tony Moore and Raj Lakha, 2006. Taylor & Francis; 3 Edition, UK.

ESE 303: Environmental Pollution & Control: Air, Soil, Noise

Credit	Contact hour/ Week	Total Class
3	3	45

Introduction to Environmental Pollution: Science and Pollution; Global Perspective of the Environment; Pollution and Population Pressures; Overview of Environmental Characterization; Soil and the Subsurface; Water and Air, Contaminants (Physical contaminants; Chemical Contaminants; Microbial Contaminants).

Processes Affecting Contaminant Transport and Fate: Chemical Processes Affecting Contaminant Transport and Fate; Biological Processes Affecting Contaminant Transport and Fate

Atmospheric Pollution: Air Pollution, Causes of air pollution, types & sources of air pollutants, Climatic & Meteorological effect on air pollution concentration, formation of smog and fumigation, Measurement of Air Quality , Collection of Gaseous Air Pollutants, Collection of Particulate Pollutants, Analysis of Air Pollutants like Sulphur dioxide, Nitrogen oxide, Carbon monoxide, Oxidants & Ozone. Hydrocarbons, Particulate Matter, Smoke and Opacity.

Approaches of Air Pollution prevention: Controlling smoke nuisance, Develop air quality criteria and practical emission standards, creating zones suitable for industry based on micrometeorology of air area, Introducing artificial methods of removal of particulate matters of waste before discharging to open atmosphere, Control of Moving Sources, Control of Global Climate Change.

Air Pollution Control Measures & Equipment: Control of Particulate Emission, Control of Gaseous Emission, Flue Gas Treatment Methods, Stacks Gravitational and Inertial Separation, Settling Chambers, Dynamic Separators, Cyclones, Filtration, Liquid Scrubbing, Spray Chambers, Packed Towers, Orifice and Ventury Scrubbers, Electrostatic Precipitators, Gas/solid Adsorption, Thermal Decomposition etc.

Law and Regulations: Legislations, regulations and federal standards, Air Pollution Control Act, National Environmental Policy Act, Ambient Air Quality Standards and Source Performance Standards, Permitting process, National air quality trends etc.

Soil Pollution and Control : Concept of soil, evolution of soil, factors of soil formation, classification of soils, Physical and chemical properties of soil, Soil Degradation, Acidification, Deforestation, Desertification, Salinization, Comparison of fertilizer and organic fertilizer, Effects of fertilization, Irrigation, The impact of human activities on the quality of the soil, Soil pollution, Classification of pollutants, Concept of soil pollution, Inorganic and Organic pollutants, Impact of soil pollution on food chain and ecosystem service, Management and remedies of polluted soils etc.

Noise Pollution and Control : The Physics of Sound; Sound Pressure Level, Frequency, and Propagation, Sound Level, How We Hear Noise; Sources, Intensity, Duration, Types of Industrial Noise, Noise measurement, Permissible Noise Limits, The Acoustic Environment, Health Effects of Noise, technology and methods used in Noise Control.

Other Sensory Pollutants: Sources, effects and controlling of Heat Islands; Sources, effects and controlling of Light Pollution; Odor as a Sensory Pollutant; Sources of Odor; Electromagnetic Fields and Radiofrequency Radiation.

Reference Books:

1. Environmental Science and Technology, Stanley E. Manahan.1997, Lewis Publishers, New York.
2. Understanding Environmental Pollution by Marquita K. Hill, Cambridge University Press, Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo, Delhi, Dubai, Tokyo.
3. 'Exploring Environmental Issues: An Integrated Approach' by David D. Kemp, 2004, Routledge, Taylor and Francis, London & New York.
4. "Air Pollution Control: A Design Approach," Cooper, C.D., and E.C. Alley, Fourth Edition, Waveland Press, 2011

5. 'A Guide to the Study of Environmental Pollution (Contours, Studies of the Environment)', William Andrews (Edn).
6. 'Environmental Chemistry of Soil', M. McBride, 1994, Oxford University Press, Inc., New York.

ESE 304: Environmental Pollution & Control: Air, Soil, Noise (Practical)

Credit	Contact hour/ Week	Total Class
1	2	30

Air Pollution: Sampling and Analysis of Air Pollutants, Sulphur dioxide, oxides of nitrogen, suspended particulate matter, respirable particulate matters (PM10, PM2.5, PM1.0), ozone, carbon monoxide, non-methane hydrocarbon, VOCs, etc., Measurement and Analysis of Metrological Parameters, Ambient weather parameters- wind speed, wind direction, Solar radiation, Relative humidity and temperature etc.

Soil Pollution: Technical remarks and quality, sample pre-treatment, Moisture content, p^H in H_2O, p^H in KCl, p^H in NaF, Total organic carbon (TOC) and total nitrogen (elemental analyzer), organic carbon (wet oxidation), Total nitrogen (wet oxidation), Carbonate, Gypsum, Exchangeable bases and cation exchange capacity (C.E.C.), exchangeable acidity, KCl extractable ammonium and nitrate, Fe and Al fractionation- "free" Fe and Al (dithionite extraction), "amorphous" Fe, Al (ammonium oxalate extraction), "pyrophosphate-extractable" Fe, Al and C, Phosporus-analysis -"available" phosphorus and phosphate retention, Water soluble salts - iron (II) and iron (III), general sulphur fractionation, total sulphur (wet digestion), Hl-reducible sulphur, raney-nickel-reducible sulphur, sulphur fractionation for acid sulphate soils, total sulphur (fusion), elementary sulphur, Na.-EDTA extractable sulphates, jarosite, pyrite.

Noise Pollution: Measurement of sound power, sound power level, sound intensity, sound intensity level, sound pressure etc. Case

studies and projects related to hazardous effects of noise pollution, on human health, Auditory effects, Non-auditory effects, Annoyance, Noise pollution and sleep interference, Effects on performance, Physiological responses, Cardiovascular effects, Psychiatric effects, Effects on cognitive behaviour in children, Effect of noise pollution on wildlife, Several control methods on noise pollution.

ESE 305: Environmental Analytical and Instrumental Chemistry

Credit	Contact hour/ Week	Total Class
3	3	45

Introduction: Basics of Measurement, Classification of instrumental methods, signals and noise, sources of noise, noise reduction: Sensitivity and detection limit, Errors-types, expression of errors; Precision and accuracy-methods of expressing an accuracy, methods of expressing precision and accuracy; Calibration of instrumental methods, calibration curves, standard addition and internal standard methods, theory etc.

Microscopic Methods: Optical microscopy, Polar microscopy, fluorescence, SEM, TEM, AFM etc.

Spectroanalytical Methods: Electromagnetic radiation, properties, emission and absorption of radiation. Fluorescence and Phosphorescence. Atomic absorption and emission spectrometry, principle and instrumentation, ICP source, Fluorimetry, nephelometry and turbidimetry principle and instrumentation; Ultraviolet-visible spectrophotometry-principle and instrumentation, Lambert and Beer's law.

Chromatographic Methods: Classification, general theory- column efficiency and resolution, band broadening, Evaluation methods, quantitative determination, Principle and instrumentation of gas chromatography and HPLC, Ion exchange chromatography and size exclusion chromatography, Mass spectrometry, NMR, Gel Chromatography etc.

Electro analytical Methods: Potentiometry, electrochemical cell, reference electrodes, Glass electrode, Measurement of pH,

Potentiometric titrations, Ion selective electrodes. Conductometry electrolytic conductivity, specific, equivalent and molar conductance. Conductance cells, conductivity meters, Conductometric titrations. Coulometry and polarography.

Radio analytical and Other methods: Particles emitted in radioactive decay, Measurement of radioactivity- Ionization chamber, proportional counter, scintillation counter and Geiger counter, Isotopic dilution analysis and activation analysis. NDIR for CO analysis, chemiluminescent analyzer for NOx, fluorescent analyzer for SO_2 , flow injection analysis and CHN analyzer.

Reference Books:

1. Skoog, Holler & Crouch 2007, Instrumental Analysis, Brooks Cole Cengage Learning, USA.
2. James W Robinson, 1995. Undergraduate instrumental analysis, Marcel Dekker, Inc. New York, USA.
3. Francis Rouessac and Annick Rouessac, 2007, Chemical Analysis-Modern Instrumentation Methods and Techniques, 2nd Edition, John Wiley & Sons Ltd, The Atrium, Southern Gate, England
4. Daniel C. Harris , 2010, Quantitative Chemical Analysis , 8th edition, W. H. Freeman and Company, 41 Madison Avenue New York, NY 10010 .

ESE 306: Environmental Analytical and Instrumental Chemistry (Practical)

Credit	Contact hour/ Week	Total Class
1	2	30

Introduction to principle of operation, application of different analytical equipments for materials characterization and analysis, Calibration of instrumental methods, calibration curves, standard addition and internal standard methods of different analytical instrument and characterization equipments. Study of different surface analysis methods for characterization of materials using Optical Microscope, Polar Microscope, SE, etc., Study on different Spectroanalytical Methods of

characterization of materials/Heavy materials/particles using ICP, AAS, AES, SEM, UV-Vis Spectrophotometry etc., Study on different Chromatographic data for characterization of materials/particles using GCMS, HPLC, MS-MS etc.; Study on different Electro analytical Methods for characterization of materials using EC, pH, DO meter etc., Study of AOX analyzer, TOC analyzer etc for characterization of waste water, soil, sludge etc., Other relevant methods for characterization measurement related to ESE 305 course.

ESE 307: Resource, Energy and Environmental Sustainability

Credit	Contact hour/ Week	Total Class
3	3	45

Introduction to Resources: Definition; Classification of Resources, Renewable Resources (solar, wind, biomass and water); Non-renewable Resources (oil, gas, coal, uranium and other minerals); Depletable resources (water, agriculture, forests and fisheries); Recyclable resources (wastewater, paper and metals); Sustainable resources development and management; Water-the most important renewable resource, its' quality and treatment techniques.

Introduction to Energy: Definition, classification and sources of Energy, Importance of Energy use, Energy demand and energy supply, Transformation of primary energy into secondary energy, final energy.

Overview of Different Types of Energy: Solar Energy (Definition, classification, Sustainable uses, Advantages and Disadvantages); Hydro and wind power Energy (Definition of hydro, tidal and Wind power energy, hydroelectric power plant, Wind mill, Advantages and disadvantages); Geothermal Energy (Definition, Sources, Application or uses, Limitations and Environmental consideration of geothermal energy); Nuclear Energy (Source and nuclear process, Fission, Fussion, Nuclear power plant, Environmental Problem associated with Nuclear Power Plant, Potential Impact on Environment, Safety of Nuclear Power Plant); Fossil Fuel (Biomass, Oil, Natural Gas-Source, Reserve of Fossil fuel, Formation and Extraction procedure,

Environmental Problem associated with Fossil fuel, Transboundary effect related to fossil fuel burning; depletion of Sunderbans).

Energy policy of Bangladesh: Basic gas laws and combustion equations; Energy Conversion; Properties of fuels, Combustion processes (Complete, Incomplete, Internal); Measurement of energy conservation; Energy Efficient Technologies; Past, present and projected future trends of energy use; Energy and Environment linkages.

Case Studies: Energy Scenario of Bangladesh- Sources, Reserve and uses of Energy, Energy Strategy, Integrated approach for resource protection and management.

Fundamentals of Sustainable Development: History and emergence of the concept of Sustainable Development; Definitions; Environmental issues and crisis (resource degradation, green house gases, desertification, social insecurity, industrialization, globalization and environment).

Judiciary System & Sustainable Development: Judicial System in Bangladesh; Introduction of sustainability concepts through legal systems (concepts, principles, doctrines, case laws).

Sustainable Development and International Contribution: Components of sustainability, Complexity of growth and equity, International Summits, Conventions, Agreements, Trans-boundary issues, Action plan for implementing sustainable development, Moral obligations and Operational guidelines.

Socio-economic Sustainable Development Systems: Socio-economic policies for sustainable development; Strategies for implementing eco-development programs; Sustainable development through trade; Economic growth; Carrying Capacity; Public participation.

Agenda for Future Global Sustainable Development: Role of developed countries in the sustainable development of developing countries; Demographic dynamics and sustainability etc.

Reference Books:

1. Water Resources Engg., Linsley, R.K. , Mc Graw Hill.
2. Energy Resources and Environment. Blahden JR (1996), Hadder and Stonghton, The Open University.

ESE 401: Solid and Hazardous Waste Management

Credit	Contact hour/ Week	Total Class
3	3	45

Introduction: Definition, sources and classification of wastes; physical and chemical properties of waste; general aspect of waste management; Basic principles of waste management; Need for solid and hazardous waste management, Legislations on management and handling of solid wastes and hazardous wastes; Problems and issues of solid and hazardous waste management; Economy and financial aspects of waste management; Waste management planning; Toxicology and risk assessment.

Solid Waste: Definition, sources and types of solid waste; Composition of solid waste; physical and chemical properties of solid waste, domestic solid waste, industrial solid waste etc; Solid Waste Management; 3R's.

Collection, Processing and Transport of Solid Waste: Waste production, collection, Type of solid waste collection systems (Sampling and characterization, Determination of the composition, Handling and segregation of wastes at source, storage and labeling); Analysis of collection system, alternative techniques for collection system; Separation, Processing and Transformation of Solid Waste (unit operations user for separation and processing, Materials Recovery facilities, Waste transformation through combustion and aerobic composting, anaerobic methods for materials recovery and treatment, Energy recovery, Incinerators); Transfer and Transport (transfer operation, transport means and methods, transfer station types and design requirements).

Disposal Ways of Different Solid Waste: Disposal design, recovery and recycling of household wastes, domestic garbage, bulk treatment on commercial scale; recycling of paper; Different disposal methods of Municipal and Industrial Solid Waste Dumping domestic & Industrial Solid Wastes (site selection, Advantages & Disadvantages); Incineration (Advantages & Disadvantages); Landfill (Site selection, design and operation, Sanitary Landfill-Advantages & Disadvantages, Secure landfills and landfill bioreactors, leachate collection systems and landfill gas management; closure and environmental monitoring, landfill remediation); Composting; Community based waste management-Bangladesh perspective; Integrated waste management facilities.

Outcome of Waste Management: Economics of waste management, waste to energy, context of sustainable development and protection of natural resources; Recovery of resources.

Hazardous waste: Definition, Sources and Types of hazardous wastes, Identification and characteristics of hazardous wastes Risk perception and risk assessment; Hazardous waste regulations (institutional and legal framework).

Hazardous waste processing, treatment, design and management: Compatibility, handling, storage, collection, transport, disposal, reuse and management of hazardous waste; cleanup of hazardous waste contaminated sites; Hazardous waste treatment technologies, design and operation facilities for physical processes, chemical processes, Thermal processes and biological processes (Solidification, chemical fixation and encapsulation, batch distillation and fractionation techniques. Biological detoxification and application of biotechnology, ion-exchange techniques, electro-dialysis, reverse osmosis, waste incineration, land disposal and ground impounding); minimization of waste generation.

Natural systems for hazardous waste treatment: Waste stabilization pond, aquatic weeds and constructed wetland system.

Sludge: Definition; sources, Importance of sludge management; General considerations and requirements for sludge management; Classification of sludge; Different options of Sludge Management; Case Study (Sludge management in Bangladesh Textile Sector).

Other Waste Types: Medical Wastes, Nuclear and Radio Active Wastes.

Medical Waste Management: Definition, sources, classification, characteristics and disposal methods of medical wastes.

Radioactive Waste Management: Definition, sources and characteristics of radioactive wastes, effects of radiation on living organism, Acute effect and delayed effect, Risk estimation, radioactive waste management techniques, Safe disposal, Long-term assessment.

Reference Books:

1. Hazardous Waste Management by Wentz, C.A. 1989. McGraw-Hill Book Co.
2. "Solid Waste Engineering", Vesilind, P.A., Worrell, W., and

Reinhart, D., Brooks/Cole, 2002.
3. "Integrated Solid Waste Management", Tchobanoglous, G., Theisen, H and Vigil, S., McGraw-Hill, New York, 1993.
4. "A brief handbook on 'Bangladesh Standards and Guidelines for Sludge Management" published for Department of Environment, Ministry of Environment and Forests; with the technical support provided by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

ESE 402: Solid & Hazardous Waste Management & Engineering (Practical)

Credit	Contact hour/ Week	Total Class
1	2	

Sampling and characterization of different kinds of Solid Wastes from Yarn/Fabric/Apparel industry; Sampling and characterization of different kinds of sludge from biological ETP; Sampling and characterization of different kinds of sludge from Chemical ETP; Practical study on Textile Sludge thickening, Sludge Dewatering (i.e. mechanical Screw type, chemical etc.), Sludge Drying, TCLP tests and Leachate studies of different types of sludge; Sampling and characterization of sludge collected from different types of Textile Industry such as Knit Composite, Woven, Denim etc.; Case Study on sludge management / Disposal system from different industrial and economic perspective. Other relevant topics related to ESE 401 course.

ESE 403: Wastewater Management and Modeling

Credit	Contact hour/ Week	Total Class
3	3	45

Introduction: Definition of Wastewater; Municipal and industrial wastewater; Physical, chemical and biological characteristics of wastewater; Constituents In waste water- Inorganic, Organic and Metallic Constituents; Surface water quality; Treatment of drinking water; Wastewater treatment - historical background; Regulations &

Compliance regarding wastewater quality - National & International (DoE guideline, ZDHC); Objectives of wastewater treatment Plant-Health, Environmental and economic issues.

Waste water characteristics: Physical, chemical and biological characteristics, sampling of effluent from different industries (Textile, steel, petroleum refineries, tanneries, atomic energy plant, mineral processing industries etc.) and respective disposal system.

Design, construction and maintenance aspects: Analysis and selection of wastewater flow rates and constituent loadings for process design; Components of waste water flows (Physical , chemical and biological characteristics of waste water), analysis of data, reactors used in waste water Treatment, Mass Balance analysis, Modeling of Ideal and Non Ideal flow in Reactors, Process selection, Location, Design, Maintenance and economical aspects, Automatic controlled ETP, advanced arrangements in ETP (Flow meter, Level sensor, online analyzer for monitoring of BOD, COD, TSS, pH etc.).

Detailed study of different methods of waste water treatment: Detail study of Physical, Chemical and Biological methods used in waste water treatment.

Pre and Primary treatment: Equalization, proportioning, neutralization, oil separation by floatation, waste reduction, volume reduction, strength reduction etc.

Chemical Treatment: Role of Unit Processes in waste water Treatment, Chemical Coagulation, Flocculation, precipitation, chemical oxidation Neutralization, Chemical Storage etc.

Biological Treatment: Overview, Classification of microorganisms, microbial metabolism, Bacterial growth and energetic, Aerobic biological oxidation, nitrification, de-nitrification, Phosphorus removal, anaerobic fermentation and oxidation, Trickling filters, Rotating biological contractors, Combined aerobic treatment process, Activated sludge film packing.

Advanced technologies: Necessity & classification of technologies used (Membrane filtration, Micro filtration, Ultra filtration, Nano filtration, Reverse Osmosis, Evaporator, PVA Gel technology etc.), Removal of colloids, suspended particles, organic, inorganic and biological constituents, Introduction to depth filtration, selection and

design, Surface filtration, Membrane filtration, Adsorption, Gas stripping, Ion exchange, Advanced oxidation process;

ZLD (Zero Liquid Discharge) Plant: Design and operation, reuse and recycle of treated waste water, economical and technical perspective.

Common Effluent Treatment Plants (CETPs): Location, Design, Operation, construction, maintenance and troubleshooting, economical aspects etc.

Reference Books:

1. "Wastewater Engineering - Treatment and Reuse", Metcalf and Eddy Inc., (2003), 4th Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
2. "Wastewater Treatment Concepts and Design Approach", Karia G.L., and Christian R.A., (2001), Prentice Hall of India Pvt. Ltd., New Delhi.
3. "Waste water Engineering Treatment and Reuse", G. Tchobanoglous, LM Franklin, H D Stensel, 4th Edition, Mc Graw Hill, 2003.
4. Industrial Waste Water Management Treatment and Disposal by Mc Graw Hill, III Edition 2008.

ESE 404: Wastewater Management and Modeling (Practical)

Credit	Contact hour/ Week	Total Class
1	2	30

Visit and study of a municipal wastewater treatment plant (STP); Visit and study of few Industrial wastewater treatment plant (ETP) ; Measure the value of some characteristics parameters of waste water like pH, Temperature, DO, BOD, COD, TDS, TSS, color etc. in laboratory.; Laboratory practice of dye house waste water using Physical treatment (Precipitation, Flocculation, Coagulation etc.); Laboratory practice of dye house waste water using Chemical treatment (Electrolysis, Catalytic degradation, Oxidation, Reduction etc.): Simulation of simple bioreactors: Simulation of an activated sludge process with nitrogen rem[illegible] Designing of a ETP plant for a vertical and composite textile fa[illegible]her relevant topics related to ESE 403 course.

ESE 405: Environmental Impact Studies

Credit	Contact hour Week	Total Class
3	3	45

Evolution of EIA: Concepts, Methodologies, Screening, Scoping, Base line studies, Mitigation, Matrices, Check list, Environmental Risk Assessment (ERA), Environmental Impact Statement (EIS)-Legal and Regulatory aspects in region, Types and limitations of EIA, Terms of Reference in EIA. Issues of EIA, National, cross sectoral, social and cultural.

Components and Methods: Components, screening, setting, analysis, prediction of impacts, mitigation, Matrices, Networks, Checklists; Impact assessment techniques, cost benefit analysis, analysis of alternatives, methods; Prediction and assessment of impacts, air, water, soil, noise, biological, cultural, social, economic environments; Standards and guidelines for evaluation; Public Participation in environmental decision making.

Prediction and assessment of impact for air and noise environment: Basic information of air quality, identification of type and quantity of air pollutant, existing air quality and air quality standards, impact prediction and assessment, mitigation; Basic information of noise, existing noise levels and standards, prediction of noise levels and assessment of impact, mitigations.

Prediction and assessment of impact for water and soil environment: Basic information of water quality (Surface water and ground water), water quality standards, identification of impact, prediction of impact and assessment, mitigations, Background information of soil environment, soil and ground water standards, prediction and assessment of impact for ground water and soil, mitigations.

Prediction and assessment of impact on cultural and socioeconomic environment: Basic information on cultural resources, rules and regulations for cultural resources like archaeological, historical structures. Cultural system, prediction and assessment of impact mitigations: Basic information of socioeconomic environment, description of existing socioeconomic environment, prediction and assessment of impact, mitigation, resettlement and rehabilitation.

Quality Control: Trends in EIA practice and evaluation criteria,

capacity building for quality assurance, Expert System in EIA, use of regulations and AQM.

Documentation and Monitoring: Document planning, collection and organization of relevant information, use of display materials, team writing, reminder checklists; Environmental monitoring, guidelines, policies, planning of monitoring, programmes; Environmental Management Plan; Post project audit.

EIA notification by Ministry of Environment and Forest (Govt. of Bangladesh): Provisions in the EIA notification, Categorization of Industries for seeking environmental clearance from concerned authorities, procedure for environmental clearance, procedure for conducting environmental impact assessment report, Rapid and Comprehensive EIA, general structure of EIA document, Environmental management plan, Post environmental monitoring. Case studies in EIA.

Integrated impact assessment (IIA): Definition, Sustainable development challenges and need for IIA, Key approaches of IIA (Environment, Social health and economic), Current practices, Changing perspectives and debate in IIA, Environmental impacts - Examples, need for assessment, difficulties; The EIA Approach - Background, Objectives, Components and techniques, Impact prediction and analysis, Treatment of risk and uncertainty, EIA inputs to the project cycle and development planning, EIA in Bangladesh - Legislative aspects, Current practices and constraints.

Case Studies: Case studies of EIA, IIA of some developmental projects in Textile sector.

Reference Books:

1. Environmental Impact Assessment Canter, L.W., McGraw Hill, New York, 1996.
2. Handbook of Environmental Impact Assessment, Petts, J., Vol I and II,Blackwell Science, London,1999.
3. The World Bank Group., Environmental Assessment and III The World Bank, Washington, 1991.

ESE 407: Industrial Occupational Hygiene and Safety

Credit	Contact hour/ Week	Total Class
3	3	45

Introduction: Fundamental concepts of occupational hygiene and safety, importance of safety and health for engineers, safety and health professions, occupational health and safety - legal and social context, Occupational Hygiene and Safety related laws, regulations, standards and codes (OHSAS 18001, ISO 45001, LEED, NFPA, Alliance, ACCORD); Scope of OH&S Management System, OH&S Management System Model for OHSAS Standard.

OH&S Management system requirements: General Requirements; OH&S Policy; Planning - Hazard Identification, Risk Assessment and Determining Controls; Legal and Other Requirements; Implementation and Operation, Resources, Roles, Responsibility, Accountability and Authority; Competence, Training and Awareness; Communication, Participation and Consultation; Documentation; Control of Documents; Operational Control, Emergency Preparedness and Response; Checking, Performance Measurement and Monitoring; Evaluation of Compliance; Incident Investigation, Nonconformity, Corrective Action and Preventive Action; Control of Records; Internal Audit; Management Review.

Hazards and their control: General principles of hazard control mechanics and structures, walking and working surfaces, building safety, electrical safety, fire protection and prevention, explosions and explosives, heat and cold, pressure, visual environment, noise and vibration, chemicals, ventilation, biohazards, hazardous waste, personal protective equipment, emergencies, facility planning and design.

The working environment: Introduction; The workplace requirements; Safety signs and signals in the workplace; Stress at work; Management systems, Human factors:- Introduction; People at work; The perceptual, physical and mental capabilities of people; Human error; The influence of equipment and system design on human performance; Organizational characteristics which influence safety-related behaviours, Communication; Health and safety trainings, Ergonomics; The total working system; Anthropometric

studies; The right safety cultures, The role of the supervisor; A typical workers; Lone working; Vulnerable groups at work.

Chemical Management: Definition of chemical Management; Chemical Management System (CMS); Importance/Benefits of CMS; Acts, Laws; Chemical Management Policy; Chemical Waste Management, CAS number.

Regulation and Compliance Framework: Bangladesh Environment Conservation Act (1995), REACH, ILO Convention 170, Toxic Substance Control Act 1976 (TSCA), Acid Control Act (2002), Consumer Product Safety Improvement Act (CPSIA), Bluesign, Detox, ZDHC, Eco-Passport, GOTS, SDGs, MRSL, RSL etc., List of chemicals of concern and their source, Phase Out plan of hazardous chemicals, Chemical Substitution.

CMS in industrial perspective: Organizational Structure, Roles and Responsibilities, Communication; Chemical Material Flow Diagrams, Chemical Inventory; Regulatory Assessment, Monitoring Regulations and Permits, Verification of Compliance; Procurement Supplier Practices, Chemical Purchasing Policy Considerations, Identify Chemical suppliers, Supplier Approval/Removal Process; Chemical Risk Assessments, Hazard Identification and Risk Assessment; Chemicals and Processes of Concern, Identify Gaps and Losses in Current Processes, RSL and MRSL Process; Performance Goals and Action Plans, MRSL Compliant Formulations, Alternatives Assessments, Training; Document Development; Document and Record Control; Chemical Management Work Practices, Safety Data Sheet Management (GHS), Chemical Labeling, Exposure Control Measures, Chemical Handling, Chemical Storage, Chemical Transportation, Chemical Use, Regular and Optimization, Personal Protective Equipment, Laboratory Practices, Maintenance and Housekeeping, Chemical Wastes and Disposal; Emergency Procedures; Monitor; Management Review.

Reference Books:

1. Industrial Safety and Health Management, Asfahl, C. Ray Upper Saddle River, New Jersey: Prentice-Hall, (2003).
2. Basics of Industrial Hygiene, Nims, D, John Wiley & Sons, New York (1999).
3. Standard Manual of OHSAS 18001 & ISO 45001.

4. OHSAS 18001-Occupational Health and Safety Management Systems-Guidelines for the Implementation of OHSAS 18001.
5. International Labour Organization: 2001-Guidelines on Occupational Health and Safety Management Systems (OSH-MS).
6. Chemical Management System Guidance Manual 2015, Zero Discharge of Hazardous Chemicals Group.
7. GIZ Chemical Management Toolkit.

ESE 409: Environmental Modeling

Credit	Contact hour/ Week	Total Class
3	3	45

Modeling Concepts: Casual and statistical models-Characteristics-Steps in model development, Importance of model building, conservation of mass and mass balance, calibration and verification of models: Transport phenomena, Advection, diffusion, dispersion, simple transport models: chemical reaction kinetics - Law of mass action, Rate constants, reaction order, types of reactions, equilibrium principles.

Water Quality Modeling: Water quality models, Historical development, Mass balance equation, Streeter, Phelps Equation-Modification to Streeter - Phelps Equation, Waste load allocations, Dissolved oxygen in Rivers and estuaries; Lake Water Quality Models: Models for Nitrogen, Bacteria, Phosphate and toxicants, Ground Water Quality Modeling, Contaminant solute transport equation, Numerical methods.

Air Pollution Modeling: Chemistry of air Pollutants, Atmospheric reactions, sinks for air pollution. Transport of air Pollutants, Meteorological settling for dispersal of air pollutants, Vertical structure of temperature and stability, atmospheric motions, Wind and shear, self cleaning of atmosphere; transport and diffusion of stack emissions, atmospheric characteristics significant to transport and diffusion of stack emission, stack plume characteristics.

Air Quality Models: Types modeling techniques, modeling for non reactive pollutants, single source, short term impact, multiple sources

and area sources, Fixed box models, diffusion models, Gaussian plume derivation- modifications of Gaussian plume equation, long term average-multiple cell model, receptor oriented and source oriented air pollution models, model performance, accuracy and utilization.

Water Quality Index: Categories of water quality index, Determination of water quality index (WQI), Industrial and municipal effluent index, ambient water quality index, combined water quality index and Delphi method.

Air Quality Index: Categories of air quality index, Determination of air quality index (AQI): National AQI, Extreme value indices, Regional indices.

Computer Models: Exposure to computer models for surface water quality, ground water quality, air quality etc.

Reference Books:

1. Steven C. Chapra, Surface Water Quality Modeling, Tata McGraw-Hill Companies, Inc., New Delhi, 1997.
2. Arthur C. Stern, Air Pollution, Air Pollutants, their transformation and Transport, (Ed.), (Third Ed.) Volume I , Academic Press, 2006.
3. Deaton and Wine Brake, Dynamic Modeling of Environmental Systems, Wiley & Sons, 2002
4. M.D. Palmer, Water Quality Modeling, the World Bank Washington DC.
5. Lohani B. N. and North A. M. Environmental Quality Management, South Asian Publishers Pvt. Ltd., New Delhi, 1984.
6. Energy and Environment - Modeling and Simulation, Bala BK (1997), NOVA Sci. Pub

ESE 410: Environmental Modeling (Practical)

Credit	Contact hour/ Week	Total Class
1	2	30

Design of water distribution system using available softwares, Design of sewer line/ wastewater drain network using available softwares, Exercise on computer simulation of air pollution, surface water quality,

soil water balance, Exercise on application of storm water management model, Exercise on application of linear programming in environmental engineering, Exercise on application of transportation problem in environmental engineering, Exercise on application of dynamic programming in environmental engineering, Digitization of your city map using available software and showing pollution map, Predicting concentration of air pollutant emitted from stack (at any given location in ambient environment by using any dispersion modeling software) Other relevant topics related to ESE 409 course.

ESE 411: Sustainable Textile Processing

Credit	Contact hour/ Week	Total Class
3	3	45

Introduction: Sustainable Development, Indicators of Sustainability, Sustainability Strategies, Barriers to Sustainability, Environmental Sustainability in the Textile Industry, Industrial activity and Environment. Industrialization and sustainable development, Industrial Ecology. Cleaner Production (CP) in Achieving Sustainability. Prevention versus Control of Industrial Pollution, Environmental Policies and Legislations, Regulations to Encourage Pollution Prevention and Cleaner Production, Regulatory versus Market-Based Approaches, Social Sustainability in Textile Industry.

Principles of Cleaner Production(CP): Definition, Importance, Historical evolution, Benefits, Promotion, Barriers, Role of Industry, Government and Institutions, Environmental Management Hierarchy, Sources Reduction Techniques, Process and equipment optimization, reuse, recovery, recycle, raw materials substitution, Internet Information & Other CP Resources.

CP Project Development and Implementation: Overview of CP Assessment, Steps and Skills, Preparing for the Site, Site Visit, Information Gathering and Process Flow Diagram, Material Balance, CP Option Generation, Technical and Environmental Feasibility analysis. Economic valuation of alternatives, Total Cost Analysis, CP Financing, Establishing a Program, Organizing a Program, Preparing a Program Plan, Measuring Progress, Pollution Prevention and Cleaner Production Awareness Plan, Waste audit, Environmental Statement.

The supply chain of textiles: Natural fibers, Man-made fibers and filament and yarns, Energy, Yarn production- Fabric production. Chemical treatment, Manufacturing, Consumption, use and care. Disposal, reuse and recycling scenarios.

Sustainable Textile Technologies: History of Textile Technology. Sustainable Technology and Textile Manufacturing, Sustainable Fiber Technologies, Sustainable Yarn Production Technologies, Sustainable Textile Surface Production Technologies, Sustainable Wet-Processing Technologies, Sustainable Technologies in Garment Manufacturing. Enzymatic Washing of Denim.

Sustainable Practices in Textile Industry: Step, Higg, BEPI, BSCI, and other allied Standards and Certificates.

Life Cycle Assessment and Environmental Management Systems: Elements of LCA, Life cycle assessment (LCA) methodology, Life cycle inventory (LCI), Life cycle assessment (LCA) results, Life cycle assessment (LCA) sensitivity analysis, Life Cycle Costing,Eco-textiles. Introduction to ecological key figures (EKF), Theory for ecological key figures (EKF), Applied ecological key features (EKF) in spinning and weaving, Discussion on ecological key figures (EKF) of textile products, Eco Labelling, Design for the Environment, International Environmental Standards - ISO 14001, Environmental audit.

Novel technologies: Tandem wet-on-wet foam application of both crease-resist and antistatic finishes, Laser and devore- Cellulose-protein textiles, utilisation of sericin in textile finishing etc. and recent practices in textile processing.

Case Studies: Industrial applications of CP, LCA, EMS and Environmental Audits.

Reference Books:

1. Textiles and Clothing Sustainability- Sustainable Technologies, Edited by Subramanian Senthilkannan Muthu.
2. Sustainability in the Textile Industry, Edited by Subramanian Senthilkannan Muthu.
3. World Bank Group (1998) 'Pollution Prevention and Abatement Handbook -Towards Cleaner Production', World Bank and UNEP, Washington D.C.

ESE 413: Environmental Ethics, Policy and Law

Credit	Contact hour/ Week	Total Class
3	3	45

Views on nature and the environmental ethics: Environmental ethics. A brief outline on Societal Environmental Ethics, Corporate Environmental Ethics, Environmental Justice, Individual Environmental Ethics and Global Environmental Ethics, Foundation for an environmental ethics, factors influencing environmental conflict and conflict resolution, Environmental policy,significance and importance of environmental policy, EMS, ISO 14001, Environmental laws. Scopes of environmental law, environmental awareness and global environmental politics, History and relevance of environmental law, relation among law, protocol and ethics.

Legal issues of Environment: Environmental court and arbitration procedure, environmental clearance for industries and organizations, international agreement, convention, protocol and law related to environment and climate; environmental compliances for industry and commerce.

Legal aspects of environmental resource management: Concepts and principles of environmental law, its legislative development, environmental law and its crisis, Origin of environmental law in Bangladesh and other countries, major environmental laws, policies and regulations [Environment Conservation Act (ECA, 1995), Environment Conservation Rules (ECR, 1997), Green Court (2000), Forest Act (2000), Wildlife Preservation Act, Fish Act, Clean Air Act (CAA), the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), Resource Conservation and Recovery Act (RCRA)], the Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act (CERCLA/SARA), Loopholes and criticism of major environmental acts.

List of allied acts, policies and laws: National environment policy, 2013; Bangladesh energy regulatory commission act, 2003; Boiler Act, 1923; Ozone layer depletion substances control rule, 2004 (amendment-2014); Noise pollution Control rule, 2006; Medical waste management and processing rule, 2008; Bangladesh labor act, 2006 & Bangladesh Labor rule, 2015; Petroleum Act, 2016;

Environment Policy, 1992, Water act 2018, Environmental dispute and resolution over common resource sharing, river water sharing (Ganga, Nile, Indus, etc), trans-boundary air pollution, biological diversity & intellectual etc.

Conventions, protocols and treaties: International environmental conventions, protocols and treaties and their implementation in Bangladesh, List of international environmental agreement. International organizations involved in environmental law, protocols, conventions and treaties (UNEP, UNDP, Green Peace, CBD, WWF, CITES, IUCN, etc).

A comparative study: Environmental laws in Bangladesh and other developed and developing countries and its enforcement (local and global perspective).

External Lecture/ seminar/ workshop.

Reference Books:

1. Warren LM and Gibson J (1999) Environmental Law and Policy. Blackwell Science
2. UNEP (1997) Handbook of Environmental Law. UNEP, Kenya
3. Elliot R (Ed) (1995) Environmental Ethics. OUP
4. Sattar SA: Introduction to Environmental Laws of Bangladesh.

ESE 414: ESE Industrial Attachment (2 Months)

Credit	Contact hour/ Week	Total Class
3	2 months	--

A professional internship is designed to gain an in-depth understanding of the practical aspects of the environmental engineering in Textile industry. Two (2) months training attachment to environmental engineering in Textile industry covering the practical aspects of environmental engineering planning, design, construction and operation. The attachment is supervised by both industry supervisor and university teacher.

Upon completion of the course, students should be able:

a. Understand the practical aspects and technical knowhow of the

environmental engineering in any industry, specifically in Textile and RMG industries.

b. Gain valuable contacts necessary to give them an edge in the working world upon graduation.

ESE 416: ESE Project Work

Credit	Contact hour/ Week	Total Class
3	--	--

The objective of this course is to provide an opportunity for students to undertake an in-depth research investigation in one of the areas in textile and environmental engineering.

Final year students will carry out project work from any discipline in environmental engineering. The project should belong to one or more of the following areas: textile processing, computing and analysis; design; laboratory investigation; field testing and instrumentation; case studies etc. The project duration is the 8th semester of their academic year. An individual formal report is required. Each student is required to make an oral presentation.

Upon completion of the course, the student should acquire basic skills in tackling research in environmental engineering. This includes gaining knowledge in the application of modern equipment for research, data collection and analyses, critical review of published literature, preparation of a research report and oral defense of his findings and conclusions.

ESE 418: Comprehensive Viva

Credit	Contact hour/ Week	Total Class
3	--	--

The Comprehensive Viva will cover the entire 4 years courses of study. 60% weightage will be on the departmental subjects and 40% weightage will be on all other subjects. No specific class hour will assigned for the comprehensive Viva.