

GOVERNMENT OF ANDHRA PRADESH



**STATE BOARD OF TECHNICAL EDUCATION AND TRAINING**  
**Andhra Pradesh :: Amaravathi**



Globally Competitive  
**CURRICULUM (C-16)**  
For Polytechnic Diploma Courses  
In Andhra Pradesh



**DIPLOMA IN**  
**TEXTILE TECHNOLOGY**

Front Cover Page

## Objective of the New Curriculum (C-16)

To make the students 'Globally Competitive & Employable' by learning industry relevant subjects & undergoing Industrial training



Suggestions from Industrialists have been incorporated in the Curriculum by organising Industry Institute Interaction Meet.

## Highlights of the Curriculum (C-16)



- ❖ 6 months /1 year industrial training in all the Diploma Courses.
- ❖ 1 year industrial training in collaboration with BOAT (Board of Apprenticeship & Training (SR), Chennai).
- ❖ Virtual labs for ECE & Computer Branches & Strengthening of Skill Development Centers to provide industrial training to students.

Fundamentals of 'Internet of Things' (IoT) is included for all the Branches in the Subject "Industrial Management & Smart Technologies".



"Communication Skills" and "Life Skills" have been introduced as practical subjects for all the Branches.





“Computer Fundamentals Laboratory” is introduced for all the Branches in First year. AutoCAD specific to the Branch has been given emphasis in the Curriculum.

C Language, Programmable Logic Controllers (PLC), Microcontrollers, Solar Energy are introduced in Electrical Engineering Branch.



Mobile Communications, Consumer Electronics are introduced in Electronics and Communication Branch

CAD/ CAM, CNC Machines, Power Plant Engineering are introduced in Mechanical Engineering Branch.



OOPS through JAVA, Web Designing, Computer Hardware & Networking are introduced in Computer Engineering Branch.

Automobile Chassis and Body Engineering, Recent Trends In Automobile Engineering, Motor Transport Organization etc are introduced in Automobile Engineering Branch.



# Journal (JPAP)

The Department of  
Technical Education,  
A.P. has a bi-annual  
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of Andhra Pradesh'  
JPAP



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**FACULTY**

1. COMPUTATION AND LAYOUT EXTRACTION OF SBF DECODER FOR BINARY LOGIC CODES 1-18  
Dr. C. Chandra Reddy
2. INFLUENCE OF NYLON FIBER REINFORCEMENT ON LIME STABILIZED CLAYEY SOIL 11-18  
Dr. P. Srinivas Ragu
3. ANALYSIS OF COLOR IMAGE PROCESSING USING SPATIAL FILTER TECHNIQUES 19-26  
Dr. Ch. Subrahmanyam, P. Kumar Babu
4. ASSESSMENT OF SEISMIC VULNERABILITY OF REINFORCED CONCRETE BUILDING FRAMES USING PUSHOVER ANALYSIS 27-38  
T. P. Sankaradurai, Ramesh Varan

**STUDENT**

5. STUDY OF ADVANCED DIGITAL MODULATION TECHNIQUES USING MATLAB 34-48  
Bhargavi Mahesh Reddy, Kakkigadda Siva Naga Raju, Mousumi Rajkumar
6. IMPLEMENTATION OF PHASE LOCKED LOOP BY USING CLOSED LOOP SYSTEM 49-57  
Puggaveerapu Sandhya, Pattapa Ushaswini, Shubh Shalaxari
7. CNC MILLING PROCESS CAPABILITY -A CASE STUDY 58-64  
K. Ravi Vivekanand, B. Krashti Bhargava, Dr. M. Chandra Shekhar
8. SELECTION OF A CAR THROUGH MULTIPLE CRITERIA DECISION MAKING (MCDM) APPROACH 65-66  
T. Suresh, Y. Raja Babu, K. V. S. Phani, A. Ravi Kumar
9. MODEL OF AN LIFT PUMP 67-68  
Shubh Mahesh Babu
10. MEASUREMENT SYSTEM ANALYSIS-AN ILLUSTRATIVE EXAMPLE 69-75  
B. Manoj Kumar, Ch. V. Nagesh Babu, T. Maheshwara Rao, M. Shyam, M. A. Gaddeti, K. Maheshwara Rao, K. Narayana Rao, M. Seethapathi Rao

**INDUSTRY**

11. SELF ASSESSMENT OF IS IN A SMALL AND MEDIUM ENTERPRISE -A CASE STUDY 76-81  
V. Ramesh Babu, Purtha Suresh, S. V. Rama, Dr. B. Nagawara Rao



## CISCO ACADEMIES IN POLYTECHNICS

- ◆ 70 Government Polytechnics chosen to have Cisco Academies
- ◆ Course Content of CISCO has been incorporated into the ECE and Computer Diploma Courses
- ◆ CISCO to train Staff of Polytechnics in two phases to enable them to run the courses effectively
- ◆ Students to get 'Certificate from CISCO' along with Diploma Certificate.

**CURRICULUM-2016**  
**( C-16 )**

**FOR DIPLOMA COURSES IN ANDHRA PRADESH**

**PREAMBLE**

The State Board of Technical Education and Training, Andhra Pradesh under the aegis of the Department of Technical Education, Andhra Pradesh generally reviews the Curricula once in every five years. However, recognizing the needs of the industries and enhancing the employability skills of Polytechnic students, the Government of Andhra Pradesh constituted a committee vide G.O.Rt.No:95 of Higher Education (TE) Dept dated: 29-4-2016 and G.O.Rt.No:98 of Higher Education (TE) Dept dated: 4-5-2016 for updation of polytechnic curriculum under the chairmanship of Sri. S. Balasubrahmanyam, IAS (Retd.,). The committee submitted a report on 31-5-2016 making certain recommendations and suggesting new initiatives to be incorporated in the curriculum. An Industry Institute Interaction Meet was organized with Industry experts and subject experts on 26-12-2016 and the suggestions from Industrialists have also been incorporated in the curriculum. The new Curricula for the different diploma courses have been designed with the active participation of the members of the faculty teaching in the Polytechnics of Andhra Pradesh, besides reviewed by Expert Committee constituted with eminent academicians.

The primary objective of the curricular change is to produce best technicians in the country by correlating growing needs of the industries with the academic input.

The revised New Curriculum i.e., Curriculum–2016 (C-16) is approved by BoG of SBTET for its implementation with effect from 2016-17.

**Salient Features:**

1. Duration of course is either 3 years / 3½ years duration of Regular Academic Instruction.
2. The Curriculum is prepared in Semester Pattern. However, First Year is maintained as Year-wise pattern.
3. 6 Months/ 1 year Industrial Training is introduced for all the Diploma courses.

4. Fundamentals of Internet of Things (IOT) is introduced for all the Diploma courses in the subject.
5. Modern subjects relevant to the industry are introduced in all the Diploma courses.
6. CISCO course content has been incorporated into the ECE and CME courses to get certification from CISCO along with Diploma.
7. The policy decisions taken at the State and Central level with regard to environmental science are implemented by including relevant topics in Chemistry. This is also in accordance with the Supreme Court guidelines issued in Sri Mehta's case.
8. Keeping in view the increased need of communication skills which is playing a major role in the success of Diploma Level students in the Industries, emphasis is given for learning and acquiring listening, speaking, reading and writing skills in English. Further as emphasized in the meetings, Communication Skills lab and Life Skills lab are introduced for all the branches.
9. Modern topics relevant to the needs of the industry and global scenario suitable to be taught at Diploma level are also incorporated in the curriculum.
10. AutoCAD specific to the branch has been given more emphasis in the curriculum. Preparing drawings using CAD software has been given more importance.
11. Every student is exposed to the computer lab at the 1st year itself in order to familiarize himself with skills required for keyboard/mouse operation, internet usage and e-mailing.
12. Upon reviewing the existing C-14 curriculum, it is found that the theory content is found to have more weightage than the Practical content. In the revised C-16 curriculum, more emphasis is given to the practical content of Laboratories and Workshops, thus strengthening the practical skills.
13. With increased emphasis for the student to acquire Practical skills, the course content in all the subjects is thoroughly reviewed and structured as outcome based than the conventional procedure based.
14. Curricula of Laboratory and Workshops have been thoroughly revised based on the suggestions received from the industry and faculty, for better utilization of the equipment available at the Polytechnics. The experiments /exercises that are chosen for the practical sessions are identified to conform to the field requirements of industry.
15. The Members of the working group are grateful to Sri G.S. Panda Das, I.A.S., Special Commissioner of Technical Education & Chairman of SBTET, AP. and Sri. Adityanath Das, I.A.S., Principal Secretary of Higher Education for their guidance and valuable inputs in revising, modifying and updating the curriculum.
16. The Members acknowledge with thanks the cooperation and guidance provided by Sri. A.Nirmal Kumar Priya, Secretary, SBTET, Andhra Pradesh and other officials of Directorate of Technical Education and the State Board of Technical Education, Andhra Pradesh, experts from industry, academia from the universities and higher

learning institutions and all teaching fraternity from the Polytechnics who are directly or indirectly involved in preparation of the curricula.

## **RULES AND REGULATIONS**

### **1 DURATION AND PATTERN OF THE COURSES**

All the Diploma programs run at various institutions are of AICTE approved 3 years or 3½ years duration of academic instruction.

All the Diploma courses are run on year wise pattern in the first year, and the remaining two or two & half years are run in the semester pattern. In respect of few courses like Diploma in BM course, the training will be in the seventh semester. Run-through system is adopted for all the Diploma Courses, subject to eligibility conditions.

### **2 PROCEDURE FOR ADMISSION INTO THE DIPLOMA COURSES:**

Selection of candidates is governed by the Rules and regulations laid down in this regard from time to time.

- a) Candidates who wish to seek admission in any of the Diploma courses will have to appear for Common Entrance Test for admissions into Polytechnics (POLYCET) conducted by the State Board of Technical Education and Training, Andhra Pradesh, Vijayawada.

Only the candidates satisfying the following requirements will be eligible to appear for

- the Common Entrance Test for admissions into Polytechnics (POLYCET).
- b) The candidates seeking admission should have appeared for S.S.C examination, conducted by the Board of Secondary Education, Andhra Pradesh or equivalent examination thereto, at the time of making application to the Common Entrance Test for admissions into Polytechnics (POLYCET). In case of candidates whose results of their Qualifying Examinations is pending, their selection shall be subject to production of proof of their passing the qualifying examination in one attempt or compartmentally at the time of admission
- c) Admissions are made based on the merit obtained in the Common Entrance Test (POLYCET) and the reservation rules stipulated by the Government of Andhra Pradesh from time to time.
- d) For admission into the following Diploma Courses for which entry qualification is 10+2, candidates need not appear for POLYCET. A separate notification will be issued for admission into these courses.
- 1). D.H.M.C.T. 2).D. Pharmacy

### **3 MEDIUM OF INSTRUCTION**

The medium of instruction and examination shall be English.

**4 PERMANENT IDENTIFICATION NUMBER (PIN)**

A cumulative / academic record is to be maintained of the Marks secured in sessional work and end examination of each year for determining the eligibility for promotion etc., A Permanent Identification Number (PIN) will be allotted to each admitted candidate to maintain academic records.

**5 NUMBER OF WORKING DAYS PER SEMESTER / YEAR:**

- a). The Academic year for all the Courses shall be in accordance with the Academic Calendar.
- b). The Working days in a week shall be from Monday to Saturday
- c). There shall be 7 periods of 50 minutes duration on all working days.
- d). The minimum number of working days for each semester / year shall be 90 / 180 days excluding examination days. If this prescribed minimum is not achieved due to any reason, special arrangements shall be made to conduct classes to cover the syllabus.

**6 ELIGIBILITY OF ATTENDANCE TO APPEAR FOR THE END EXAMINATION**

- a). A candidate shall be permitted to appear for the end examination in all subjects, if he or she has attended a minimum of 75% of working days during the year/Semester.
- b). Condonation of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester or 1<sup>st</sup> year may be granted on medical grounds.
- c). A stipulated fee shall be payable towards condonation for shortage of attendance.
- d). Candidates having less than 65% attendance shall be detained.
- e). Students whose shortage of attendance is not condoned in any semester / 1<sup>st</sup> year and not paid the condonation fee in time are not eligible to take their end examination of that class and their admissions shall stand cancelled. They may seek re-admission for that semester / 1<sup>st</sup> year when offered next.

**7 READMISSION**

Readmission shall be granted to eligible candidates by the respective Principal/ Regional Joint Director.



1. a) Within 15 days after commencement of class work in any semester (Except Industrial Training).  
b) For Industrial Training: before commencement of the Industrial training.
2. Within 30 days after commencement of class works in any year (including D. Pharmacy course or first year course in Engineering and Non Engineering Diploma streams).

Otherwise such cases shall not be considered for readmission for that semester / year and are advised to seek readmission in the next subsequent eligible academic year.

The percentage of attendance of the readmitted candidates shall be calculated from the first day of beginning of the regular class work for that year / Semester, as officially announced by CTE/SBTET but not from the day on which he/she has actually reported to the class work, after readmission is granted.

## 8 SCHEME OF EXAMINATION

### a) First Year

**THEORY EXAMINATION:** Each Subject carries 80% marks with examination of 3 hours duration, along with 20% marks for internal evaluation. (Sessional marks). However, there are no minimum marks prescribed for sessionals.

**PRACTICAL EXAMINATION:** There shall be 40% Marks for regular practical work done, i.e. sessional marks for each practical subject with an end examination of 3 hours duration carrying 60% marks. However, there are no minimum marks prescribed for sessionals.

### b) III, IV, V, VI and VII Semesters:

**THEORY EXAMINATION:** Each subject carries usually 80 marks and 30 marks in respect of specified subjects of 3hours duration, along with 20 marks for internal evaluation (sessional marks) respectively.

**PRACTICAL EXAMINATION:** Each subject carry 60/30 marks of 3hours duration 40/20 sessional marks.

## 9 INTERNAL ASSESSMENT SCHEME

- a) Theory Subjects: Theory Subjects carry 20% sessional marks, Internal examinations will be conducted for awarding sessional marks on the dates specified. **Three unit tests will be conducted for I year students and two**

**Unit Tests for semesters.** Average of marks obtained in all the prescribed tests will be considered for awarding the sessional marks.

- b) Practical Subjects: Student's performance in Laboratories / Workshop shall be assessed during the year/ semester of study for 40% marks in each practical subject. Allotment of marks should be discrete taking into consideration of the students' skills, accuracy, recording and performance of the task assigned to him / her. Each student has to write a record / log book for assessment purpose. In the subject of Drawing, which is also considered as a practical paper, the same rules hold good. Drawing exercises are to be filed in seriatum.
- c) Internal assessment in Labs / workshops / Survey field work etc., during the course of study shall be done and sessional marks shall be awarded by the concerned Lecturer / Senior Lecturer / Workshop superintendent as the case may be.
- d) For practical examinations, except in drawing, there shall be two examiners. External examiner shall be appointed by the Principal in consultation with respective Head of Section preferably choosing a qualified person from any local Industry/ nearby Government Polytechnic/ Local Government Organization. Internal examiner shall be the person concerned with internal assessment as in (c) above. The end examination shall be held along with all theory papers in respect of drawing.
- e) Question Paper for Practicals: Question paper should cover all the experiments / exercise prescribed.
- f) Records pertaining to internal assessment marks of both theory and practical subjects are to be maintained for official inspection.
- g) **In case of Diploma courses *having* Industrial Training**, the training assessment shall be done and the marks are to be awarded in the following manner.

Industrial assessment each)	:	200 marks (in two spells of 100 marks
Maintenance of log book	:	30 marks
Record Work	:	30 marks
Seminar / viva-voce	:	40 marks
		-----
TOTAL	:	300 marks

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The assessment at the institution level (Seminar/Viva-voce) shall be done by three members, viz., Internal Faculty member, External Examiner and Head of Section and be averaged.

## **10 MINIMUM PASS MARKS**

### **THEORY EXAMINATION:**

For passing a theory subject, a candidate has to secure a minimum of 35% in end examination and a combined minimum of 35% of both Sessional and end examination marks put together.

### **PRACTICAL EXAMINATION:**

For passing a practical subject, a candidate has to secure a minimum of 50% in end examination and a combined minimum of 50% of both sessional and practical end examination marks put together. In case of D.C.C.P., the pass mark for typewriting and short hand is 45% in the end examination. There are no sessional marks for typewriting and Shorthand subjects of D.C.C.P course.

## **11. PROVISION FOR IMPROVEMENT**

1. Improvement is allowed only after he / she has completed all the subjects from First Year to Final semester of the Diploma.
2. Improvement is allowed in any 4 (Four) subjects of the Diploma.
3. The student can avail of this improvement chance **ONLY ONCE**, that too within the succeeding two examinations after the completion of Diploma. However, the duration including Improvement examination shall not exceed **FIVE** years from the year of first admission.
4. No improvement is allowed in Practical / Lab subjects or Project work or Industrial Training assessment. However, improvement in drawing subject(s) is allowed.
5. If improvement is not achieved, the marks obtained in previous Examinations hold good.
6. Improvement is not allowed in respect of the candidates who are punished under Mal-practice in any Examination.
7. Examination fee for improvement shall be paid as per the notification issued by State Board of Technical Education and Training from time to time.

8. All the candidates who wish to appear for improvement of performance shall deposit the original Marks Memos of all the years / Semesters and also original Diploma Certificate to the Board. If there is improvement in performance of the current examination, the revised Memorandum of marks and Original Diploma Certificate will be issued, else the submitted originals will be returned.

## **12. RULES OF PROMOTION FROM 1<sup>ST</sup> YEAR TO 3<sup>RD</sup>, 4<sup>TH</sup>, 5<sup>TH</sup>, 6<sup>TH</sup> and 7<sup>TH</sup> SEMESTERS:**

### **a) For Diploma Courses of 3 Years duration**

- i. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.
- ii. A candidate shall be promoted to 3<sup>rd</sup> semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3<sup>rd</sup> semester.
- iii. A candidate shall be promoted to 4<sup>th</sup> semester provided he/she puts the required percentage of attendance in the 3<sup>rd</sup> semester and pay the examination fee. A candidate who could not pay the 3<sup>rd</sup> semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4<sup>th</sup> semester.

A candidate is eligible to appear for the 4<sup>th</sup> semester examination if he/she

- i) Puts the required percentage of attendance in the 4<sup>th</sup> semester
- ii) Should not have failed in more than Four backlog subjects of 1<sup>st</sup> year

### **For IVC & ITI Lateral Entry Students:**

A candidate is eligible to appear for the 4<sup>th</sup> semester examination if he/she puts the required percentage of attendance in the 4<sup>th</sup> semester

- iv) A candidate shall be promoted to 5<sup>th</sup> semester provided he / she puts the required percentage of attendance in the 4<sup>th</sup> semester and pays the examination fee. A candidate, who could not pay the 4<sup>th</sup> semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5<sup>th</sup> semester.

A candidate is eligible to appear for the 5<sup>th</sup> semester examination if he/she

- i) Puts the required percentage of attendance in the 5<sup>th</sup> semester
- ii) Should get eligibility to appear for 4<sup>th</sup> Semester examination.

**For IVC& ITI Lateral Entry students:**

- i) Puts the required percentage of attendance in the 5<sup>th</sup> semester
  - ii) Should not have failed in more than Four backlog subjects of 3<sup>rd</sup> Semester
- v) A candidate shall be promoted to 6<sup>th</sup> semester provided he/she puts in the required percentage of attendance in the 5<sup>th</sup> semester and pay the examination fee. A candidate who could not pay the 5<sup>th</sup> semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 6<sup>th</sup> semester.

A candidate is eligible to appear for 6<sup>th</sup> semester Industrial Training assessment (Seminar/Viva-voce)

- i) Puts the required percentage of attendance, ie., 90% in 6th semester Industrial Training
- ii) Should get eligibility to appear for 4<sup>th</sup> Semester Examination.

**For IVC & ITI Lateral Entry students:**

- i) Puts the required percentage of attendance, ie., 90% in 6<sup>th</sup> semester Industrial Training.
- ii) should get eligibility to appear for 5<sup>th</sup> Semester Examination.

**Important Note:**

**Seminar/Viva-voce should not be conducted for Not-Eligible Candidates, till the candidate gets eligibility. The record of internal assessment for Industrial Training for 260 marks shall be maintained at Institution Level for all candidates and the data is to be uploaded only for eligible candidates. For not eligible candidates the data is to be uploaded as and when the candidate gets eligibility.**

**b) For Diploma Courses of 3 ½ Years duration (MET/ CH/ CHPP/ CHPC/ CHOT/ TT ):**

1. A candidate shall be permitted to appear for 1<sup>st</sup> year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%)

i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.

2. A candidate shall be promoted to 3<sup>rd</sup> semester if he/she puts the required percentage of attendance in the 1<sup>st</sup> year and pays the examination fee. A candidate who could not pay the 1<sup>st</sup> year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3<sup>rd</sup> semester.
3. A candidate shall be promoted to 4<sup>th</sup> semester provided he/she puts the required percentage of attendance in the 3<sup>rd</sup> semester and pay the examination fee. A candidate, who could not pay the 3<sup>rd</sup> semester exam fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4<sup>th</sup> semester.

A candidate is eligible to appear for the 4<sup>th</sup> semester exam if he/she

- i) Puts the required percentage of attendance in the 4<sup>th</sup> semester
- ii) Should not have failed in more than Four backlog subjects of 1<sup>st</sup> year.

**For IVC & ITI Lateral Entry students:**

(i) Puts the required percentage of attendance in the 4<sup>th</sup> semester

4. A candidate shall be promoted to 5th semester industrial training provided he / she puts the required percentage of attendance in the 4th semester and pays the examination fee. A candidate, who could not pay the 4th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5th semester.
5. Promotion from 5th to 6th semester is automatic (i.e., from 1st spell of Industrial Training to 2nd spell) provided he/she puts the required percentage of attendance, which in this case ie.,90 % of attendance and attends for the VIVA-VOCE examination at the end of training.
6. A candidate shall be promoted to 7th semester provided he / she puts the required percentage of attendance in the 6th semester and pays the examination fee. A candidate, who could not pay the 6th semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 7th semester.
7. A candidate shall be promoted to 7th semester of the course provided he/she has successfully completed both the spells of Industrial Training.

A candidate is eligible to appear for 7th semester examination if he/she

- i) Puts the required percentage of attendance in the 7th semester
- ii) Should get eligibility to appear for 4<sup>th</sup> semester Examination.

**For IVC & ITI Lateral Entry students:**

- i) Puts the required percentage of attendance in the 7th semester
- ii) Should not have failed more than four backlog subjects of 3<sup>rd</sup> Semester

#### **OTHER DETAILS**

- a) In case a candidate does not successfully complete the Industrial training, he / she will have to repeat the training at his / her own cost.
- b) The I spell of Industrial training shall commence 10 days after the completion of the last theory examination of 4th Semester.
- c) The Second spell of Industrial training shall commence within 10 days after the completion of I spell of Industrial training.

#### **c) For Diploma Courses of 3 ½ Years duration (BM):**

The same rules which are applicable for conventional courses also apply for this course. The industrial training in respect of this course is restricted to one semester (6 months) after the 6<sup>th</sup> semester (3 years) of the course.

1. A candidate shall be permitted to appear for first year examination provided he / she puts in 75% attendance (which can be condoned on Medical grounds upto 10%) i.e. attendance after condonation on Medical grounds should not be less than 65% and pay the examination fee.
2. A candidate shall be promoted to 3<sup>rd</sup> semester if he/she puts the required percentage of attendance in the first year and pays the examination fee. A candidate who could not pay the first year examination fee has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 3<sup>rd</sup> semester.
3. A candidate shall be promoted to 4<sup>th</sup> semester provided he/she puts the required percentage of attendance in the 3<sup>rd</sup> semester and pay the examination fee. A candidate who could not pay the 3<sup>rd</sup> semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 4<sup>th</sup> semester.

A candidate is eligible to appear for the 4<sup>th</sup> semester examination if he/she

- i) Puts the required percentage of attendance in the 4<sup>th</sup> semester
- ii) Should not have failed in more than Four backlog subjects of 1<sup>st</sup> year

#### **For IVC & ITI Lateral Entry Students:**

A candidate is eligible to appear for the 4<sup>th</sup> semester examination if he/she puts the required percentage of attendance in the 4<sup>th</sup> semester

4. A candidate shall be promoted to 5<sup>th</sup> semester provided he / she puts the required percentage of attendance in the 4<sup>th</sup> semester and pays the examination fee. A candidate, who could not pay the 4<sup>th</sup> semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 5<sup>th</sup> semester.

A candidate is eligible to appear for the 5<sup>th</sup> semester exam if he/she

- i) Puts the required percentage of attendance in the 5<sup>th</sup> semester
- ii) Should get eligibility to appear for 4<sup>th</sup> Semester examination.

**For IVC & ITI Lateral Entry students:**

- iii) Puts the required percentage of attendance in the 5<sup>th</sup> semester
- iv) Should not have failed in more than Four backlog subjects of 3<sup>rd</sup> Semester

5. A candidate shall be promoted to 6<sup>th</sup> semester provided he/she puts in the required percentage of attendance in the 5<sup>th</sup> semester and pays the examination fee.

A candidate who could not pay the 5<sup>th</sup> semester examination fee, has to pay the promotion fee as prescribed by State Board of Technical Education and Training from time to time before commencement of 6<sup>th</sup> semester.

A candidate is eligible to appear for 6<sup>th</sup> semester examination

- i) Puts the required percentage of attendance in 6<sup>th</sup> semester and
- ii) should get eligibility to appear for 4<sup>th</sup> Semester Examination.

**For IVC & ITI Lateral Entry students:**

- i) Puts the required percentage of attendance in 6<sup>th</sup> semester.
  - ii) should get eligibility to appear for 5<sup>th</sup> Semester Examination.
6. A candidate shall be promoted to 7<sup>th</sup> semester provided he/she puts the required percentage of attendance in 6<sup>th</sup> semester and pay the examination fee. A candidate, who could not pay the 6<sup>th</sup> semester examination fee, has to pay the promotion fee prescribed by SBTET from time to time before commencement of the 7<sup>th</sup> semester (Industrial Training).



A candidate is eligible to appear for 7<sup>th</sup> semester Industrial Training assessment (Seminar/Viva-voce) if he/she

- i) Puts the required percentage of attendance, ie., 90% in 7<sup>th</sup> semester Industrial Training
- ii) Should get eligibility to appear for 4<sup>th</sup> Semester Examination.

**For IVC & ITI Lateral Entry students:**

- i) Puts the required percentage of attendance, ie., 90% in 7<sup>th</sup> semester Industrial Training.
- ii) Should get eligibility to appear for 5<sup>th</sup> Semester Examination.

**Important Note:**

**Seminar/Viva-voce should not be conducted for Not-Eligible Candidates, till the candidate gets eligibility. However, the record of internal Assessment for Industrial Training for 260 marks shall be maintained at Institution Level for all candidates and the data is to be uploaded only for eligible candidates. For not eligible candidates the data is to be uploaded as and when the candidate gets eligibility.**

**OTHER DETAILS**

- a) In case a candidate does not successfully complete the Industrial training, he / she will have to repeat the training at his / her own cost.
- b) The Industrial training shall commence 10 days after the completion of the last theory examination of 6<sup>th</sup> Semester.

**13. STUDENTS PERFORMANCE EVALUATION**

Successful candidates shall be awarded the Diploma under the following divisions of pass.

1. First Class with Distinction shall be awarded to the candidates who secure an overall aggregate of 75% marks and above.
2. First Class shall be awarded to candidates who secure overall aggregate of 60% marks and above and below 75% marks.
3. Second Class shall be awarded to candidates who secure a pass with an overall aggregate of below 60%.

The Weightage of marks for various year/Semesters which are taken for computing overall aggregate shall be 25% of I year marks + 100% of 3<sup>rd</sup> and subsequent Semesters.

In respect IVC & ITI Lateral Entry candidates who are admitted directly into diploma course at the 3<sup>rd</sup> semester (i.e., second year) level the aggregate of (100%) marks secured at the 3<sup>rd</sup> and subsequent semesters of study shall be taken into consideration for determining the overall percentage of marks secured by the candidates for award of class/division.

4. Second Class shall be awarded to all students, who fail to complete the Diploma in the regular 3 years/ 3 ½ years and four subsequent examinations, from the year of first admission.

#### **14. EXAMINATION FEE SCHEDULE:**

The examination fee should be as per the notification issued by State Board of Technical Education and Training from time to time.

#### **15. STRUCTURE OF END EXAMINATION QUESTION PAPER:**

The question paper for theory examination is patterned in such a manner that the Weightage of periods/marks allotted for each of the topics for a particular subject be considered Examination paper is of 3/6/9 hours duration.

- a) Each theory paper consists of Section 'A' and Section 'B'. Section 'A' contains 10 short answer questions. All questions are to be answered and each carries 3 marks Max. Marks: 10 x 3 = 30.  
Section B contains 8 essay type questions including Numerical questions, out of which 5 questions each carrying 10 marks are to be answered.

Max.Marks: 5 x 10 = 50.

Total Maximum Marks: 80.

- b) For Engineering Drawing Subject (107) consist of section 'A' and section 'B'. Section 'A' contains four (4) questions. All questions in section 'A' are to be answered and each carries 5 marks. Max. Marks: 4 x 5=20. Section 'B' contains six (6) questions. Out of which four (4) questions to be answered and each question carries 10 Marks. Max. Marks 4 x 10 = 40.

- c) Practical Examinations

For Workshop practice and Laboratory Examinations, Each student has to pick up a question paper distributed by Lottery System.

Max. Marks for an experiment / exercise : 50%

Max. Marks for VIVA-VOCE : 10%

Total : 60% (of total marks for the subject)

In case of practical examinations with 50 marks, the marks will be worked out basing on the above ratio.

In case of any change in the pattern of question paper, the same shall be informed sufficiently in advance to the candidates.

#### **16. ISSUE OF MEMORANDUM OF MARKS**

All candidates who appear for the end examination will be issued memorandum of marks without any payment of fee. However candidates who lose the original memorandum of marks have to pay the prescribed fee to the Secretary, State Board of Technical Education and Training, A.P. for each duplicate memo.

#### **17. MAXIMUM PERIOD FOR COMPLETION OF DIPLOMA COURSES:**

Maximum period for completion of the diploma courses is twice the duration of the course from the date of First admission (includes the period of detention and discontinuation of studies by student etc) failing which they will have to forfeit the claim for qualifying for the award of Diploma (They will not be permitted to appear for examinations after that date). This rule applies for all Diploma courses of 3 years and 3 ½ years of engineering and non-engineering courses.

#### **18. ELIGIBILITY FOR AWARD OF DIPLOMA**

A candidate is eligible for award of Diploma Certificate if he / she fulfils the following academic regulations.

- i. He / She pursued a course of study for not less than 3 / 3 ½ academic years & not more than 6 / 7 academic years.
- ii. He / she has completed all the subjects.

Students who fail to fulfill all the academic requirements for the award of the Diploma within 6 / 7 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

#### **For IVC & ITI Lateral Entry students:**

- i. He / She pursued a course of study for not less than 2 / 2 ½ academic years & not more than 4 / 5 academic years.
- ii. He / she has completed all the subjects.

Students who fail to fulfill all the academic requirements for the award of the Diploma within 4 / 5 academic years from the year of admission shall forfeit their seat in the course & their seat shall stand cancelled.

**19. ISSUE OF PHOTO COPY OF VALUED ANSWER SCRIPT, RECOUNTING & REVERIFICATION:**

**A) FOR ISSUE OF PHOTO COPIES OF VALUED ANSWER SCRIPTS**

1. A candidate desirous of applying for Photo copy of valued answer script/ scripts should apply within prescribed date from the date of the declaration of the result.
2. Photo copies of valued answer scripts will be issued to all theory subjects and Drawing subject(s).
3. The Photo copy of valued answer script will be dispatched to the concerned candidate's address as mentioned in the application form by post.
4. No application can be entertained from third parties.

**B) FOR RE-COUNTING(RC) and RE-VERIFICATION(RV) OF THE VALUED ANSWER SCRIPT**

1. A candidate desirous of applying for Re-verification of valued answer script should apply within prescribed date from the date of the declaration of the result.
2. Re-verification of valued answer script shall be done for all theory subjects and Drawing subject(s).
3. The Re-verification committee constituted by the Secretary, SBTETAP with subject experts shall re-verify the answer scripts.

**I) RE-COUNTING**

The Officer of SBTET will verify the marks posted and recount them in the already valued answer script. The variations if any will be recorded separately,

without making any changes on the already valued answer script. The marks awarded in the original answer script are maintained (hidden).

## **2) RE-VERIFICATION**

- (i) The Committee has to verify the intactness and genuineness of the answer script(s) placed for Re-verification.
- (ii) Initially single member shall carry out the re-verification.
- (iii) On re-verification by single member, if the variation is less than 12% of maximum marks, and if there is no change in the STATUS in the result of the candidate, such cases will not be referred to the next level ie., for 2-Tier evaluation.
- (iv) On re-verification by a single member, if the variation is more than 12% of maximum marks, it will be referred to 2-Tier evaluation.
- (v) If the 2-Tier evaluation confirms variation in marks as more than 12% of maximum marks, the variation is considered as follows:
  - a) If the candidate has already passed and obtains more than 12% of the maximum marks on Re-verification, then the variation is considered.
  - b) If the candidate is failed and obtains more than 12% of the maximum marks on Re-verification and secured pass marks on re-verification, then the status of the candidate changes to PASS.
  - c) If a candidate is failed and obtains more than 12% of the maximum marks on Re-verification and if the marks secured on re-verification are still less than the minimum pass marks, the status of the candidate remain FAIL only.
- (vii) After Re-verification of valued answer script the same or change if any therein on Re-verification, will be communicated to the candidate.
- (viii) On Re-verification of Valued Answer Script if the candidate's marks are revised, the fee paid by the candidate will be refunded or else the candidate has to forfeit the fee amount.

4. No request for Photo copies/ Recounting /Re-verification of valued answer script would

be entertained from a candidate who is reported to have resorted to Malpractice in that

examination.

## **20. MAL PRACTICE CASES:**

If any candidate resorts to Mal Practice during examinations, he / she shall be booked and the Punishment shall be awarded as per SBTETAP rules and regulations in vogue.

**21. DISCREPANCIES/ PLEAS:**

Any Discrepancy /Pleas regarding results etc., shall be represented to the SBTETAP within one month from the date of issue of results. Thereafter, no such cases shall be entertained in any manner.

**22. ISSUE OF DUPLICATE DIPLOMA**

If a candidate loses his/her original Diploma Certificate and desires a duplicate to be issued he/she should produce written evidence to this effect. He / she may obtain a duplicate from the Secretary, State Board of Technical Education and Training, A.P., on payment of prescribed fee and on production of an affidavit signed before a First Class Magistrate (Judicial) and *non-traceable certificate* from the Department of Police. In case of damage of original Diploma Certificate, he / she may obtain a duplicate certificate by surrendering the original damaged certificate on payment of prescribed fee to the State Board of Technical Education and Training, A.P.

In case the candidate cannot collect the original Diploma within 1 year from the date of issue of the certificate, the candidate has to pay the penalty prescribed by the SBTET from time to time.

**23. ISSUE OF MIGRATION CERTIFICATE AND TRANSCRIPTS:**

The Board on payment of prescribed fee will issue these certificates for the candidates who intend to prosecute Higher Studies in India or Abroad.

**24. GENERAL**

- i. The Board may change or amend the academic rules and regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students, for whom it is intended, with effect from the dates notified by the competent authority.
- ii. All legal matters pertaining to the State Board of Technical Education and Training are within the jurisdiction of Vijayawada.
- iii. In case of any ambiguity in the interpretation of the above rules, the decision of the Secretary, SBTET, A.P is final.

**DIPLOMA IN TEXTILE TECHNOLOGY  
SCHEME OF INSTRUCTIONS AND EXAMINATION**

**C-16**

**(FIRST YEAR)**

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
<b>THEORY SUBJECTS</b>								
TT-101	English	3	-	90	3	20	80	100
TT-102	Engineering Mathematics - I	5	-	150	3	20	80	100
TT-103	Engineering Physics	4	-	120	3	20	80	100
TT-104	Engineering Chemistry and Environmental studies	4	-	120	3	20	80	100
TT-105	Basic Mechanical and Electrical Engineering	4	-	120	3	20	80	100
TT-106	Textile Fibres	4	-	120	3	20	80	100
<b>PRACTICAL SUBJECTS</b>								
TT-107	Engineering Drawing	-	6	180	3	40	60	100
TT-108	Workshop Practice	-	6	180	3	40	60	100
TT-109	Physics Laboratory	-	3	90	3	20	30	50
TT-110	Chemistry Laboratory	-			3	20	30	50
TT-111	Computer Fundamentals Laboratory	-	3	90	3	40	60	100
	<b>Total</b>	<b>24</b>	<b>18</b>	<b>1260</b>	-	<b>290</b>	<b>710</b>	<b>1000</b>

TT-101,102,103,104,107,109,110,111 common with all branches

**DIPLOMA IN TEXTILE TECHNOLOGY**  
**SCHEME OF INSTRUCTIONS AND EXAMINATIONS**  
**(III SEMESTER)**

Subject Code	Name of the Subject	Instruction period / week		Total Period / sem	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
<b>THEORY:</b>								
TT-301	Engineering Mathematics – II	5	-	75	3	20	80	100
TT-302	Yarn Manufacture– I	5	-	75	3	20	80	100
TT-303	Fabric Manufacture – I	5	-	75	3	20	80	100
TT-304	Textile Chemical Processing – I	5	-	75	3	20	80	100
TT-305	Apparel Production Technology	4	-	60	3	20	80	100
<b>PRACTICAL:</b>								
TT-306	Yarn ManufactureLab – I	-	6	90	3	40	60	100
TT-307	Fabric Manufacture Lab – I	-	6	90	3	40	60	100
TT-308	Communication Skills	-	3	45	3	40	60	100
TT-309	Textile Chemical Processing Lab – I	-	3	45	3	40	60	100
<b>TOTAL</b>		24	18	630		260	640	900



**DIPLOMA IN TEXTILE TECHNOLOGY  
SCHEME OF INSTRUCTIONS AND EXAMINATIONS**

**(IV SEMESTER)**

Subject Code	Name of the Subject	Instruction period / week		Total Period / sem	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
<b>THEORY:</b>								
TT-401	Yarn Manufacture– II	5	-	75	3	20	80	100
TT-402	Fabric Manufacture – II	5	-	75	3	20	80	100
TT-403	Textile Chemical Processing – II	5	-	75	3	20	80	100
TT-404	Textile Calculations	4	-	60	3	20	80	100
TT-405	Textile Testing & Quality Control – I	5		75	3	20	80	100
<b>PRACTICAL:</b>								
TT-406	Yarn ManufactureLab – II		6	90	3	40	60	100
TT-407	Fabric ManufactureLab – II	-	6	90	3	40	60	100
TT-408	Textile Chemical Processing Lab – II	-	3	45	3	40	60	100
TT -409	Textile Testing Lab – I	-	3	45	3	40	60	100
<b>TOTAL</b>		24	18	630		260	640	900

**C-16-V SEMESTER**  
**SCHEME OF INSTRUCTION AND EXAMINATION**  
**TT-501-INDUSTRIAL TRAINING**

S No	Subject	Duration	Scheme of Examination			
			Nature	Item	Max. Marks	
1.	Practical training in a Textile Industry or allied Industry	6 Months	Viva Voce & Log book	<u>At the Industry</u>		
				1) First Assessment (At the end of 3 <sup>rd</sup> month)		100
				2) Second Assessment (At the end of 6 <sup>th</sup> month )		100
				<u>At the Institution</u>		
				4 ) Log Book		30
				5) Training Report		30
6) Seminar on training	40					
Total for V semester					300	

1.The Industrial training shall carry 300 marks and pass marks is 50%. A candidate failing to secure the minimum marks should complete it at his own expenses.

2. During Industrial training the candidate shall put a minimum of 90% attendance.

**C-16-VI SEMESTER**  
**SCHEME OF INSTRUCTION AND EXAMINATION**  
**TT-601-INDUSTRIAL TRAINING**

S No	Subject	Duration	Scheme of Examination			
			Nature	Item	Max. Marks	
1.	Practical training in a Textile Industry or allied Industry	6 Months	Viva Voce & Log book	<u>At the Industry</u>		
				1) First Assessment (At the end of 3 <sup>rd</sup> month)		100
				2) Second Assessment (At the end of 6 <sup>th</sup> month )		100
				<u>At the Institution</u>		
				4 ) Log Book		30
				5) Training Report		30
6) Seminar on training	40					
Total for V semester					300	

1.The Industrial training shall carry 300 marks and pass marks is 50%. A candidate failing to secure the minimum marks should complete it at his own expenses.

2. During Industrial training the candidate shall put a minimum of 90% attendance.

**DIPLOMA IN TEXTILE TECHNOLOGY  
SCHEME OF INSTRUCTIONS AND EXAMINATIONS**

**(VII SEMESTER)  
TIME SCHEDULE**

Subject Code	Name of the Subject	Instruction period / week		Total Period / sem	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
<b>THEORY:</b>								
TT-701	Textile Mill Management & Smart Technologies	5	-	75	3	20	80	100
TT-702	Fabric Structure & Design	4	-	60	3	20	80	100
TT-703	Advanced yarn manufacture&	6	-	90	3	20	80	100
TT-704	Advanced Fabric Manufacture	5	-	75	3	20	80	100
TT-705	Textile Testing & Quality Control– II	4	-	60	3	20	80	100
<b>PRACTICAL:</b>								
TT-706	Textile CAD	-	6	90	3	40	60	100
TT-707	Fabric Analysis Lab	-	3	45	3	40	60	100
TT-708	Life Skills	-	3	45	3	40	60	100
TT-709	Textile Testing Lab – II	-	6	90	3	40	60	100
<b>TOTAL</b>		24	18	630		260	640	900

Note: In Subject code :TT-701, Smart technologies topic is introduced for 20 periods. In this topic one essay question and one short answer question can be given

**I YEAR**

**DIPLOMA IN TEXTILE TECHNOLOGY  
SCHEME OF INSTRUCTIONS AND EXAMINATION**

**C-16**

**(FIRST YEAR)**

Sub Code	Name of the Subject	Instruction Periods/Week		Total Periods Per Year	Scheme Of Examinations			
		Theory	Practicals		Duration (hrs)	Sessional Marks	End Exam Marks	Total Marks
<b>THEORY SUBJECTS</b>								
TT-101	English	3	-	90	3	20	80	100
TT-102	Engineering Mathematics - I	5	-	150	3	20	80	100
TT-103	Engineering Physics3	4	-	120	3	20	80	100
TT-104	Engineering Chemistry and Environmental studies	4	-	120	3	20	80	100
TT-105	Basic Mechanical and Electrical Engineering	4	-	120	3	20	80	100
TT-106	Textile Fibres	4	-	120	3	20	80	100
<b>PRACTICAL SUBJECTS</b>								
TT-107	Engineering Drawing	-	6	180	3	40	60	100
TT-108	Workshop Practice	-	6	180	3	40	60	100
TT-109	Physics Laboratory	-	3	90	3	20	30	50
TT-110	Chemistry Laboratory	-			3	20	30	50
TT-111	Computer Fundamentals Laboratory	-	3	90	3	40	60	100
	<b>Total</b>	<b>24</b>	<b>18</b>	<b>1260</b>	-	<b>290</b>	<b>710</b>	<b>1000</b>

TT-101,102,103,104,107,109,110,111 common with all branches

**TT-101- ENGLISH**  
**(Common to all Branches)**

**Subject Title : ENGLISH**

**Subject Code : TT - 101**

**Periods per Week : 3**

**Periods per Year : 90**

**Time Schedule& Weightage**

<b>Sl No</b>	<b>Major Topics</b>	<b>Titles of the Lessons</b>	<b>No. of Periods</b>	<b>Weightage of Marks</b>	<b>No of Short Answers</b>	<b>No of Long Answers</b>
1	Vocabulary & Need for English	Lessons 1,2 & Regular and essential vocabulary	5	13	1	1
2	Grammar	Lessons 11,12 & 19 to 26	30	31	7	1
3	Reading	Lessons 13 To 18	10	10	-	1
4	Writing	Lessons 27 To 40	30	40	-	4
5	English in Action	Lessons 3 To 10	15	16	2	1
		Total	90	110	10	08

## **Rationale and Scope**

Globalization has ushered in an era of opportunities for those who have the necessary competencies. Effective communication is one among them. This shift demands strengthening of English in polytechnics. In C-16 Curriculum the focus is on the special needs of English for technicians.

. This course aims at integration of the four fold language abilities viz., listening, speaking, reading and writing. The use of English for learning technical subjects and for performing technical functions like, writing reports, giving instructions and interpreting graphics/data is of great importance. Therefore the curriculum C-16 focuses on improving communicative abilities equipping the students to become industry- ready and employable.

### **On completion of this course the student will be able to:**

- 1.0 Build vocabulary in the direction of future needs
- 2.0 Learn various grammatical structures
- 3.0 Read and comprehend English and understand the details and draw inferences
- 4.0 Learn to be competent in various forms of written communication (writing composition and data interpretation)
- 5.0 Practice spoken communication suited to various situations.

#### **1.0 Extend their vocabulary in the direction of their future needs**

- 1.1 Locate words, learn spellings, understand meanings
- 1.2 Pronounce words intelligibly
- 1.3 Find synonyms and antonyms
- 1.4 Use affixation
- 1.5 Comprehend meanings of words by understanding meanings of roots

#### **2.0 Learn various grammatical structures**

- 2.1 Identify and use nouns
- 2.2 Identify and use pronouns
- 2.3 Use the present tense
- 2.4 Use the past tense
- 2.5 Use the future tense
- 2.6 Identify and use adjectives
- 2.7 Identify and use adverbs
- 2.8 Use prepositions
- 2.9 Use linkers
- 2.10 State basic sentence structures
- 2.11 Construct different types of sentences
- 2.12 Frame questions to elicit information
- 2.13 Frame questions for confirmation
- 2.14 Use active voice
- 2.15 Use passive voice
- 2.16 Use direct speech
- 2.17 Use indirect speech
- 2.18 Identify and correct errors



### **3.0 Read and comprehend English**

- 3.1 Identify the main ideas
- 3.2 Identify the specific details
- 3.3 Draw inferences
- 3.4 Give contextual meanings of the words
- 3.5 Perceive tone in a text

### **4.0 Learn to excel in various forms of written communication (writing composition and data interpretation)**

- 4.1 Identify components of a good paragraph
- 4.2 Write types of paragraphs
- 4.3 Distinguish between formal and informal letters
- 4.4 Write personal letters
- 4.5 Write leave letters
- 4.6 Write official letters
- 4.7 Write letters of complaints
- 4.8 Prepare a resume
- 4.9 Write a cover letter
- 4.10 Write short messages
- 4.11 Report incidents
- 4.12 Report experiments
- 4.13 Report Industrial visits
- 4.14 Write work done statements
- 4.15 Write maintenance reports
- 4.16 Make notes using Cue method and Mapping method
- 4.17 Summarize Paragraphs
- 4.18 Present and Interpret Data from flow charts, tree diagrams, bar graphs, tables, pie charts

### **Practice spoken communication suited to various situations.**

- 4.19 Use appropriate expressions to greet and take leave
- 4.20 Use proper expressions to make requests
- 4.21 Use apt expressions for asking and giving directions
- 4.22 Use suitable expressions to seek and offer suggestions
- 4.23 Use suitable expressions to state intentions
- 4.24 Use suitable expressions to state feelings
- 4.25 Use appropriate expressions to state agreement and disagreement
- 4.26 Use proper expressions to make complaints
- 4.27 Use suitable expressions to express obligations

### **Course Material**

The textbook prepared by the faculty of English of Polytechnics in AP.

### Reference Books

1. Essential English Grammar (Intermediate Level) Raymond Murphy
2. Learn English ( A Fun Book of Functional Language, Grammar and Vocabulary) Santanu Sinha Chaudhuri
3. Grammar Builder ( Entire Series) Oxford University Press
4. High School English Grammar ( Revised Edition) Wren and Martin
5. Sentence skills with Readings ( fourth Edition, Tata McGraw Hill) John Langan, Paul Langan
6. Word Power Made Easy Norman Lewis
7. Spoken English Shashi Kumar and Dhamija



	<b>Geometry</b>									
<b>13</b>	Straight Lines	5	3	6	1	1	0	0	0	0
<b>14</b>	Circle	4	2	5	0	0	0	0	1/2	0
<b>15</b>	Conic Sections	4	3	5	0	0	0	0	1/2	0
	<b>Unit – IV : Differential Calculus</b>									
<b>16</b>	Limits and Continuity	4	2	3	0	1	0	0	0	0
<b>17</b>	Differentiation	18	10	23	1	0	0	1	1	0
<b>S. No</b>	<b>Major Topic</b>	<b>No of Periods</b>		<b>Weightage of Marks</b>	<b>Short Type</b>			<b>Essay Type</b>		
	<b>Unit - V : Applications of Differentiation</b>	<b>Theory</b>	<b>Practice</b>		<b>R</b>	<b>U</b>	<b>App</b>	<b>R</b>	<b>U</b>	<b>App</b>
<b>18</b>	Geometrical Applications	3	2	5	0	0	0	0	0	1/2
<b>19</b>	Physical Applications	2	2	5	0	0	0	0	0	1/2
<b>20</b>	Maxima and Minima	3	4	5	0	0	0	0	0	1/2
<b>21</b>	Errors and Approximations	2	0	5	0	0	0	0	0	1/2
<b>Total</b>		<b>92</b>	<b>58</b>	<b>110</b>	<b>6</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>2 1/2</b>	<b>3 1/2</b>
				<b>Marks</b>	<b>18</b>	<b>12</b>	<b>0</b>	<b>20</b>	<b>25</b>	<b>35</b>

**R: Remembering type**                      38 marks  
**U: Understanding type**                     37 marks  
**App: Application type**                      35 marks

**ENGINEERING MATHEMATICS – I**  
**COMMON TO ALL BRANCHES – 102**

**Objectives**

Upon completion of the course the student shall be able to:

**UNIT – I**

**Algebra**

**1.0 Use Logarithms in engineering calculations**

- 1.1 Define logarithm and list its properties.
- 1.2 Distinguish natural logarithms and common logarithms.
- 1.3 Explain the meaning of e and exponential function.
- 1.4 State logarithm as a function and its graphical representation.
- 1.5 Use the logarithms in engineering calculations.

**2.0 Resolve Rational Fraction into sum of Partial Fractions in engineering problems**

2.1 Define the following fractions of polynomials:

- 1. Rational,
- 2. Proper and
- 3. Improper

2.2 Explain the procedure of resolving rational fractions of the type mentioned below into partial fractions

$$\begin{array}{ll} i) \quad \frac{f(x)}{(x+a)(x+b)(x+c)} & ii) \quad \frac{f(x)}{(x+a)^2(x+b)(x+c)} \\ iii) \quad \frac{f(x)}{(x^2+a)(x+b)} & iv) \quad \frac{f(x)}{(x+a)(x^2+b)^2} \end{array}$$

**3.0 Use Matrices for solving engineering problems**

- 3.1 Define a matrix and order of a matrix.
- 3.2 State various types of matrices with examples (upto 3<sup>rd</sup> order square matrices).
- 3.3 Compute sum, scalar multiplication and product of matrices.
- 3.4 Illustrate the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.

- 3.5 Define the transpose of a matrix and write its properties.
- 3.6 Define symmetric and skew-symmetric matrices.
- 3.7 Resolve a square matrix into a sum of symmetric and skew-symmetric matrices with examples in all cases.
- 3.8 Define minor, co-factor of an element of 2x2 and 3x3 square matrices with examples.
- 3.9 Expand the determinant of a 3 x 3 matrix using Laplace expansion formula.
- 3.10 Distinguish singular and non-singular matrices.
- 3.11 State properties of determinants with simple examples.
- 3.12 Define multiplicative inverse of a matrix and list properties of adjoint and inverse.
- 3.13 Compute adjoint and multiplicative inverse of a square matrix.
- 3.14 Representation of system of linear equations (2 variables in 2 equations and 3 variables in 3 equations) in matrix form.
- 3.15 Solve system of linear equations using Cramer's rule.
- 3.16 Solve system of linear equations by matrix inversion method
- 3.17 State elementary row operations.
- 3.18 Solve a system of linear equations by Gauss- Jordan method

## **UNIT – II**

### **Trigonometry :**

#### **4.0 Understand Trigonometric Ratios**

- 4.1 Define trigonometric ratios of any angle.
- 4.2 List the values of trigonometric ratios at specified values.
- 4.3 Draw graphs of trigonometric functions
- 4.4 Explain periodicity of trigonometric functions.

#### **5.0 Solve simple problems on Compound Angles**

- 5.1 Define compound angles and state the formulae of  $\sin(A\pm B)$ ,  $\cos(A\pm B)$ ,  $\tan(A\pm B)$  and  $\cot(A\pm B)$
- 5.2 Give simple examples on compound angles to derive the values of  $\sin 15^\circ$ ,  $\cos 15^\circ$ ,  $\sin 75^\circ$ ,  $\cos 75^\circ$ ,  $\tan 15^\circ$ ,  $\tan 75^\circ$  etc.
- 5.3 Derive identities like  $\sin(A+B)\sin(A-B) = \sin^2 A - \sin^2 B$  etc.,
- 5.4 Solve simple problems on compound angles.

## **6.0 Solve problems using the formulae for Multiple and Sub- multiple Angles**

- 6.1 Derive the formulae of multiple angles  $2A$ ,  $3A$  etc and sub multiple angles  $A/2$  in terms of angle  $A$  of trigonometric functions.
- 6.2 Derive useful allied formulas like  $\sin A = (1 - \cos 2A)/2$  etc.,
- 6.3 Solve simple problems using the above formulae

## **7.0 Apply Transformations for solving the problems in Trigonometry**

- 7.1 Derive the formulae on transforming sum or difference of two trigonometric ratios in to a product and vice versa- examples on these formulae.

## **8.0 Use Inverse Trigonometric Functions for solving engineering problems**

- 8.1 Explain the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.
- 8.2 Define inverses of six trigonometric functions along with their domains and ranges.
- 8.3 Derive relations between inverse trigonometric functions so that given  $A = \sin^{-1} x$ , express angle  $A$  in terms of other inverse trigonometric functions - with examples.
- 8.4 State various properties of inverse trigonometric functions and identities like  $\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}$  etc.
- 8.5 Derive formulae like  $\tan^{-1} x + \tan^{-1} y = \tan^{-1} \left( \frac{x + y}{1 - xy} \right)$ , where  $x \geq 0, y \geq 0, xy < 1$  etc., and solve simple problems.

## **9.0 Solve Trigonometric Equations in engineering applications**

- 9.1 Explain what is meant by solutions of trigonometric equations and find the general solutions of  $\sin x = k$ ,  $\cos x = k$  and  $\tan x = k$  with appropriate examples.
- 9.2 Solve models of the type  $a \sin^2 x + b \sin x + c = 0$ ,  $a \cos x + b \sin x = c$  etc., and problems using simple transformations.

## **10.0 Appreciate Properties of triangles and their solutions**

- 10.1 State sine rule, cosine rule, tangent rule and projection rule.
- 10.2 Explain the formulae for  $\sin A/2$ ,  $\cos A/2$ ,  $\tan A/2$  and  $\cot A/2$  in terms of semi-perimeter and sides  $a, b, c$ .
- 10.3 List various formulae for the area of a triangle.
- 10.4 Solve problems using the above formulae.
- 10.5 Solve a triangle when (i) three sides, (ii) two sides and an included angle, (iii) two sides and an opposite angle-case of two solutions and (iv) one side and two angles are given.

## **11.0 Represent the Hyperbolic Functions in terms of logarithm functions**

- 11.1 Define Sinh  $x$ , cosh  $x$  and tanh  $x$  and list the hyperbolic identities.
- 11.2 Represent inverse hyperbolic functions in terms of logarithms.

## **12.0 Represent Complex numbers in various forms**

- 12.1 Define complex number, its modulus, conjugate and list their properties.
- 12.2 Define the operations on complex numbers with examples.
- 12.3 Define amplitude of a complex number
- 12.4 Represent the complex number in various forms like modulus-amplitude (polar) form, Exponential (Euler) form – illustrate with examples.
- 12.5 State DeMoivre's theorem and its applications to complex numbers e.g., finding the roots, powers, simplifications of a complex number with illustrative examples

## **UNIT - III**

### **Coordinate Geometry**

#### **13.0 Solve the problems on Straight lines**

- 13.1 Write the different forms of a straight line – point slope form, two point form, intercept form, normal form and general form
- 13.2 Solve simple problems on the above forms
- 13.3 Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines.

#### **14.0 Solve the problems on Circles**

- 14.1 Define locus of a point – circle and its equation.
- 14.2 Find the equation of a circle given



- (i) Center and radius
- (ii) Two ends of a diameter
- (iii) Centre and a point on the circumference
- (iv) Three non collinear points

14.3 Write the general equation of a circle and find the centre and radius.

**15.0 Appreciate the properties of Conics in engineering applications**

- 15.1 Define a conic section.
- 15.2 Explain the terms focus, directrix, eccentricity, axes and latus rectum of a conic with illustrations.
- 15.3 Find the equation of a conic when focus, directrix and eccentricity are given
- 15.4 Describe the properties of Parabola, Ellipse and Hyperbola in standard form.

**UNIT - IV**

**Differential Calculus**

**16.0 Use the concepts of Limit and Continuity for solving the problems**

16.1 Explain the concept of limit and meaning of  $\lim_{x \rightarrow a} f(x) = l$  and state the properties of limits.

16.2 Mention the Standard limits  $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$ ,  $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ ,  $\lim_{x \rightarrow 0} \frac{\tan x}{x}$ ,  $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$ ,

$$\lim_{x \rightarrow 0} \frac{e^x - 1}{x}, \quad \lim_{x \rightarrow 0} (1 + x)^{\frac{1}{x}}, \quad \lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x \quad (\text{All without proof}).$$

16.3 Solve the problems using the above standard limits

16.4 Evaluate the limits of the type  $\lim_{x \rightarrow l} \frac{ax^2 + bx + c}{\alpha x^2 + \beta x + \gamma}$  and  $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$

16.5 Explain the concept of continuity of a function at a point and on an interval with some examples whether a given function is continuous or not.

**17.0 Appreciate Differentiation and its meaning in engineering situations**

17.1 State the concept of derivative of a function  $y = f(x)$  – definition, first principle as

$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$  and also provide standard notations to denote the

derivative of a function.

- 17.2 State the significance of derivative in scientific and engineering applications.
- 17.3 Find the derivatives of elementary functions like  $x^n$ ,  $a^x$ ,  $e^x$ ,  $\log x$ ,  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $\sec x$ ,  $\csc x$  and  $\cot x$  using the first principles.
- 17.4 Find the derivatives of simple functions from the first principle .
- 17.5 State the rules of differentiation of sum, difference, scalar multiplication, product and quotient of functions with illustrative and simple examples.
- 17.6 Explain the method of differentiation of a function of a function (Chain rule) with illustrative examples such as

$$(i) \sqrt{t^2 + \frac{2}{t}} \quad (ii) x^2 \sin 2x \quad (iii) \frac{x}{\sqrt{x^2 + 1}} \quad (iv)$$

$\log(\sin(\cos x))$ .

- 17.7 Find the derivatives of Inverse Trigonometric functions and examples using the Trigonometric transformations.
- 17.8 Explain the method of differentiation of a function with respect to another function and also differentiation of parametric functions with examples.
- 17.9 Find the derivatives of hyperbolic functions.
- 17.10 Explain the procedures for finding the derivatives of implicit function with examples.
- 17.11 Explain the need of taking logarithms for differentiating some functions with examples like  $[f(x)]^{g(x)}$ .
- 17.12 Explain the concept of finding the higher order derivatives of second and third order with examples.
- 17.13 Explain the concept of functions of several variables, partial derivatives and difference between the ordinary and partial derivatives with simple examples.
- 17.14 Explain the definition of Homogenous function of degree n
- 17.15 Explain Euler's theorem for homogeneous functions with applications to simple problems.

## UNIT - V

### Applications of the Differentiation

#### 18.0 Understand the Geometrical Applications of Derivatives

- 18.1 State the geometrical meaning of the derivative as the slope of the tangent to the curve  $y=f(x)$  at any point on the curve.
- 18.2 Explain the concept of derivative to find the slope of tangent and to find the equation of tangent and normal to the curve  $y=f(x)$  at any point on it.
- 18.3 Find the lengths of tangent, normal, sub-tangent and sub normal at any point on the curve  $y=f(x)$ .
- 18.4 Explain the concept of angle between two curves and procedure for finding the angle between two given curves with illustrative examples.

#### 19.0 Understand the Physical Applications of Derivatives

- 19.1 Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples.
- 19.2 Explain the derivative as a rate measurer in the problems where the quantities like volumes, areas vary with respect to time- illustrative examples.

#### 20.0 Use Derivatives to find extreme values of functions

- 20.1 Define the concept of increasing and decreasing functions.
- 20.2 Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.
- 20.3 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable - simple problems yielding maxima and minima.
- 20.4 Solve problems on maxima and minima in applications like finding areas, volumes, etc.

#### 21.0 Use Derivatives to find Errors and Approximations

- 21.1 Find the absolute error, approximate error, relative error and percentage error in functions of single variable.

## COURSE CONTENT

### Unit-I

#### Algebra

**1. Logarithms :**

Definition of logarithm and its properties, natural and common logarithms; the meaning of e and exponential function, logarithm as a function and its graphical representation.

**2. Partial Fractions :**

Rational, proper and improper fractions of polynomials. Resolving rational fractions into their partial fractions covering the types mentioned below:

$$\begin{array}{ll} i) \quad \frac{f(x)}{(x+a)(x+b)(x+c)} & ii) \quad \frac{f(x)}{(x+a)^2(x+b)(x+c)} \\ iii) \quad \frac{f(x)}{(x^2+a)(x+b)} & iv) \quad \frac{f(x)}{(x+a)(x^2+b)^2} \end{array}$$

**Matrices:**

3. Definition of matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum, scalar multiplication and product of matrices. Transpose of a matrix-Symmetric, skew symmetric matrices-Minor, cofactor of an element-Determinant of a square matrix-Laplace's expansion, properties of determinants. Singular and non singular matrices-Adjoint and multiplicative inverse of a square matrix- examples-System of linear equations in 2 or 3 variables-Solutions by Cramer's rule, Matrix inversion method-examples-Elementary row operations on matrices -Gauss-Jordan method to solve a system of equations

### Unit-II

#### Trigonometry :

4. **Trigonometric ratios:** definition of trigonometric ratios of any angle, values of trigonometric ratios at specified values, draw graphs of trigonometric functions, periodicity of trigonometric functions.
5. **Compound angles:** Formulas of  $\sin(A\pm B)$ ,  $\cos(A\pm B)$ ,  $\tan(A\pm B)$ ,  $\cot(A\pm B)$ , and related identities with problems.

6. **Multiple and sub multiple angles:** trigonometric ratios of multiple angles  $2A, 3A$  and submultiple angle  $A/2$  with problems.
7. Transformations of products into sums or differences and vice versa simple problems
8. **Inverse trigonometric functions :** definition, domains and ranges-basic properties- problems.
9. **Trigonometric equations:** concept of a solution, principal value and general solution of trigonometric equations :  
 $\sin x = k$  ,  $\cos x = k$ ,  $\tan x = k$ .  
 Solutions of simple quadratic equations, equations involving usage of transformations- problems.
10. **Properties and solutions of triangles:** relation between sides and angles of a triangle- sine rule, cosine rule, tangent rule and projection rule-area of a triangle-solving a triangle- problems.
11. **Hyperbolic functions:** Definitions of hyperbolic functions, identities of hyperbolic functions, inverse hyperbolic functions and expression of inverse hyperbolic functions in terms of logarithms.
12. **Complex Numbers:** Definition of a complex number, Modulus and conjugate of a complex number, Arithmetic operations on complex numbers, Modulus-Amplitude (polar) form, Exponential form (Euler) form of a complex number-Problems. DeMoivre's Theorem and its applications in complex numbers- Simple problems.

### UNIT-III

#### Coordinate geometry

13. **Straight lines:** various forms of straight lines, angle between lines, perpendicular distance from a point, distance between parallel lines-examples.
14. **Circle:** locus of a point, Circle definition-Circle equation given (i) center and radius, (ii) two ends of a diameter (iii) centre and a point on the circumference (iv) three non collinear points - general equation of a circle - finding center, radius.
15. Definition of a conic section, equation of a conic when focus directrix and eccentricity are given. Properties of parabola, ellipse and hyperbola, standard forms.

## **UNIT-IV**

### **Differential Calculus**

16. Concept of Limit- Definition- Properties of Limits and Standard Limits -Simple Problems-Continuity of a function at a point- Simple Examples only.
17. Concept of derivative- definition (first principle) - different notations-derivatives of elementary functions - problems. Derivatives of sum, product, quotient, scalar multiplication of functions - problems. Chain rule, derivatives of inverse trigonometric functions, derivative of a function with respect to another function, derivative of parametric functions, derivative of hyperbolic, implicit functions, logarithmic differentiation – problems in each case. Higher order derivatives - examples – functions of several variables – partial differentiation, Euler’s theorem-simple problems.

## **UNIT-V**

### **Applications of Derivatives:**

18. Geometrical meaning of the derivative, equations of Tangent and normal to a curve at any point. Lengths of tangent, normal, sub tangent and subnormal to the curve at any point. Angle between the curves - problems.
19. Physical applications of the derivative – velocity, acceleration, derivative as a rate Measure – Problems.
20. Applications of the derivative to find the extreme values – Increasing and decreasing functions, finding the maxima and minima of simple functions - problems leading to applications of maxima and minima.
21. Applications of derivative in finding errors and approximations of functions and simple problems.

### **Reference Books :**

1. A text book of matrices by Shanti Narayan,
2. Plane Trigonometry, by S.L Loney
3. Co-ordinate Geometry, by S.L Loney
4. Thomas Calculus, Pearson Addison-Wesley publishers
5. Calculus – I, by Shanti Narayan and Manicavachgam Pillai, S.V Publications

## ENGINEERING PHYSICS

Subject Title	:	Engineering Physics
Subject Code	:	TT -103
Periods per week	:	04
Total periods per year	:	120

### TIME SCHEDULE

S.No	Major Topics	No. of Periods	Weightage of Marks	Short Answer Type	Essay Type
1.	Units and Dimensions	08	03	1	-
2.	Elements of Vectors	12	13	1	1
3.	Kinematics	14	13	1	1
4.	Friction	08	10	-	1
5.	Work, Power and Energy	12	10	-	1
6.	Simple Harmonic Motion	12	13	1	1
7.	Heat & Thermodynamics	12	13	1	1
8.	Sound	12	13	1	1
9.	Properties of matter	10	06	2	-
10.	Electricity & magnetism	12	13	1	1
11.	Modern Physics	08	03	1	-
	<b>Total:</b>	<b>120</b>	<b>110</b>	<b>10</b>	<b>8</b>

### OBJECTIVES

Upon completion of the course the student shall be able to

#### 1.0 Understand the concept of Units and dimensions

- 1.1 Explain the concept of Units
- 1.2 Define the terms
  - a) Physical quantity, b) Fundamental physical quantities and
  - c) Derived physical quantities
- 1.3 Define unit
- 1.4 Define fundamental units and derived units
- 1.5 State SI units with symbols
- 1.6 State Multiples and submultiples in SI system
- 1.7 State Rules of writing S.I. units
- 1.8 State advantages of SI units
- 1.9 Define Dimensions
- 1.10 Write Dimensional formulae
- 1.11 Derive dimensional formulae of physical quantities
- 1.12 List dimensional constants and dimensionless quantities
- 1.13 State the principle of Homogeneity of Dimensions
- 1.14 State the applications of Dimensional analysis
- 1.15 State the limitations of dimensional analysis
- 1.16 Solve problems

#### 2.0 Understand the concept of Elements of Vectors

- 2.1 Explain the concept of Vectors
- 2.2 Define Scalar and Vector quantities
- 2.3 Give examples for scalar and vector quantities

- 2.4 Represent vectors graphically
- 2.5 Classify the Vectors
- 2.6 Resolve the vectors
- 2.7 Determine the Resultant of a vector by component method
- 2.8 Represent a vector in space using unit vectors (  $i, j, k$  )
- 2.9 State triangle law of addition of vectors
- 2.10 State parallelogram law of addition of vectors
- 2.11 Illustrate parallelogram law of vectors in case of flying bird and sling.
- 2.12 Derive expression for magnitude and direction of resultant of two vectors
- 2.13 State polygon law of addition of vectors
- 2.14 Explain subtraction of vectors
- 2.15 Define Dot product of two vectors with examples (Work done, Power)
- 2.16 Mention the properties of Dot product
- 2.17 Define Cross products of two vectors with examples (Torque, Linear velocity)
- 2.18 Mention the properties of Cross product.
- 2.19 Solve the related numerical problems

### **3.0 Understand the concept of Kinematics**

- 3.1 Write the equations of motion in a straight line
- 3.2 Explain the acceleration due to gravity
- 3.3 Derive expressions for vertical motion
  - a) Maximum Height, b) time of ascent, c) time of descent, and d) time of flight
- 3.4 Derive height of a tower when a body projected vertically upwards from the top of a tower.
- 3.5 Explain projectile motion with examples
- 3.6 Explain Horizontal projection
- 3.7 Derive an expression for the path of a projectile in horizontal projection
- 3.8 Explain oblique projection
- 3.9 Derive an expression for the path of projectile in oblique projection
- 3.10 Derive formulae for projectile in oblique projection
  - a) Maximum Height, b) time of ascent, c) time of descent, and d) time of flight
  - e) Horizontal Range, f) Maximum range
- 3.11 Solve the related numerical problems

### **4.0 Understand the concept of Friction**

- 4.1 Define friction
- 4.2 Classify the types of friction and define
- 4.3 Explain the concept of Normal reaction
- 4.4 State the laws of friction
- 4.5 Define coefficients of friction
- 4.6 Explain the Angle of friction
- 4.7 Derive an expression for acceleration of a body on a rough horizontal surface
- 4.8 Derive an expression for the displacement and time taken to come to rest over a rough horizontal surface
- 4.9 Define Angle of repose
- 4.10 Derive expressions for acceleration of a body on a smooth inclined plane (up and down)



4.11 Derive expressions for acceleration of a body on a rough inclined plane (up and down)

4.12 List the Advantages and Disadvantages of friction

4.13 Mention the methods of minimizing friction

4.14 Solve the related numerical problems

## **5.0 Understand the concepts of Work, Power, and Energy**

5.1 Define the terms 1. Work, 2. Power and Energy

5.2 State SI units and dimensional formulae for 1. Work, 2. Power, and Energy

5.3 Define potential energy and state examples

5.4 Derive the expression for Potential energy

5.5 Define kinetic energy and state examples

5.6 Derive the expression for kinetic energy

5.7 State and derive Work- Energy theorem

5.8 Derive the relation between Kinetic energy and momentum

5.9 State the law of conservation of energy and mention examples

5.10 Verify the law of conservation of energy in the cases of a freely falling body and vertically projected body in the upward direction

5.11 Solve the related numerical problems

## **6.0 Understand the concept of Simple harmonic motion**

6.1 Define Simple harmonic motion

6.2 Give examples for Simple harmonic motion

6.3 State the conditions of Simple harmonic motion

6.4 Explanation of SHM in terms of projection of circular motion on any one of the diameters of the circular path

6.5 Derive expression for displacement

6.6 Derive expression for velocity

6.7 Derive expression for acceleration

6.8 Derive expression for Time period and frequency of S H M

6.9 Define phase of S H M and explain from the expression of displacement

6.10 Define Ideal simple pendulum and derive expression for Time period of simple pendulum

6.11 State the laws of motion of simple pendulum and mention formulae

6.12 Solve the related numerical problems

## **7.0 Understand the concept of Heat and thermodynamics**

7.1 Explain the concept of expansion of gases

7.2 State and explain Boyle's law and also express it in terms of density

7.3 Define absolute zero temperature

7.4 Explain absolute scale of temperature

7.5 State Charles laws in terms of absolute temperature and explain

7.6 Define ideal gas and distinguish from real gas

7.7 Derive Ideal gas equation

7.8 Define Specific gas constant and Universal gas constant

7.9 Explain why universal gas constant is same for all gases

7.10 State SI unit and dimensional formula of universal gas constant

7.11 Calculate the value of universal gas constant

7.12 State the gas equation in different forms ( as a function of density and mass )

7.13 Distinguish between  $r$  and  $R$

- 7.14 State and Explain Isothermal process
- 7.15 State and Explain adiabatic process
- 7.16 Distinguish between isothermal and adiabatic processes
- 7.17 State first and second laws of thermodynamics and state applications
- 7.18 Define specific heats & molar specific heats of a gas and differentiate them
- 7.19 Derive the relation  $C_p - C_v = R$  (Mayer's Equation)
- 7.20 Solve the relevant numerical problems

## **8.0 Understand the concept of Sound**

- 8.1 Define the term sound
- 8.2 Explain longitudinal and transverse wave motion and state differences
- 8.3 Distinguish between musical sound and noise
- 8.4 Explain noise pollution and state SI unit for intensity level of sound
- 8.5 Explain causes of noise pollution
- 8.6 Explain effects of noise pollution
- 8.7 Explain methods of minimizing noise pollution
- 8.8 Explain the phenomenon of beats
- 8.9 State the applications of beats
- 8.10 Define Doppler effect
- 8.11 List the Applications of Doppler effect
- 8.12 Define reverberation and reverberation time
- 8.13 Write Sabine's formula and name the parameters contained
- 8.14 Define and Explain echoes and also state its applications
- 8.15 State conditions of good auditorium
- 8.16 Solve the related numerical problems

## **9.0 Understand the properties of matter**

- 9.1 Define the term Elasticity
- 9.2 Define the terms stress and strain and also define different types of stress and strain
- 9.3 State the units and dimensional formulae for stress and strain
- 9.4 State and explain Hooke's law
- 9.5 Define surface tension and state examples
- 9.6 Explain Surface tension with reference to molecular theory
- 9.7 Define angle of contact
- 9.8 Define capillarity
- 9.9 Write the formula for surface tension based on capillarity and name the parameters
- 9.10 Explain the concept of Viscosity
- 9.11 Mention examples of Viscosity
- 9.12 State Newton's formula for viscous force and explain
- 9.13 Define co-efficient of viscosity and write its units and dimensional formula
- 9.14 Explain the effect of temperature on viscosity of liquids and gases
- 9.15 State Poiseuille's equation for Co-efficient of viscosity and name the physical quantities involved
- 9.16 Solve the related numerical problems

## **10.0 Understand the concept of Electricity and Magnetism**

- 10.1 Explain the concept of Electricity
- 10.2 State Ohm's law and write the formula
- 10.3 Explain Ohm's law
- 10.4 Define specific resistance, conductance and state their units
- 10.5 State Kichoff's laws
- 10.6 Explain Kichoff's laws
- 10.7 Describe Wheatstone's bridge with legible sketch
- 10.8 Derive an expression for balancing condition of Wheatstone's bridge
- 10.9 Describe Meter Bridge experiment for the determination of resistivity with a neat circuit diagram
- 10.10 Write the formula in Meter Bridge to determine specific resistance
- 10.11 Explain the concept of magnetism
- 10.12 State the Coulomb's inverse square law of magnetism
- 10.13 Define magnetic field and magnetic lines of force and write the properties of magnetic lines of force
- 10.14 State the Magnetic induction field strength and mention its units and dimensional formula
- 10.15 Derive an expression for the moment of couple on a bar magnet placed in a uniform magnetic field
- 10.16 Derive Magnetic induction field strength at a point on the axial line
- 10.17 Derive Magnetic induction field strength at a point on the equatorial line
- 10.18 Solve the related numerical problems

## **11.0 Understand the concept of Modern physics**

- 11.1 State and Explain Photo-electric effect
- 11.2 Write Einstein's photoelectric equation and explain
- 11.3 State laws of photoelectric effect
- 11.4 Explain the Working of photoelectric cell
- 11.5 List the Applications of photoelectric effect
- 11.6 Recapitulate refraction of light and its laws
- 11.7 Define critical angle
- 11.8 Explain the Total Internal Reflection
- 11.9 Explain the principle and working of Optical Fiber
- 11.10 Mention types of optical fibbers
- 11.11 List the applications of Optical Fiber
- 11.12 Define super conductor and superconductivity and mention examples for superconductors
- 11.13 State the properties of superconducting materials
- 11.14 List the applications of superconductors

## COURSE CONTENT

### 1. **Units and Dimensions:**

Introduction – Physical quantity – Fundamental and Derived quantities – Fundamental and Derived units- SI units –Multiples and Sub multiples – Rules for writing S.I. units-Advantages of SI units – Dimensions and Dimensional formulae- Dimensional constants and Dimensionless quantities- Principle of Homogeneity- Advantages and limitations of Dimensional analysis- - Problems.

### 2. **Elements of Vectors:**

Scalars and Vectors –Types of vectors(Proper Vector, Null Vector, Unit Vector, Equal , Negative Vector, Like Vectors, Co-Initial Vectors, Co-planar Vectors and Position Vector).Addition of vectors- Representation of vectors- Resolution of vectors - Parallelogram, Triangle and Polygon laws of vectors–Subtraction of vectors- Dot and Cross products of vectors-Problems

### 3. **Kinematics**

Introduction- Concept of acceleration due to gravity- Equations of motion for a freely falling body and for a body thrown up vertically- Projectiles- Horizontal and Oblique projections- Expressions for maximum height, time of flight, range - problems

### 4. **Friction:**

Introduction to friction- Causes- Types of friction- Laws of friction- Angle of repose-Angle of friction— Motion of a body over a horizontal surface- smooth inclined plane- rough inclined plane- Advantages and disadvantages of friction- Methods of reducing friction – Problems

### 5. **Work, Power and Energy:**

Work, Power and Energy- Definitions and explanation- potential energy- kinetic energy-Derivations of Potential and Kinetic energies-K.E and Momentum relation - Work-Energy theorem- Law of Conservation of energy- Problems

### 6. **Simple Harmonic Motion:**

Introduction- Conditions of SHM- Definition- Examples- Expressions for displacement, velocity, acceleration, Time period, frequency and phase in SHM- Time period of a simple pendulum- Laws of simple pendulum-seconds pendulum- Problems

### 7. **Heat and Thermodynamics:**

Expansion of Gases- Boyle's law- Absolute scale of temperature- Charles laws- Ideal gas equation- Universal gas constant- Differences between  $r$  and  $R$ - Isothermal and adiabatic processes- Laws of thermodynamics- Specific heats - molar specific heats of a gas –Derivation of Mayer's Equation- Problems

### 8. **Sound:**

Sound- Nature of sound- Types of wave motion -musical sound and noise- Noise pollution – Causes & effects- Methods of reducing noise pollution- Beats- Doppler effect- Echo- Reverberation-Reverberation time-Sabine 's formula- Conditions of good auditorium- Problems

**9. Properties of matter**

Definition of Elasticity –Definition of stress and strain -the units and dimensional formulae for stress and strain-The Hooke's law- Definition of surface tension-Explanation of Surface tension with reference to molecular theory - Definition of angle of contact - Definition of capillarity -The formula for surface tension based on capillarity - Explanation of concept of Viscosity - Examples for surface tension and Viscosity - Newton's formula for viscous force-Definition of co-efficient of viscosity- The effect of temperature on viscosity of liquids and gases - Poiseuille's equation for Co-efficient of viscosity- The related numerical problems

**10. Electricity & Magnetism:**

Ohm's law and explanation- Specific resistance- Kirchoff 's laws- Wheatstone's bridge - Meter bridge- Coulomb's inverse square law magnetic field- magnetic lines of force-Magnetic induction field strength- magnetic induction field strength at a point on the axial line - magnetic induction field strength at a point on the equatorial line –problems.

**11. Modern Physics;**

Photoelectric effect –Einstein's photoelectric equation-laws of photoelectric effect - photoelectric cell –Applications of photo electric effect- Total internal reflection- fiber optics- -principle and working of an optical fiber-types of optical fibers - Applications of optical fibers- superconductivity - applications

**REFERENCE BOOKS**

- |   |                                    |
|---|------------------------------------|
| 1. Intermediate physics Volume-I & 2        | Telugu Academy ( English version ) |
| 2. Unified physics Volume 1,2,3 and 4       | Dr.S.L Guptha and Sanjeev Guptha   |
| 3. Text book of physics Volume I            | Resnick & Holiday                  |
| 4. Text book of applied physics             | Dhanpath Roy                       |
| 5. Fibre optics                             | D.A Hill                           |
| 6. NCERT Text Books ----- XI & XII Standard |                                    |

**Blue Print for setting question paper at different levels**

S.No	Major Topics	No. of Periods	Weightage of Marks	Short answer type			Essay type		
				K	U	A	K	U	A
1.	Units and Dimensions	08	03	1	0	0	0	0	0
2.	Elements of Vectors	12	13	0	0	1	0	1	0
3.	Kinematics	14	13	0	1	0	1	0	0
4.	Friction	08	10	0	0	0	0	1	0
5.	Work, Power and Energy	12	10	0	0	0	0	1	0
6.	Simple Harmonic Motion	12	13	0	0	1	0	1	0
7.	Heat & Thermodynamics	12	13	0	1	0	1	0	0
8.	Sound	12	13	0	1	0	0	0	1
9.	Properties of Matter	10	06	1	1	0	0	0	0
10.	Electricity & magnetism	12	13	0	1	0	0	1	0
11.	Modern Physics	08	03	1	0	0	0	0	0
<b>Tota</b>		<b>120</b>	<b>110</b>	<b>3</b>	<b>5</b>	<b>2</b>	<b>2</b>	<b>5</b>	<b>1</b>

**ENGINEERING CHEMISTRY & ENVIRONMENTAL STUDIES**  
(Common to all Branches)

**Subject Title** : Engineering Chemistry & Environmental Studies  
**Subject Code** : TT-104  
**Periods per week** : 04  
**Total periods per year** : 120

**Scheme of instruction and examination Time Schedule**

S.No	Major topic	No of Periods	Weight age of marks	Short type (3marks)			Essay type (10 marks)			remarks
				R	U	A	R	U	A	
<b>A. ENGINEERING CHEMISTRY</b>										
1	Fundamentals of Chemistry	18	16	1	0	1	0	1	0	
2	Solutions	10	8	1	0	0	0	0	1/2	5 mark
3	Acids and bases	10	8	0	0	1	0	1/2	0	5 mark
4	Principles of Metallurgy	10	10	0	0	0	1	0	0	
5	Electrochemistry	14	13	0	1	0	0	0	1	
6	Corrosion	8	10	0	0	0	0	1	0	
7	Water Technology	14	13	1	0	0	1	0	0	
8	Polymers	12	13	1	0	0	1	0	0	
9	Fuels	6	3	1	0	0	0	0	0	
<b>B. ENVIRONMENTAL STUDIES</b>		18	16	1	1	0	0	1	0	
total		120	110	6	2	2	3	3 1/2	1 1/2	
				18	6	6	30	35	15	

**OBJECTIVES**

**Upon completion of the course the student shall be able to**

**A. ENGINEERING CHEMISTRY**

**1.0 Understand the concept of Atomic structure**

- 1.1 Explain the charge and mass of fundamental particles of an atom (electron, proton and neutron)
- 1.2 Explain the concept of atomic number and mass number.
- 1.3 State the Postulates of Bohr's atomic theory and its limitations.

- 1.4 Explain the significance of four Quantum numbers.
- 1.5 Explain 1. Aufbau principle, 2 Pauli's exclusion principle 3 Hund's rule.
- 1.6 Define Orbital in an atom.
- 1.7 Draw the shapes of s, p and d- Orbitals .
- 1.8 Distinguish between Orbit and Orbital
- 1.9 Write the electronic configuration of elements up to atomic number 30
- 1.10 Explain the significance of chemical bonding
- 1.11 Explain the Postulates of Electronic theory of valency
- 1.12 Define the types of Chemical bonding viz., Ionic, Covalent bonds.
- 1.13 Explain the types of Chemical bonding viz., Ionic, Covalent bonds with examples.
- 1.14 Explain bond formation in NaCl and MgO.
- 1.15 List Properties of Ionic compounds
- 1.16 Explain bond formation in Hydrogen molecule, Oxygen molecule, and Nitrogen molecule using Lewis dot method.
- 1.17 List Properties of Covalent compounds
- 1.18 Distinguish between properties of ionic compounds and covalent compounds.
- 1.19 Structures of ionic solids -define a) Unit cell b) co-ordination number.
- 1.20 Structures of Unit cells of NaCl and CsCl.
- 1.21 Define the term. Oxidation number.
- 1.22 Calculate the Oxidation Number of underlined atoms in the following examples  
a)  $\text{KMMnO}_4$  b)  $\text{K}_2\text{Cr c)  $\text{HNO}_3$  d)  $\text{H}_2\text{SO e)  $\text{ClO}_4^-$  f)  $\text{NH$$$
- 1.23 Differentiate between Oxidation Number and Valency

## **2.0 Calculate Molarity and Normality of given Solution**

- 2.1 Define the terms 1. Solution, 2. Solute and 3. Solvent
- 2.2 Classify solutions based on physical state and solubility
- 2.3 Define mole
- 2.4 Problems on 'Mole concept'
- 2.5 Define the terms 1. Atomic weight, 2. Molecular weight and 3. Equivalent weight
- 2.6 Calculate Molecular weight and Equivalent weight of given Acids, ( $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ ) Bases ( $\text{NaOH}$ ,  $\text{KOH}$ ,  $\text{Ca(OH)}_2$ ) and Salts ( $\text{NaCl}$ ,  $\text{Na}_2\text{CO}_3$ ,  $\text{CaCO}_3$ )
- 2.7 Define 1. Molarity, 2. Normality of solutions
- 2.8 Solve Numerical problems on Molarity and Normality
  - a) calculate the Molarity or Normality if weight of solute and volume of solution are given
  - b) calculate the weight of solute if Molarity or normality with volume of solution are given



- c) problems on dilution to convert high concentrated solutions to low concentrated solutions

### **3.0 Understand the concepts of Acids and bases**

- 3.1 Explain Arrhenius theory of Acids and Bases
- 3.2 State the limitations of Arrhenius theory of Acids and Bases
- 3.3 Explain Bronsted–Lowry theory of acids bases
- 3.4 State the limitations of Bronsted–Lowry theory of acids bases
- 3.5 Explain Lewis theory of acids and bases
- 3.6 State the limitations of Lewis theory of acids and bases
- 3.7 Explain the Ionic product of water
- 3.8 Define pH and explain Sorenson scale
- 3.9 Solve the Numerical problems on pH (Strong Acids and Bases)
- 3.10 Define Buffer solution
- 3.11 Give atleast three examples for Buffer solutions
- 3.12 State the applications of Buffer solution

### **4.0 Understand the Principles of Metallurgy**

- 4.1 List at least eight Characteristics of Metals
- 4.2 Distinguish between Metals and Non Metals
- 4.3 Define the terms 1.Mineral, 2.Ore, 3. Gangue, 4.Flux and 5.Slag
- 4.4 Describe the methods of concentration of Ore; 1.Hand picking, 2.Levigation, and 3. Froth Floatation
- 4.5 Describe the methods involved in extraction of crude metal- Roasting, Calcination and Smelting.
- 4.6 Explain the purification of Metals by Electrolytic Refining
- 4.7 Define an Alloy
- 4.8 Write the Composition of the following alloys:1.Brass, 2. Germansilver, 3 Nichrome
- 4.9 List the uses of the following Alloys: 1. Brass, 2. German silver, 3. Nichrome

### **5.0 Understand the concepts of Electrochemistry**

- 5.1 Define the terms1. Conductor, 2. Insulator, 3.Electrolyte 4.Non–electrolyte
- 5.2 Distinguish between metallic conduction and Electrolytic conduction
- 5.3 Explain electrolysis by taking example fused NaCl
- 5.4 Explain Faraday's laws of electrolysis
- 5.5 Define 1.Chemical equivalent (E) 2.Electrochemical equivalent (e) and their relation.
- 5.6 Solve the Numerical problems based on Faraday's laws of electrolysis

- 5.7 Define Galvanic cell
- 5.8 Explain the construction and working of Galvanic cell
- 5.9 Distinguish between electrolytic cell and galvanic cell
- 5.10 Explain the electrode potentials and standard electrode potentials
- 5.11 Explain the electrochemical series and its significance
- 5.12 Explain the emf of a cell.
- 5.13 Solve the numerical problems on emf of the cell based on standard electrode potentials.

## **6.0 Understand the concept of Corrosion**

- 6.1 Define the term corrosion
- 6.2 state the Factors influencing the rate of corrosion
- 6.3 Describe the formation of a)composition cell, b)stress cell, c)concentration cell during corrosion.
- 6.4 Define rusting of iron and Explain the mechanism of rusting of iron.
- 6.5 Explain the methods of prevention of corrosion:
  - a)Protective coatings (anodic and cathodic coatings)
  - b) Cathodic protection (Sacrificial anode process and Impressed–voltage process)

## **7.0 Understand the concept of Water Technology**

- 7.1 State the various Sources of water like Surface water and sub-surface water.
- 7.2 Define the terms soft water and hard water with respect to soap consumption.
- 7.3 Define the term hardness of water
- 7.4 Types of hardness of water 1.Temporary hardness 2. Permanent hardness
- 7.5 List the salts that causing hardness of water(with Formulae)
- 7.6 State the disadvantages of using hard water in industries
- 7.7 Define Degree of hardness , units of hardness (mg/L) or ppm.
- 7.8 Explain the methods of softening of hard water: a) Ion-Exchange process, b) Permutit process or zeolite process
- 7.9 Concept of Osmosis and Reverse Osmosis with examples .
- 7.10 State the applications of Reverse Osmosis.
- 7.11 State essential qualities of drinking water.

## **8.0 Understand the concepts of Polymers**

- 8.1 Explain the concept of polymerisation
- 8.2 Describe the methods of polymerization a) addition polymerization of Ethylene b)condensation polymerization of phenol and formaldehyde (Only flow chart i.e. with out chemical equations)

- 8.3 Define the term plastic
- 8.4 Classify the plastics with examples
- 8.5 Distinguish between thermo and thermosetting plastics
- 8.6 List the Characteristics of plastics
- 8.7 State the advantages of plastics over traditional materials
- 8.8 State the disadvantages of using plastics.
- 8.9 Explain the methods of preparation of the following plastics:  
1.Polythene, 2. PVC, 3.Teflon, 4. Polystyrene and 5. Urea formaldehyde
- 8.10 Explain the uses of the following plastics:  
1.Polythene, 2. PVC, 3.Teflon, 4.Polystyrene and 5. Urea formaldehyde
- 8.11 Define the term natural rubber
- 8.12 write the structural formula of Natural rubber
- 8.13 Explain the processing of Natural rubber from latex
- 8.14 List the Characteristics of natural rubber
- 8.15 Explain the process of Vulcanization
- 8.16 List the Characteristics of Vulcanized rubber
- 8.17 Define the term Elastomer
- 8.18 Describe the preparation of the following synthetic rubbers a) Buna-s and b)Neoprene rubber
- 8.19 List the uses of the following synthetic rubbers a) Buna-s and b)Neoprene rubber

## **9.0 Understand the concepts of Fuels**

- 9.1 Define the term fuel
- 9.2 Classify the fuels based on physical state—solid, liquid and gaseous fuels,
- 9.3 Classify the fuels based on occurrence-primary and secondary fuels
- 9.4 List the characteristics of good fuel
- 9.5 State the composition and uses of gaseous fuels:  
a)water gas, b)producer gas, c)natural gas, d)coal gas, e)Biogas and f) acetylene

## **B. ENVIRONMENTAL STUDIES**

- 1.1 Define the term environment
- 1.2 Explain the scope and importance of environmental studies
- 1.3 Segments of environment 1).Lithosphere, 2).Hydrosphere, 3).Atmosphere, 4).Biosphere,
- 1.4 Define the following terms 1)Pollutant, 2).Pollution, 3).Contaminant, 4) receptor, 5) sink, 6) particulates, 7) dissolved oxygen, 8)Threshold limitvalue, 9).BOD, and 10).COD 11) eco system .
- 1.5 State the renewable and non renewable energy sources with examples.

- 1.6 Define the terms:
  - 1). Producers, 2). Consumers and 3). Decomposers with examples.
- 1.7 Explain biodiversity and threats to biodiversity
- 1.8 Define air pollution
- 1.9 Classify the air pollutants-based on origin and physical state of matter.
- 1.10 Explain the causes of Air pollution.
- 1.11 Explain the effects of air pollution on human beings, plants and animals.
- 1.12 State the uses of forest resources.
- 1.13 State the deforestation and its causes and effects.
- 1.14 Explain the 1.) Green house effect , 2) Ozone layer depletion and 3) Acid rain.
- 1.15 Explain the methods of control of Air pollution
- 1.16 Define Water pollution
- 1.17 Explain the causes of Water pollution
- 1.18 Explain the effects of Water pollution on living and Non-living things.
- 1.19 Explain the methods of control of Water pollution.

## **COURSE CONTENT**

### **A. ENGINEERING CHEMISTRY**

#### **1. Fundamentals of Chemistry**

**Atomic Structure:** Introduction - Fundamental particles – Bohr's theory – Quantum numbers - Aufbau principle - Hund's rule - Pauli's exclusion Principle- Orbitals, shapes of s, p and d orbitals - Electronic configurations of elements

**Chemical Bonding:** Introduction – types of chemical bonds – Ionic and covalent bond with examples – Properties of Ionic and Covalent compounds- structures of ionic crystals NaCl, CsCl.

**Oxidation Number-** calculations, differences between Oxidation Number and Valency.

#### **2. Solutions**

Introduction-concentration methods – Mole concept, Molarity, Normality, Equivalent weights, Numerical problems on Mole, Molarity and Normality.

#### **3. Acids and Bases**

Introduction – Theories of acids and bases and limitations – Arrhenius theory- Bronsted – Lowry theory – Lewis acid base theory – Ionic product of water– pH and related numerical problems – Buffer solutions – Applications

#### **4. Principles of Metallurgy**

Characteristics of Metals and distinction between Metals and Non Metals, Metallurgy, ore, Gangue, Flux, Slag - Concentration of Ore –Hand picking, Levigation, Froth floatation – Methods of Extraction of crude Metal – Roasting, Calcination, Smelting – Alloys – Composition and uses of Brass, German silver and Nichrome

#### **5. Electrochemistry**

Conductors, insulators, electrolytes– electrolysis – Faraday's laws of electrolysis- numerical problems – Galvanic cell – standard electrode potential – electrochemical series– emf and numerical problems on emf of a cell

#### **6. Water technology**

Introduction – soft and hard water–causes of hardness–types of hardness –disadvantages of hard water – degree of hardness (ppm) – softening methods – permutit process – ion exchange process– drinking water –Osmosis, Reverse Osmosis – Applications of Reverse osmosis

7. Introduction - factors influencing corrosion - composition, stress and concentration cells–rusting of iron and its mechanism – prevention of corrosion by coating methods, cathodic protection

#### **8. Polymers**

Introduction – polymerization – types of polymerization – addition, condensation with examples – plastics – types of plastics – advantages of plastics over traditional materials –Disadvantages of using plastics – preparation and uses of the following plastics: 1.Polythene 2. PVC 3.Teflon 4. Polystyrene 5. Urea formaldehyde – Rubber – Natural rubber – processing from latex – Vulcanization – Elastomers, Buna-s, Neoprene rubber and their uses .

#### **9. Fuels**

Definition and classification of fuels–characteristics of good fuel-composition and uses of gaseous fuels.

#### **B. ENVIRONMENTAL STUDIES**

Introduction – environment – scope and importance of environmental studies important terms – renewable and non-renewable energy sources – Concept of ecosystem , producers, consumers and decomposers – Biodiversity, definition and threats to Biodiversity.

Air pollution – causes -Effects– forest resources: uses and over exploitation, deforestation, acid rain, greenhouse effect –ozone depletion – control of air pollution – Water pollution – causes – effects – control measures,

## REFERENCEBOOKS

1. Intermediate chemistry Vol 1&2 Telugu Academy
2. Intermediate chemistry Vol 1&2 Vikram Publishers
3. Intermediate chemistry Vol 1&2 Vignan Publishers & Deepthi Publishers
4. Engineering Chemistry Jain & Jain
5. Engineering Chemistry O.P. Agarwal, Hi-Tech.
6. Engineering Chemistry Sharma
7. Engineering Chemistry A.K. De

## BASIC MECHANICAL AND ELECTRICAL ENGINEERING

**Subject Title** : **BASIC MECHANICAL AND ELECTRICAL ENGINEERING**  
**Subject Code** : **TT- 105**  
**Periods/Week** : **04**  
**Periods per semester** : **120**

### TIME SCHEDULE

S. No	Major Topics	No. of Periods	Weightage of Marks	Short Answer Questions	Essay Type Questions
1.	Sources of Energy, Boilers	6	8	1	1/2
2.	I.C. Engines.	12	13	1	1
3.	Air compressors and Hydraulic Pumps	14	13	1	1
4.	Refrigeration and Air conditioning	10	8	1	1/2
5.	Mechanical elements ,Friction and Lubrication	12	13	1	1
6.	Power Transmission - Belt, Rope, Chain and Gear Drives	21	13	1	1
7	Electrical engineering fundamentals	5	3	1	0
8	DC machines	12	13	1	1
9	A.C. Fundamentals & A.C. Machines	15	13	1	1
10	Electrical measuring instruments , Safety procedures & Illumination	13	13	1	1
<b>Total</b>		<b>120</b>	<b>110</b>	<b>10</b>	<b>08</b>

### OBJECTIVES

Upon completion of the course the student shall be able to

#### 1 Understand Sources of energy, Boilers

- 1.1 Define the term fuel
- 1.2 Classify the Fuels
- 1.3 List the advantages and disadvantages of solid, liquid and gaseous fuels
- 1.4 Define steam generators ( Boiler)
- 1.5 Classify the boilers

- 1.6 Explain the construction & working principle of
  - 1.6.1 Simple vertical boiler (Cochran boiler)
  - 1.6.2 Lancashire boiler
- 1.7 List the requirements of a good boiler
- 1.8 List the factors to be considered while selecting boilers
- 1.9 List the various boiler mountings
- 1.10 List the various boiler accessories

## **2 Understand I C Engines**

- 2.1 Define I. C. Engines
- 2.2 Classification of I.C. engines
- 2.3 Explain the construction & working principle of two stroke petrol engine
- 2.4 Explain the construction & working principle of four stroke petrol engine
- 2.5 Explain the construction & working principle of two stroke diesel engine
- 2.6 Explain the construction & working principle of four stroke diesel engine
- 2.7 Distinguish between two stroke and four stroke engines
- 2.8 Distinguish between petrol and diesel engines
- 2.9 State the advantages and disadvantages of two stroke and four stroke engines
- 2.10 State the function of carburetor
- 2.11 Mention different types of ignition systems
- 2.12 List the applications of I.C engines

## **3 Understand the concept of Air compressors and Hydraulic pumps**

- 3.1 Define the term "Compressor"
- 3.2 Classify the compressors
- 3.3 Explain the construction & working principle of single stage air compressor
- 3.4 Explain the construction & working principle of multi stage air compressor
- 3.5 Applications of air compressor
- 3.6 Enumerate the uses of compressed air in textile mills
- 3.7 Explain the function of pump
- 3.8 Classify the pumps
- 3.9 State the working principle of reciprocating pump
- 3.10 Explain the construction and working of single acting reciprocating pump
- 3.11 Explain the construction and working of double acting reciprocating pump
- 3.12 Explain the working principle & construction details of single stage centrifugal pump
- 3.13 Explain the working principle & construction details of multi stage centrifugal pump
- 3.14 Differentiate between reciprocating and centrifugal pumps
- 3.15 Advantages and disadvantages of centrifugal and reciprocating pumps

## **4 Understand Refrigeration & Air conditioning**

- 4.1 Define the term refrigeration
- 4.2 Express the unit of refrigeration
- 4.3 State the principle of refrigeration
- 4.4 Define the refrigerant
- 4.5 List commonly used refrigerants
- 4.6 List the properties of good refrigerants
- 4.7 State the principle of vapor compression refrigerator
- 4.8 Define the term air conditioning
- 4.9 State the principle of air conditioning



- 4.10 Explain about humidity control in air conditioning
- 4.11 State the functions of fans, ducts, filters (wet, dry, electric & viscous)
- 4.12 Explain about dust collectors with the help of legible sketch
- 4.13 Explain the use of heating & cooling coils
- 4.14 Explain air distribution systems

## **5 understand Mechanical elements, Friction and Lubrication**

- 5.1 Define the terms Fastener and Fastening
- 5.2 State the difference between V thread and square thread
- 5.3 Define different methods of locking
- 5.4 State the difference between Bolt and Rivet
- 5.5 State the applications of riveted joints
- 5.6 Define the term "key"
- 5.7 Mention different types of keys
- 5.8 Define coupling (shaft coupling)
- 5.9 Mention different types of couplings
- 5.10 Define clutch
- 5.11 State the function of clutch
- 5.12 Mention different types of clutches
- 5.13 Define brake
- 5.14 State the working principle of simple Block / shoe break
- 5.15 State the working principle of internally expanding shoe break
- 5.16 State the working principle of band break
- 5.17 State the difference between break and clutch
- 5.18 Define dynamo meter
- 5.19 Define bearing
- 5.20 Classify the bearings
- 5.21 Define the term friction
- 5.22 State the laws of friction
- 5.23 Define coefficient of friction
- 5.24 List the types of lubricants
- 5.25 List the properties of good lubricant
- 5.26 Mention different methods of lubrication

## **6 understand Power transmission – Belt, chain and Gear drives**

- 6.1 Classify the types of power transmission systems
- 6.2 Explain open and crossed belt drives
- 6.3 Solve simple problems on belt drives
- 6.4 State the disadvantages of flat belts
- 6.5 State the advantages of V belt
- 6.6 State the phenomenon of creep in belt drives and mention its results
- 6.7 State the difference between fast pulley and loose pulley
- 6.8 State the advantages and disadvantages of chain drives
- 6.9 Explain different types of gear drives by simple sketches
- 6.10 Explain different types of Gear trains by simple sketches
- 6.11 Solve simple problems related to gear drives

## **7 Understand Electrical Engineering Fundamentals**

- 7.1 Define the basic terms - Electric Current, electric Potential, Potential difference, E.M.F, Resistance, Specific resistance, Conductivity, electric Power, electric Energy, Conductor, Insulator and Semi conductor.

- 7.2 State the units for electrical current, voltage, Resistance, electric Power, electric Energy
- 7.3 State the factors influencing resistance
- 7.4 Effect of Temperature on resistance
- 7.5 Define Ohm's Law
- 7.6 Solve simple problems on Ohm's Law
- 7.7 State the Laws of Resistance
- 7.8 Resistance in Series and Parallel connections
- 7.9 Problems on calculating resistance in series and parallel connections
- 7.10 Explain Kirchhoff's laws.
- 7.11 Solve simple Problems on calculating Energy consumption and Electricity bill.
- 7.12 Define electric Field, electric Flux, Electric Field intensity, electric Flux density, Permittivity, Capacitor or Condenser, Capacitance
- 7.13 Define Magnetic Field, magnetic Flux, magnetic Flux density, magnetic Intensity, Absolute and Relative Permeability, Reluctance
- 7.14 State Faradays laws of Electro Magnetic Induction (no problems)
- 7.15 Explain Dynamically and Statistically induced E.M.F (no problems)
- 7.16 State Lenz's Law. (no problems)
- 7.17 Explain Fleming's Right Hand rule. (no problems)
- 7.18 Explain Inductance
  - 7.18.1 Self inductance
  - 7.18.2 Mutual inductance
  - 7.18.3 Coefficient of coupling

## **8 DC Machines**

- 8.1 Understand D.C. Machines.
  - 8.1.1 Explain working principle of D.C. Generator.
  - 8.1.2 Mention the types of DC generators with simple sketches
  - 8.1.3 Explain Constructional features of D.C. Generator and materials used.
  - 8.1.4 Explain the principle of operation of D.C. Motor.
  - 8.1.5 List the applications of D.C. motors

## **9 Understand A.C. Fundamentals and A.C. Machines**

- 9.1 Define
  - 9.1.1 Alternating Current, Amplitude (Peak Value), Time Period, Frequency, Instantaneous value, Average value, R.M.S Value, Form Factor
  - 9.1.2 Explain Graphical and Vector representation of alternating quantities.
  - 9.1.3 Explain Phase, Phase difference
  - 9.1.4 State power in an A.C. circuit and Power factor [No derivation]
    - 9.1.4.1 Resistance
    - 9.1.4.2 Inductance
    - 9.1.4.3 Capacitance
  - 9.1.5 Explain single phase circuit
    - 9.1.5.1 Simple series circuit consisting R-L, R-C, L-C and R-L-C.
    - 9.1.5.2 Simple parallel circuit R-L-C.
- 9.2 Write the methods of controlling power factor in textile mills
- 9.3 Explain Poly phase and 3 phase system
- 9.4 Explain phase difference in 3 phase system.
- 9.5 Understand Star-Delta connection.
- 9.6 Explain working principle of transformer and rating of transformer

- 9.7 .Write relation between Turns ratio, Voltage ratio and Current ratios
- 9.8 Describe the Transformer with a sketch
- 9.9 Explain the working Principle of three phase induction motor
- 9.10 Explain constructional features of – 3 phase Induction motors.
  - 9.10.1 Squirrel cage induction motor.
  - 9.10.2 Wound rotor induction motor
- 9.11 Describe with sketch
  - 9.11.1 D.O.L Starter
  - 9.11.2 Star – Delta Starter
  - 9.11.3 Rotor resistance starter
- 9.12 State the application of 3 phase induction Motor.
- 9.13 Explain the working principle of Single Phase induction motor.
- 9.14 List out types of single phase induction Motors.
- 9.15 State the applications of single phase induction Motors.
- 9.16 Explain the Energy conservation measures in Textile Industry.

## **10 Understand Electrical Measuring Instruments , Safety Procedures & Illumination**

- 10.1 Explain construction and working principle of Moving Coil ammeter and Volt meter.
- 10.2 Explain construction and working principle of Moving iron ammeter and Voltmeter.
- 10.3 State the working principle of
  - a) Dynamometer type wattmeter.
  - b) A. C. Single phase induction type Energy meter
- 10.4 Explain effect of electrical shock and Burn.
- 10.5 State procedure to be adopted in case of electric shocks.
- 10.6 State purpose of Earthing of electrical equipment and machinery.
- 10.7 Describe the procedure for Pipe earthing.
- 10.8 Define Brightness, Luminous Flux, Luminous Intensity, Lumen and Candle Power.
- 10.9 List different types of lamps used in Textile mills.
- 10.10 Explain the illumination requirements in Textile mills.

## **COURSE CONTENT**

**1 Sources of energy, Boilers** Define the term fuel - Classify the Fuels -Advantages and disadvantages of different fuels – Boilers : Classify the boilers - construction &working principle of Simple vertical boiler (Cochran boiler) and Lancashire boiler - Requirement of good boiler -Factors to be considered while selecting boilers - Boiler mountings and boiler accessories

### **2 I C Engines**

Definition of I. C. Engines - Classification of I.C. engines - Construction & working principles of two stroke and four stroke engines and diesel and petrol engines - petrol engine –Distinction between two-stroke and four-stroke engines – Distinction between petrol and diesel engines -Advantages and disadvantages of two stroke and four stroke engines - State the function of carburetor - Mention different types of ignition systems - List the applications of I.C engines

### **3 Understand the concept of Air Compressors and Hydraulic pumps**

Compressors : Classify the compressors - construction & working principle of single stage and multi stage air compressors - Applications of air compressor - uses of compressed air in textile mills. Function of pump - Classify the pumps - Working principle of reciprocating pump - Construction and working of single acting and double reciprocating pumps - construction and working of single stage centrifugal pump and multi stage centrifugal pump - Differentiate between reciprocating and centrifugal pumps - Advantages and disadvantages of centrifugal and reciprocating pumps

### **4 Refrigeration & Air conditioning**

Define refrigeration - unit of refrigeration -Principle of refrigeration - Define the refrigerant - Commonly used refrigerants - Properties of good refrigerants - Principle of vapor compression refrigerator - Air conditioning : principle of air conditioning - Humidity control in air conditioning - functions of fans, ducts, filters (wet, dry, electric & viscous) -Dust collectors - Use of heating & cooling coils - Air distribution systems

### **5 Mechanical elements, Friction and Lubrication**

Fastener and Fastening - Difference between V thread and square thread - Different methods of locking - difference between Bolt and Rivet - applications of riveted joints – Definition of the term "key" - types of keys - Define coupling (shaft coupling)- types of couplings – Definition of clutch - function of clutch - Different types of clutches - Define brake - Principle of simple Block / shoe break - Principle of internally expanding shoe break - working principle of band break - Difference between break and clutch - Define dynamo meter - Define bearing - Classify the bearings - Define the term friction - laws of friction - coefficient of friction - types of lubricants - properties of good lubricant - different methods of lubrication

### **6 Power transmission – belt, chain and Gear drives**

Classify the types of power transmission systems - open and crossed belt drives - Simple problems on belt drives - Disadvantages of flat belts - Advantages of V belt - phenomenon of creep in belt drives - Difference between fast pulley and loose pulley -  
Advantages and disadvantages of chain drives - types of gear drives - types of Gear trains - simple problems related to gear drives

### **7 Electrical Engineering Fundamentals &**

Definition of basic terms of Electrical engineering and their units - Factors influencing resistance - Effect of temperature on resistance - Ohm's Law - Simple problems on Ohm's Law - Laws of Resistance - Resistance in series and parallel connections - Problems on calculating resistance in series and parallel connections - Kirchhoff's laws – Simple problems on calculating Energy consumption and Electricity bill - Basic terms in Electromagnetism - Faradays laws of Electro Magnetic Induction (no problems) - Dynamically and Statistically induced E.M.F (no problems) - Lenz's Law. (no problems) - Fleming's Right Hand rule. (no problems) – Inductance, Self inductance, Mutual inductance - Coefficient of coupling.

## 8 DC Machines

Understand D.C. Machines - Working principle of D.C. Generator – Types- Constructional features of D.C. Generator and materials used - Principle of operation of D.C. Motor - Applications of D.C. motors

## 9 A.C. Fundamentals and A.C. Machines

Basic definitions -Graphical and Vector representation of alternating quantities – Phase and Phase Difference -Power in an A.C. circuit and Power Factor [No derivation] - Resistance -Inductance –Capacitance - Single phase circuit -Simple series circuit consisting R-L, R-C, L-C and R-L-C - Simple parallel circuit R-L-C - methods of controlling power factor in textile mills -poly phase and 3 phase system - Phase difference in 3 phase system - Star-Delta connection - Working principle of transformer and rating of transformer - Relation between Turns ratio, Voltage ratio and Current ratios - Describe with sketch a Transformer -Three phase induction motor working Principle - Constructional features of – 3 phase Induction motors - Squirrel cage induction motor -Wound rotor induction motor - D.O.L Starter - Star – Delta Starter - Rotor resistance starter - Applications of 3 phase induction Motor - Working principle of single Phase induction motor -Types of single phase induction Motors - Applications of single phase induction Motors -Energy conservation measures in Textile Industry.

## 10 Understand Electrical Measuring Instruments , Safety Procedures & Illumination

Explain construction and working principle of Moving Coil Ammeter and Volt meter - Working principle of Moving Iron Ammeter and Voltmeter -Working principle of Dynamometer type Wattmeter - A. C. Single phase induction type Energy meter - Effect of electrical shock and burn- Procedure to be adopted in case of electric shocks - Purpose of earthing of electrical equipment and machinery - Procedure for pipe earthing – Define Brightness, Luminous Flux, Luminous Intensity, Lumen and Candle power - Different types of lamps used in Textile mills - Illumination requirements in Textile mills.

## REFERENC BOOKS

1. Theraja B.L. - A Text Book of Electrical Engg. and Electronics.
2. Mehtha.V.K - Principles of Electronics
3. Gupta - Fundamentals of Elec. Engg.
4. Uppal - A Text Book of Elec.Engg & Electronics.
5. Machine design - R.S.Khurmi
6. Design of machine elements - Pandya & Shaha
7. Theory of machines - Thomas Bevan
8. Design of machine elements –V.V.Bhandari
9. Elements of Mechanical Engineering – Gopala Krishnanan

## TEXTILE FIBERS

Course Title	:	Textile Fibers
Course Code	:	TT – 106
Periods per week	:	04
Periods per year	:	120

## TIME SCHEDULE

S.No.	Major Topics	No. of Periods	Weightage of marks	Short Answer Type	Essay Type
1.	Introduction to Textile Fibres	8	3	1	
2	Natural Cellulose fibers	16	13	1	1
3	Natural Protein fibers – Wool	14	13	1	1
4	Natural protein fibers – Silk	14	13	1	1
5	Introduction to Man-Made fibers	12	13	1	1
6	Manufacture of man made fibers	26	26	2	2
7	Applications of textile fibers	15	13	1	1
8	Identification and comparisons of textile fibers.	15	16	2	1
	<b>Total</b>	<b>120</b>	<b>110</b>	<b>10</b>	<b>08</b>

## OBJECTIVES

On completion of this course, student should be able to comprehend the following

### 1. Introduction to Textiles and Textile Fibers

- 1.1. Name the major textile industries in India.
- 1.2. Identify different sectors of textile industry.
- 1.3. Definitions of terms – Monomer, Polymer, Degree of Polymerization, Fiber, Textile Fiber, Filament, Yarn, Thread, Fabric, Garment.
- 1.4. Difference between Staple Yarn and Filament yarn
- 1.5. Different methods of producing fabric –woven, knitted, Non-woven fabrics

- 1.6. Differences between woven and knitted fabric
- 1.7. Differences between woven and Non-woven fabric.
- 1.8. Essential properties of textile fibers
- 1.9. Classification of textile fibers based on Source and chemical nature.
- 2.0 General Sequence of operations involved in Conversion of cotton  
From fiber to garment.

## **2. Natural Cellulose fibers**

- 2.1. List of natural cellulose fibers
- 2.2. Cotton
  - 2.2.1. Mention the Botanical Classification of cotton plant.
  - 2.2.2. World and Indian varieties of cotton.
  - 2.2.3. List the essential properties of cotton.
  - 2.2.4. Explain Cultivation, Harvesting and picking of cotton.
  - 2.2.5. Mention the Fibre quality parameters for grading of cotton.
  - 2.2.6. Explain the Morphological structure / microscopic structure of cotton .
  - 2.2.7. Explain the Crystalline and amorphous structure of cotton.
  - 2.2.8. Explain the importance of Convolutions in cotton.
  - 2.2.9. Chemical Composition.
  - 2.2.10. Explain physical and chemical properties of cotton.
- 2.3. Bast fibers
  - 2.3.1. List the features of Bast fibers - Jute and Flax.
  - 2.3.2. Explain the Preparation of Bast fibers for extraction (Retting) .
  - 2.3.3. Extraction (Manufacturing) of Bast fibers.
  - 2.3.4. Explain the microscopic and longitudinal Structure of bast fibers – Jute & Flax
  - 2.3.5. Physical and chemical properties of jute and flax fibres.

## **3. Natural protein fibre - Wool**

- 3.1. Classification of wool – by sheep, by fleece and by commercial use
- 3.2. Factors influencing quality of wool
- 3.3. Wool producing countries
- 3.4. Impurities in raw wool
- 3.5. Explain the Cleaning and preparation of wool for production of Yarns.
- 3.6. Differences between Woollen and Worsted Yarns.

- 3.7. Physical Structure of wool / wool fibers cross section
- 3.8. Felting property of wool.
- 3.9. Explain the physical and chemical properties of wool.

#### **4. Natural protein fibre – Silk**

- 4.1. Varieties of Silk
- 4.2. Sericulture - study of life cycle of silkworm.
- 4.3. Physical characteristics of cocoon
- 4.4. Mulberry silk Vs Non mulberry silk
- 4.5. Explain different stages in production of raw silk from cocoons
- 4.6. Mulberry Silk Reeling
  - 4.6.1. Systems of reeling – comparison
  - 4.6.2. Charkha reeling
  - 4.6.3. cottage basin reeling
  - 4.6.4. Multi end reeling machine
  - 4.6.5. Automatic reeling machine
- 4.7. Degumming of Silk.
- 4.8. Weighing of Silk.
- 4.9. Process flow charts of Mulberry silk, Tassar and Muga cocoons .
- 5.0 Explain the physical and chemical properties of Silk.

#### **5.0 Introduction to Man-Made fibers**

- 5.1 Basic raw materials used for production of Synthetic fibers.
- 5.2 Requirements of fiber forming Polymers.
- 5.3 Different methods of fiber formation (methods of fibre spinning)
  - 5.3.1 Melt Spinning
  - 5.3.2 Wet Spinning
  - 5.3.3 Dry Spinning
  - 5.3.4 Advantages and disadvantages of different fibre spinning methods( wet-spinning, Dry-spinning and melt spinning)
- 5.4 List the Spinning methods for different polymers.



## **6.0 Manufacturing of Man-Made fibers**

6.1 Explain the manufacturing process of

6.2 Semi synthetic fibers

6.2.1 Regular Viscose

6.2.2 Lyocell

**6.2.3** Cellulose acetate

6.3 Synthetic fibers

6.3.1 Polyester

6.3.2 Nylon ( Nylon6, & Nylon 6,6)

6.3.3 Olefin fibers ( Polyethylene & Poly propylene)

6.3.4 Acrylic fibers

6.3.5 Modacrylic fibers

6.4 Explain different physical and chemical properties of viscose Rayan, Lyocell, Polyester, Nylon6, nylon 66 ,Acrylic fibres ,polypropelene fibre

## **7.0 Applications of Textile fibers**

7.1 Applications of following fibers in apparel, furnishing fields

7.1.1 Cotton, Jute,flax,Wool, Silk

7.1.2.Viscose, Lyocell, Acetate

7.1.3. Polyester, Nylons6,Nylon66, Acrylic

7.2 Tabulate applications of textile fibers based on their specific properties

7.3 Tabulate the examples of industrial and technical textiles

7.4 Uses of wool.

## **8.0 Identification and Comparison of textile fibers**

8.1 List different methods of fiber identification.

8.2 List various Solvents dissolving textile fibers

8.3 Describe microscopic appearance (longitudinal and cross sectional) of textile fibers of cotton,wool,silk,polyester,nylon6,nylon 66 and Acrylic.

8.4 Tabulate identification of textile fibers by Burning Test.

8.5 Comparison of natural and synthetic fibers

8.6 Comparison of Jute and Flax

8.7 Comparison of wool and silk

8.8 Comparison of Vegetable and animal fibers.

Comparison of cotton, Viscose and Lyocell

## CONTENTS

**Introduction to Textiles and Textile Fiber**- major textile industries in India -Definitions of terms – Monomer, Polymer, Degree of Polymerisation, Fiber, Textile Fiber, Filament, Yarn, Thread, Fabric, Garment, Difference between Staple Yarn and Filament yarn - methods of producing fabric – their definitions-Essential properties of textile fibers - Classification of textile fibers based on Source and chemical nature.-General Sequence of operations involved in Conversion of cotton fiber to garment

**Natural Cellulose fibers** -natural cellulose fibers -Cotton -Botanical Classification of cotton.-World and Indian varieties of cotton and their essential properties -Cultivation, Harvesting and picking of cotton plant.-Fibre quality parameters for grading of cotton - Morphological structure / microscopic structure of cotton -Crystalline and amorphous structure-Convolutions -Chemical Composition ,physical and chemical properties of cotton,.-Bast fibers -Features of Bast fibers - Jute and Flax.-Preparation of Bast fibers for extraction (Retting) .-Extraction (Manufacturing) of Bast fibers.-Structure of bast fibers – Jute & Flax,,physical and chemical properties of jute and flax fibres.

**Natural protein fibre - Wool** -Classification of wool – by sheep, by fleece and by commercial use -Factors influencing quality of wool -Virgin wool and shoddy wool -Wool producing countries -Impurities in raw wool -Cleaning and preparation wool for production of Yarns.-Differences between Woollen and Worsted Yarns.-Physical Structure of wool / wool fibers fibre cross -section --Felting property of wool.,physical and chemical properties of wool.

**Natural protein fibre – Silk** -Varieties of Silk -Sericulture - study of life cycle of silkworm.-Physical characteristics of cocoon -Mulberry silk Vs Non mulberry silk - different stages in production of raw silk from cocoons -Drying / Stifling – different methods -Cocoon cooking – different methods -Mulberry Silk Reeling -Systems of reeling – comparison -Functions of croissure -Charkha reeling -cottage basin reeling - Multi end reeling machine -Automatic reeling machine -Degumming of Silk.-Weighing of Silk.-Process flow charts of -mulberry silk, Tassar and Muga coccons ,physical and chemical properties of silk fibre.

**Introduction to Man-made Fiber**-basic raw materials used for production of Synthetic fibers-Monomers used for common textile fibers and their chemical structure-Requirements of fiber forming Polymers.-Different methods of fiber formation (methods of fibre spinning)-Melt Spinning-Wet Spinning-Dry Spinning-Spinning methods for different polymers-Advantages and disadvantages of different fibre spinning methods.

**Manufacturing of Man-made fibers**-manufacturing process of -Semi synthetic fibers - Regular Viscose-Lyocell -Cellulose acetate -Synthetic fibers -Polyester -Nylon ( Nylon6, & Nylon 6,6)-Olefin fibers ( Polyethylene & Poly propylene) -Acrylic fibers -Modacrylic fibers -different physical and chemical properties of viscose rayon,Lyocell,polyester,nulon6.nylon66 and Acrylic fibres.

**Applications of Textiles fibers** -Applications of fibers in apparel, furnishing files - Cotton, Bast Fibres, Wool, Silk, -Viscose, Lyocell, Acetate -Polyester, Nylons, Acrylic - applications of textile fibers based on their specific properties -the examples of industrial and technical textiles- Use of manufactured fibers for different purposes.uses of wool.

**Identification and Comparison of textile fibers**-different methods of fiber identification. -various Solvents dissolving textile fibers - microscopic appearance (longitudinal and cross sectional) of textile fibers - identification of textile fibers by Burning Test.-Uses of wool – apparel, furnishing, carpets, industrial -Comparison of natural and synthetic fibers-Comparison of Jute and Flax -Comparison of wool and silk- Comparison of Vegetable and animal fibers.-Comparison of cotton, Viscose and Lyocell.

#### **REFERENCE BOOKS**

- |    |  |   |                  |
|----|--|---|------------------|
| 1. | Textile Science                                | - | Gohl & Velensky. |
| 2. | A text book of<br>Fiber Science and Technology | - | S.P. Mishra.     |
| 3. | Production of Synthetic fibers                 | - | A.A. Vaidya.     |
| 4. | Textile Science                                | - | Gohl & Velensky. |
| 5. | A text book of<br>Fiber Science and Technology | - | S.P. Mishra.     |
| 6. | Production of Synthetic fibers                 | - | A.A. Vaidya.     |
| 7. | Textiles                                       | - | Sara J Kadolph   |

## Engineering Drawing

Subject Title	:	Engineering Drawing
Subject Code	:	TT-107 (Common to all Branches)
Periods/Week	:	06
Periods Per Year	:	180

### Time Schedule

Sno	Major Topics	No. of Periods	Weightage of marks	Short Answer Questions	Essay type Questions
1	Importance of Engineering Drawing	01	-	-	-
2	Engineering Drawing Instruments	05	-	-	-
3	Free hand lettering & Numbering	06	5	1	-
4	Dimensioning Practice	09	5	1	-
5	Geometrical Constructions	21	15	1	1
6	Projection of points, Lines, Planes & Solids	21	10	-	1
7	Auxiliary views	06	5	1	-
8	Sectional views	27	10	-	1
9	Orthographic Projection	33	10	-	1
10	Pictorial drawing	30	10	-	1
11	Development of surfaces	21	10	-	1
	<b>Total</b>	<b>180</b>	<b>80</b>	<b>04</b>	<b>06</b>

The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation

## **OBJECTIVES**

**Upon completion of the subject the student shall be able to**

### **1) Understand the basic concepts of Engineering Drawing**

- a) State the importance of drawing as an engineering communication medium
- b) State the necessity of B.I.S. Code of practice for Engineering Drawing
- c) Explain the linkages between Engineering drawing and other subjects of study in diploma course

### **2) Use of Engineering Drawing Instruments**

- a) Select the correct instruments and draw lines of different orientation
- b) Select the correct instruments and draw small and large Circles
- c) Select the correct instruments for measuring distances on the drawing
- d) Use correct grade of pencil for different types of lines, thickness and given function
- e) Select and use appropriate scales for a given application
- f) Identify different drawing sheet sizes as per I.S. and Standard Layouts
- g) Prepare Title block as per B.I.S. Specifications
- h) Identify the steps to be taken to keep the drawing clean and tidy

### **3) Write Free Hand Lettering and Numbers**

- a) Write titles using slanting letters and numerals of 7mm, 10mm and 14mm height
- b) Write titles using vertical letters and numerals of 7mm, 10mm and 14mm height
- c) Select suitable sizes of lettering for different layouts and applications

### **4) Understand Dimensioning Practice**

- a) Define "Dimensioning"
- b) State the need of dimensioning the drawing according to accepted standards
- c) Identify notations of Dimensioning used in dimensioned drawing
- d) Identify the system of placement of dimensions in the given dimensioned drawing
- e) Dimension a given drawing using standard notations and desired system of dimensioning
- f) Dimension standard features applying necessary rules
- g) Arrange dimensions in a desired method for a given drawing
- h) Identify the departures if any made in the given dimensioned drawing with reference to SP-46-1988, and dimension the same correctly

### **5) Apply Principles of Geometric Constructions**

- a) Divide a given line into desired number of equal parts internally
- b) Draw tangent lines and arcs
- c) Use General method to construct any polygon
- d) Explain the importance of conics
- e) Construct ellipse by concentric circles method
- f) Construct parabola by rectangle method

- g) Construct rectangular hyperbola from the given data
- h) Construct involute from the given data
- i) Construct cycloid and helix from the given data
- j) State the applications of the above constructions in engineering practice

**6) Apply Principles of Projection of points, lines, planes & solids**

- a) Visualize the objects
- b) Explain the I-angle and III-angle projections
- c) Practice the I-angle projections
- d) Draw the projection of a point with respect to reference planes (HP&VP)
- e) Draw the projections of straight lines with respect to two reference planes (cases of lines parallel to one plane and inclined to other plane only)
- f) Draw the projections of planes (cases of planes perpendicular to one plane and inclined to other plane only)
- g) Draw the projections of solids (cases of axis perpendicular to one plane and inclined to other plane only)

**7) Understand the need of auxiliary views**

- a) State the need of Auxiliary views for a given engineering drawing
- b) Draw the auxiliary views of a given engineering component
- c) Differentiate between auxiliary view and apparent view

**8) Appreciate the need of Sectional Views**

- a) Explain the need to draw sectional views
- b) Select the section plane for a given component to reveal maximum information
- c) Explain the positions of section plane with respect to reference planes
- d) Differentiate between true shape and apparent shape of section
- e) Draw sectional views and true sections of regular solids discussed in chapter-6 above
- f) Apply principles of hatching

**9) Apply principles of orthographic projection**

- a) Explain the principles of orthographic projection with simple sketches
- b) Draw the orthographic view of an object from its pictorial drawing
- c) Draw the minimum number of views needed to represent a given object fully

**10) Prepare pictorial drawings**

- a) State the need of pictorial drawings
- b) Differentiate between isometric scale and true scale
- c) Prepare Isometric views for the given orthographic drawings

**11) Interpret Development of surfaces of different solids**

- a) State the need for preparing development drawing
- b) Prepare development of simple engineering objects (cubes, prisms, cylinders, cones, pyramids) using parallel line and radial line methods
- c) Prepare development of surface of engineering components like trays, funnels, 90° elbows & rectangular duct

## **COURSE CONTENT**

### **NOTE**

- 1) B.I.S Specifications should invariably be followed in all the topics.**
- 2) A-3 Size Drawing Sheets are to be used for all Drawing Practice Exercises.**
- 3) First Angle Projection is to be followed for all Orthographic projection exercises**

#### **1) The importance of Engineering Drawing**

Explanation of the scope and objectives of the subject of Engineering Drawing, Its importance as a graphic communication -Need for preparing drawing as per standards – SP-46–1988 – Mention B.I.S - Role of drawing in engineering education – Link between Engineering drawing and other subjects of study

#### **2) Engineering drawing Instruments**

Classification: Basic tools, tools for drawing straight lines, tools for curved lines, tools for measuring distances and special tools like mini drafter & drafting machine – Mention the names under each classification and their brief description -Scales: Recommended scales reduced & enlarged scales-Lines: Types of lines, selection of line thickness - Selection of Pencils -Sheet Sizes: A0, A1, A2, A3, A4, A5, Layout of drawing sheets in respect of A0, A1, A3 sizes, Sizes of the Title block and its contents - Care and maintenance of Drawing Sheet

#### **Drawing Plate 1: Consisting of two exercises on use of drawing instruments**

#### **3) Free hand lettering & numbering**

Importance of lettering – Types of lettering -Guide Lines for Lettering- Practicing letters & numbers of given sizes (7mm, 10mm and 14mm) Advantages of single stroke or simple style of lettering

#### **Drawing plate 2: Consisting of five to six exercises on freehand Lettering & Numbering**

#### **4) Dimensioning practice**

Purpose of engineering Drawing, Need of B.I.S code in dimensioning -Shape description of an Engineering object - Dimensioning size, Location features, surface finish, fully dimensioned Drawing - Notations or tools of dimensioning, dimension line, extension line, leader line, arrows, symbols, number and notes, rules to be observed in the use of above tools - Placing dimensions: Aligned system and unidirectional system ( SP-46- 1988) - Arrangement of dimensions: Chain, parallel, combined, progressive, and dimensioning by co-ordinate methods - The rules for dimensioning standard features Circles (holes) arcs, angles, tapers, chamfers, and dimensioning of narrow spaces

#### **Drawing Plate 3: Consisting of 8 exercises on Dimensioning methods and rules**

## 5) Geometric Constructions

Division of a line: to divide a straight line into given number of equal parts internally and its examples in engineering applications. Construction of tangent lines: to draw tangent lines touching circles internally and externally. Construction of tangent arcs i) To draw tangent arc of given radius to touch two lines inclined at given angle (acute, right and obtuse angles) ii) Tangent arc of given radius touching a circle or an arc and a given line iii) Tangent arcs of radius R, touching two given circles internally and externally Construction of polygon: Construction of any regular polygon of given side using general method. Conical Curves: Explanation of Ellipse, Parabola, Hyperbola, as sections of a double cone and loci of a moving point, Eccentricity of above curves – Their Engg. applications viz. Projectiles, reflectors, P-V Diagram of a Hyperbolic process - Construction of ellipse by concentric circles method - Construction of parabola by rectangle method - Construction of rectangular hyperbola - General Curves: Involute, Cycloid and Helix, explanations as locus of a moving point, their engineering applications, viz, Gear tooth profile, screw threads, springs etc. - their construction.

**Drawing Plate 4: Consisting of eight exercises on construction of polygons**

**Drawing Plate 5: Consisting of eight exercises on construction of conics**

**Drawing Plate 6: Consisting of eight exercises on involute, cycloid and helix**

## 6) Projection of points, lines, planes & solids

Projecting a point on two planes of projection -Projecting a point on three planes of projection -Projection of straight line i) Parallel to both the planes ii) Perpendicular to one of the planes iii) Inclined to one plane and parallel to other plane - Projection of regular planes- i) Plane perpendicular to HP and parallel to VP and vice versa ii) Plane perpendicular to HP and inclined to VP and vice versa - Projection of regular solids with i) Axis perpendicular to one of the planes ii) Axis parallel to VP and inclined to HP and vice versa

**Drawing Plate 7: Consisting of eight exercises on projection of points and Lines**

**Drawing Plate 8: Consisting of eight exercises on projection of planes**

**Drawing Plate 9: Consisting of eight exercises on projection of solids**

## 7) Auxiliary views

Need for drawing auxiliary views - Explanation of the basic principles of drawing auxiliary views, explanation of reference plane and auxiliary plane - Partial auxiliary view.

**Drawing plate 10: Consisting of four exercises on auxiliary views**



## **8) Sectional views**

Need for drawing sectional views – what is a sectional view - Location of cutting plane – Purpose of cutting plane line – Selection of cutting plane to give maximum information (vertical and offset planes) - Hatching – Section of regular solids inclined to one plane and parallel to other plane

**Drawing Plate 11: Consisting of six exercises on sections of solids**

## **9) Orthographic Projections**

Meaning of orthographic projection -Using a viewing box model – Number of views obtained on the six faces of the box, - Legible sketches of only 3 views for describing object - Concept of front view, top view, and side view, sketching these views for number of engineering objects - Explanation of first angle projection. – Positioning of three views in First angle projection - Projection of points as a means of locating the corners of the surfaces of an object – Use of mitre line in drawing a third view when other two views are given - Method of representing hidden lines - Selection of minimum number of views to describe an object fully

**Drawing Plate 12: Consisting of 12 exercises on orthographic projections of engineering objects**

## **10) Pictorial Drawings**

Brief description of different types of pictorial drawing viz., Isometric, oblique, and perspective and their use - Isometric drawings: Iso axis, angle between them, meaning of visual distortion in dimensions - Need for an isometric scale, difference between Isometric scale, and ordinary scale- difference between Isometric view and Isometric projection - Isometric and Non-isometric lines -Isometric drawing of common features like rectangles, circular shapes, non-isometric lines - Use of box and offset methods

**Drawing plate 13: Consisting of 12 exercises on Isometric views of engineering objects**

## **11) Development of Surfaces**

Need for preparing development of surface with reference to sheet metal work -Concept of true length of a line with reference to its orthographic projection when the line is (i) parallel to the plane of projection (ii) inclined to one principal plane and parallel to the other -Development of simple solids like cubes, prisms, cylinders, cones, pyramids -Types of development: Parallel line and radial line development -Procedure of drawing development - drawings of trays, funnels, 90° elbow pipes and rectangular ducts.

**Drawing plate 14: Consisting of 5 exercises on development problems**

## REFERENCE BOOKS

Engineering Graphics                    by     P I Varghese – ( McGraw-hill)

Engineering Drawing                by     Basant Agarwal & C.M Agarwal - ( McGraw-hill)

Engineering Drawing                by     N.D.Bhatt.

T.S.M. & S.S.M on “ Technical Drawing” prepared by T.T.T.I., Madras.

SP-46-1998 – Bureau of Indian Standards.

## WORKSHOP PRACTICE

**Subject Title** : **WORKSHOP PRACTICE**  
**Subject Code** : **TT-108**  
**Periods/Week** : **06**  
**Periods Per Year** : **180**

### TIME SCHEDULE

<b>S.No</b>	<b>Major Title</b>	<b>No of Periods</b>
1	Carpentry shop	45
2	Sheet metal work	45
3	Welding shop	45
4	Machine shop	45
	Total	180

### OBJECTIVES

Upon completion of the course the student shall be able to

- Practice the required operations in Carpentry Shop
- Practice the required operations in Sheet metal Shop
- Practice the required operations in Welding Shop
- Practice the required operations in Lathe Machine Shop

**Competencies and KEY competencies to be achieved by the student.**

Title of the Job	Competencies	Key Competencies
<p><b>Carpentry Shop (45)</b></p> <p>1. Cutting of wood with hand saw (06)</p>	<ul style="list-style-type: none"> <li>- Identify the orientation of grains</li> <li>- Select appropriate saw for cutting in each of the directions viz. across and along the grains</li> <li>- Select appropriate work holding device</li> <li>- Handle appropriate measuring and marking tools(Steel rule, Try square, Marking gauge)</li> <li>- Mark dimensions on work using Marking gauge</li> <li>- Fix the work in the vice</li> <li>- Perform cutting along the grains using Rip saw</li> <li>- Change the position of work in the vice</li> <li>- Perform cutting perpendicular the grains using cross cut saw</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the orientation of grains</li> <li>• Mark dimensions on work using marking gauge</li> <li>• Perform cutting along and perpendicular the grains using appropriate saw</li> </ul>
<p>2. Planning of wood(06)</p>	<ul style="list-style-type: none"> <li>- Identify the direction for planning wood stock</li> <li>- Select appropriate jack plane</li> <li>- Prepare the jack plane for planning (Load and unload the blade of a jack plane</li> <li>- Select appropriate work holding device</li> <li>- Perform marking on work using appropriate tool</li> <li>- Fix the work in the vice</li> <li>- Plane the surfaces on all four sides using jack plane</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the direction for planning wood stock</li> <li>• Prepare the jack plane for planning</li> <li>• Plane the surfaces on all four sides using jack plane</li> </ul>
<p>3. Chiseling of wood (06)</p>	<ul style="list-style-type: none"> <li>- Select appropriate chisels and saw</li> <li>- Select appropriate work holding device</li> <li>- Select appropriate measuring and marking tools</li> <li>- Fix the work in the vice</li> <li>- Mark the position of grooves on work using marking gauge</li> <li>- Cut sides of grooves by hand saw</li> <li>- Chip the material using firmer chisel by applying pressure with mallet</li> <li>- Finish the grooves with rasp file</li> </ul>	<ul style="list-style-type: none"> <li>• Select appropriate chisels and saw</li> <li>• Mark the position of grooves on work using marking gauge</li> <li>• Cut sides of grooves by hand saw</li> <li>• Chip the material using firmer chisel by applying pressure with mallet</li> </ul>
<p>4. Preparation of a Dove tail joint (06)</p>	<ul style="list-style-type: none"> <li>- Select the appropriate cutting tools and work holding devices</li> <li>- Plane the wooden pieces on all sides</li> <li>- Mark at an angle of 75<sup>0</sup> with bevel square</li> <li>- Trim the dovetail by chisel to exact size</li> <li>- Cutt the dovetail groove on second piece</li> <li>- Finish the groove</li> <li>- Assemble the two pieces to prepare dovetail halving joint by using mallet</li> </ul>	<ul style="list-style-type: none"> <li>• Trim the dovetail by chisel to exact size</li> <li>• Mark at an angle of 75<sup>0</sup> with bevel square</li> <li>• Cutt the dovetail groove on second piece</li> <li>• Assemble the two pieces to prepare dovetail halving joint by using mallet</li> </ul>

<p>5. Preparation of Mortise and Tenon joint Preparation of Mortise and Tenon joint (06)</p>	<ul style="list-style-type: none"> <li>- Select the appropriate cutting tools and work holding devices</li> <li>- Plane the two pieces to the required size using jack plane</li> <li>- Mark the dimensions to make Tenon using mortise gauge</li> <li>- Cut tenon with tenon saw along the marked lines</li> <li>- Use firmer chisel to remove the excess material to set finished tenon</li> <li>- Mark the dimension to make mortise on the second piece with mortise gauge</li> <li>- Use mortise chisel to provide recess in the second piece to accommodate tenon</li> <li>Assemble the two pieces by fitting</li> </ul>	<ul style="list-style-type: none"> <li>• Mark the dimensions to make Tenon and mortise on two pieces using mortise gauge</li> <li>• Cut tenon with tenon saw along the marked lines</li> <li>• Use mortise chisel to provide recess in the second piece to accommodate tenon</li> <li>• Assemble the two pieces by fitting the tenon into mortise</li> </ul>
<p>6. .Wood turning on lathe (06)</p>	<ul style="list-style-type: none"> <li>- Select appropriate tools</li> <li>- Plane the four corners of the work piece using jack plane</li> <li>- Mark the centres of the work on either side</li> <li>- Mount the work between head stock &amp; tailstock centres</li> <li>- Fix the tool in the tool post &amp; Position it in appropriate height</li> <li>- Start the lathe to make the work piece to revolve at desired speed</li> <li>- Feed the bevel gauge against the rotating work to get the required size and shape</li> <li>- Use outside callipers to check the diameter of work piece</li> <li>- Use parting off tool to reduce the diameter on either ends of the work piece</li> <li>- Remove the rolling work piece between centers and cut off excess material on either sides</li> </ul>	<ul style="list-style-type: none"> <li>• Mark the centres of the work on either side</li> <li>• Fix the tool in the tool post &amp; Position it in appropriate height</li> <li>• Start the lathe to make the work piece to revolve at desired speed</li> <li>• Feed the bevel gauge against the rotating work to get the required size and shape</li> </ul>
<p>7.Preparation of any household article (ex: stool) (09)</p>	<ul style="list-style-type: none"> <li>- Prepare the drawings of a stool required for a particular drawing table</li> <li>- State the specifications of the wood stock required</li> <li>- Identify the type of joints to be made</li> <li>- Identify the operations to be made and their sequence</li> <li>- Perform operations to produce pieces of joint</li> <li>- Assemble all joints as per the drawing</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare the drawings of a stool required for a particular drawing table</li> <li>• Identify the operations to be made and their sequence</li> <li>• Perform operations to produce pieces of joint</li> <li>• Assemble all joints as per the drawing</li> </ul>

<p><b>Sheet metal Work (45)</b> 8. Practice on cutting of sheet (06)</p>	<ul style="list-style-type: none"> <li>- Cutt the required sheet from the stock using snip</li> <li>- Mark the dimensions on the sheet using scribe &amp; steel rule</li> <li>- Draw the circular shapes using divider</li> <li>- Perform rough cutting of the curved shapes using chisel and finish cutting using snips</li> <li>- Cut the straight edges using straight snips</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the marking and cutting tools</li> <li>• Cut the sheet of different shapes using appropriate tools</li> </ul>
<p>9. Formation of joints like grooved joint, locked groove joint (06)</p>	<ul style="list-style-type: none"> <li>- Cut the sheet in to two halves</li> <li>- Form the flange on the sheet by folding the sheet along scribed lines using mallet &amp; stakes</li> <li>- Perform bending edges of sheets applying moderate pressure using mallet</li> <li>- Inter lock the bent edges and apply pressure with mallet to make required joint</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the marking and cutting tools</li> <li>• Cut the sheet</li> <li>• Perform bending along the marked lines.</li> </ul>
<p>10. Preparation of a rectangular open type tray (09)</p>	<ul style="list-style-type: none"> <li>- Draw the development of the object to be made</li> <li>- Place the pattern on the sheet</li> <li>- Mark the dimensions using scribe</li> <li>- Shear the required piece from the stock using straight snips</li> <li>- Mark the lines on the sheet to form bends</li> <li>- Strengthen the sides of sheet by single hem using hatchet stake</li> <li>- Form the sheet in to desired shape using stakes</li> <li>- Seam the corners by inserting laps of the adjacent sides with single hem</li> </ul>	<ul style="list-style-type: none"> <li>• Drawing development of objects</li> <li>• Cut the sheet</li> <li>• Seam the corners by inserting laps of the adjacent sides with single hem</li> </ul>
<p>11. Preparation of hollow cylinder (06)</p>	<ul style="list-style-type: none"> <li>- Draw the development of the object to be made</li> <li>- Place the pattern on the sheet</li> <li>- Mark the dimensions using scribe</li> <li>- Shear the required piece from the stock using straight snips</li> <li>- Mark the lines on the sheet to form bends</li> <li>- Strengthen the sides of sheet by single hem on top &amp; bottom side using hatchet stake</li> <li>- Form the flat sheet into cylindrical shape by cylindrical stake and apply pressure using mallet</li> <li>- Prepare single hem on to longitudinal sides in opposite directions</li> <li>- Inter lock the sides and apply pressure to make a strong joint</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the marking and cutting tools</li> <li>• Drawing development of objects</li> <li>• Cut the sheet</li> <li>• Inter lock the sides and apply pressure using mallet to make a strong joint</li> </ul>

<p>12.Preparation of pipe elbow (06)</p>	<ul style="list-style-type: none"> <li>- Draw the development of a cylindrical pipe truncated at an angle of 45° on one side</li> <li>- Scribe the lines on the sheet by placing the pattern on it</li> <li>- Cutt the sheet over the marked dimensions using curved snips</li> <li>- Hem the straight side of the sheet and flange the curved side</li> <li>- Fold the edges of joining sides</li> <li>- Form the sheet into cylindrical shape using stakes</li> <li>- Seam the sides using mallet</li> <li>- Repeat the similar operation for making the second pipe</li> <li>- Butt the treated portions of the cylindrical pipes at rectangles</li> <li>- Seam the two pipes</li> <li>- Solder the joint to make leak proof</li> </ul>	<ul style="list-style-type: none"> <li>• Draw the development of a cylindrical pipe truncated at an angle of 45° on one side</li> <li>• Cutt the sheet over the marked dimensions using curved snips</li> <li>• Form the sheet into cylindrical shape using stakes</li> </ul>
<p>13.Preparation of funnel (06)</p>	<ul style="list-style-type: none"> <li>- Draw the development of upper conical part</li> <li>- Place the pattern on the sheet and cut to required size</li> <li>- Hem the upper side of the sheet</li> <li>- Flange out the bottom side of the sheet</li> <li>- Fold the edges of the joining sides</li> <li>- form the sheet into conical shape using appropriate stake and mallet</li> <li>- Repeat the similar operation for making the bottom part</li> <li>- Seam the top conical part and bottom conical part to obtain required funnel</li> </ul>	<ul style="list-style-type: none"> <li>• Draw the development of upper and bottom conical parts</li> <li>• Place the pattern on the sheet and cut to required size</li> <li>• form the sheet into conical shape using appropriate stake and mallet</li> <li>• Seam the top conical part and bottom conical part to obtain required funnel</li> </ul>
<p>14.Preparation of utility articles such as dust pan, kerosene hand pump (06)</p>	<ul style="list-style-type: none"> <li>- Draw the development of given dust pan</li> <li>- Scribe the lines on the sheet and cut to required size</li> <li>- Hem all the four sides to strengthen the edges</li> <li>- Form the sheet into designed shape using suitable stakes and mallet</li> <li>- Solder the corner lap joints to make the required dust pan</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the marking and cutting tools</li> <li>• Drawing development of objects</li> <li>• Cut the sheet</li> <li>• Perform bending along the marked lines and to form the article</li> </ul>
<p><b>Welding Shop (45)</b></p> <p>15. Welding Layout of beads (06)</p>	<ul style="list-style-type: none"> <li>- Perform Edge preparation</li> <li>- Hold the electrode at suitable angle and distance with respect to the work piece to maintain the arc</li> <li>- Check the bead</li> </ul>	<ul style="list-style-type: none"> <li>• Perform Edge preparation</li> <li>• Hold the electrode at suitable angle and distance with respect to the work piece to maintain the constant arc length.</li> <li>• Check the bead</li> </ul>

<p>16. Lap joint (06)</p>	<ul style="list-style-type: none"> <li>- Perform Edge preparation</li> <li>- Hold the electrode at suitable angle and distance with respect to the work piece to maintain the arc</li> <li>- Check the bead</li> </ul>	<ul style="list-style-type: none"> <li>• Perform Edge preparation</li> <li>• Hold the electrode at suitable angle and distance with respect to the work piece to maintain the arc</li> <li>• Check the bead</li> </ul>
<p>17. Butt joint (06)</p>	<ul style="list-style-type: none"> <li>- Perform Edge preparation</li> <li>- Hold the electrode at suitable angle and distance with respect to the work piece to maintain the arc</li> <li>- Check the bead</li> </ul>	<ul style="list-style-type: none"> <li>• Perform Edge preparation</li> <li>• Hold the electrode at suitable angle and distance with respect to the work piece to maintain the arc</li> <li>• Check the bead</li> </ul>
<p>18. Preparation of T-Joints (06) H- Joints (06) Angular Joints (06) Basket and stand (09)</p>	<ul style="list-style-type: none"> <li>- Perform edge preparation</li> <li>- Hold the electrode at suitable angle</li> <li>- Identify the suitable Method of welding technique.</li> <li>- Maintain proper distance between work piece and electrode tip produce arc</li> <li>- Check the weld bead</li> </ul>	<ul style="list-style-type: none"> <li>• Perform edge preparation</li> <li>• Hold the electrode at suitable angle</li> <li>• Identify the suitable Method of welding technique.</li> <li>• Maintain proper distance between work piece and electrode tip produce arc</li> <li>• Check the weld bead</li> </ul>
<p><b>Machine shop (45)</b> 19. Plain turning (09)</p>	<ul style="list-style-type: none"> <li>- Check the centering of the work piece using dial gauge</li> <li>- Fix the cutting tool at proper inclination</li> <li>- Select the suitable speed, feed and depth of cut for rough and finishing operations</li> <li>- Check the dimensions</li> </ul>	<ul style="list-style-type: none"> <li>• Check the centering of the work piece using dial gauge</li> <li>• Fix the cutting tool at proper inclination</li> <li>• Select the suitable speed, feed and depth of cut for rough and finishing operations</li> <li>• Check the dimensions</li> </ul>
<p>20. Step turning (9)</p>	<ul style="list-style-type: none"> <li>- Check the centering of the work piece using dial gauge</li> <li>- Fix the cutting tool at proper inclination</li> <li>- Select the suitable speed, feed and depth of cut for rough and finishing operations</li> <li>- Check the dimensions</li> </ul>	<ul style="list-style-type: none"> <li>• Check the centering of the work piece using dial gauge</li> <li>• Fix the cutting tool at proper inclination</li> <li>• Select the suitable speed, feed and depth of cut for rough and finishing operations</li> <li>• Check the dimensions</li> </ul>
<p>21. Taper turning (09)</p>	<ul style="list-style-type: none"> <li>- Check the centering of the work piece using dial gauge</li> <li>- Fix the cutting tool at proper inclination</li> <li>- Select the suitable speed, feed and depth of cut for rough and finishing operations</li> <li>- Check the dimensions</li> <li>- Rotate the compound rest to the suitable angle</li> </ul>	<ul style="list-style-type: none"> <li>• Check the centering of the work piece using dial gauge</li> <li>• Fix the cutting tool at proper inclination</li> <li>• Select the suitable speed, feed and depth of cut for rough and finishing operations</li> <li>• Check the dimensions</li> <li>• Rotate the compound rest to the suitable angle</li> </ul>



22. Collar turning (09)	<ul style="list-style-type: none"> <li>– Check the centring of the work piece using dial gauge</li> <li>– Fix the cutting tool at proper inclination to turn the work piece</li> <li>– Select the suitable speed, feed and depth of cut for rough and finishing operations</li> <li>– Check the dimensions</li> </ul>	<ul style="list-style-type: none"> <li>• Check the centring of the work piece using dial gauge</li> <li>• Fix the cutting tool at proper inclination to turn the work piece</li> <li>• Select the suitable speed, feed and depth of cut for rough and finishing operations</li> <li>• Check the dimensions</li> </ul>
23. Knurling (09)	<ul style="list-style-type: none"> <li>– Check the centring of the work piece using dial gauge</li> <li>– Fix the cutting tool at proper inclination to turn the work piece</li> <li>– Select the suitable speed, feed and depth of cut for rough and finishing operations</li> <li>– Check the dimensions</li> <li>– Fix the knurling tool and selecting the suitable speed and feed</li> </ul>	<ul style="list-style-type: none"> <li>• Check the centring of the work piece using dial gauge</li> <li>• Fix the cutting tool at proper inclination to turn the work piece</li> <li>• Select the suitable speed, feed and depth of cut for rough and finishing operations</li> <li>• Check the dimensions</li> <li>• Fix the knurling tool and selecting the suitable speed and feed</li> </ul>

### REFERENCE BOOKS

1. Manufacturing Technology (Vol I) by P N Rao (Mc Graw Hill)
2. Principles of Foundry Technology by P L Jain (Mc Graw Hill)

## PHYSICS LABORATORY

Subject Title	:	Physics Laboratory
Subject Code	:	TT -109
Periods per week	:	03
Total periods per year	:	45

### TIME SCHEDULE

S.No	Name of the Experiment	No. of Periods
1.	Hands on practice on Vernier Calipers	03
2.	Hands on practice on Screw gauge	03
3.	Verification of Parallelogram law of forces and Triangle law of forces	03
4.	Simple pendulum	03
5.	Velocity of sound in air – (Resonance method)	03
6.	Focal length and Focal power of convex lens (Separate & Combination)	03
7.	Refractive index of solid using traveling microscope	03
8.	Surface tension of liquid using traveling microscope	03
9.	Coefficient of viscosity by capillary method	03
10.	Boyle's law verification	03
11.	Meter bridge	03
12.	Mapping of magnet lines of force	03
	Revision	06
	Test	03
	<b>Total:</b>	<b>45</b>

### Objectives:

**Upon completion of the course the student shall be able to**

- 1.0 Practise with Vernier calipers to determine the volumes and areas of a cylinder and sphere and their comparison etc .
- 2.0 Practise with Screw gauge to determine thickness of a glass plate, cross sectional area of a wire and volumes of sphere and also their comparison etc
- 3.0 Verify the parallelogram law and Triangle law
- 4.0 Determine the value of acceleration due to gravity using Simple Pendulum
- 5.0 Determine the velocity of sound in air at room temperature and its value at zero degree centigrade
- 6.0 Calculate the Focal length and focal power of convex lenses using distant object method , U-V method , U-V graph and  $1 / U - 1 / V$  graph methods and their comparison,

- 7.0 Determine the refractive index of a solid using travelling microscope
- 8.0 Determine the surface tension of a liquid using travelling microscope
- 9.0 Determine the viscosity of a liquid using capillary method
- 10.0 Verify the Boyle's law employing a Quill tube
- 11.0 Determine the specific resistance of material of a wire using Meter Bridge
- 12.0 Drawing magnetic lines of force under N-S and N-N methods and locate null points

**Competencies and Key competencies to be achieved by the student**

<b>Name of the Experiment (No of Periods)</b>	<b>Competencies</b>	<b>Key competencies</b>
1. Hands on practice on Vernier Calipers(03)	<ul style="list-style-type: none"> <li>• Find the Least count</li> <li>• Fix the specimen in posit</li> <li>• Read the scales</li> <li>• Calculate the physical quantities of given object</li> </ul>	<ul style="list-style-type: none"> <li>• Read the scales</li> <li>• Calculate the requisite physical quantities of given objects</li> </ul>
2. Hands on practice on Screw gauge(03)	<ul style="list-style-type: none"> <li>• Find the Least count</li> <li>• Fix the specimen in posit</li> <li>• Read the scales</li> <li>• Calculate thickness of glass place and cross section of wire and other quantities</li> </ul>	<ul style="list-style-type: none"> <li>• Read the scales</li> <li>• Calculate thickness of given glass plate</li> <li>• Calculate cross section of wire and other quantities</li> </ul>
3. Verification of Parallelogram law of forces and Triangle law of forces(03)	<ul style="list-style-type: none"> <li>• Fix suitable weights</li> <li>• Note the positions of threads on drawing sheet</li> <li>• Find the angle at equilibrium point</li> <li>• Construct parallelogram</li> <li>• Compare the measured diagonal</li> <li>• Construct triangle</li> <li>• Find the length of sides</li> <li>• Compare the ratios</li> </ul>	<ul style="list-style-type: none"> <li>• Find the angle at equilibrium point</li> <li>• Constructing parallelogram</li> <li>• Construct triangle</li> <li>• Compare the ratios of force and length</li> </ul>

4. Simple pendulum(03)	<ul style="list-style-type: none"> <li>• Fix the simple pendulum to the stand</li> <li>• Adjust the length of pendulum</li> <li>• Find the time for number of oscillations</li> <li>• Find the time period</li> <li>• Calculate the acceleration due to gravity</li> <li>• Draw I-T and I-T<sup>2</sup> graph</li> </ul>	<ul style="list-style-type: none"> <li>• Find the time for number of oscillations</li> <li>• Find the time period</li> <li>• Calculate the acceleration due to gravity</li> <li>• Draw I-T and I-T<sup>2</sup> graph</li> </ul>
5. Velocity of sound in air –Resonance method (03)	<ul style="list-style-type: none"> <li>• Arrange the resonance apparatus</li> <li>• Adjust the reservoir level for booming sound</li> <li>• Find the first and second</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust the reservoir level</li> <li>• Find the first and second resonating lengths</li> </ul>
6. Focal length and Focal power of convex lens (Separate & Combination) (03)	<ul style="list-style-type: none"> <li>• Fix the object distance</li> <li>• Find the Image distance</li> <li>• Calculate the focal length and power of convex lens</li> </ul>	<ul style="list-style-type: none"> <li>• Calculate the focal length and power of convex lens</li> <li>• Draw u-v and 1/u – 1/v graphs</li> </ul>
7. Refractive index of solid using traveling microscope(03)	<ul style="list-style-type: none"> <li>• Find the least count of vernier on microscope</li> <li>• Place the graph paper</li> </ul>	<ul style="list-style-type: none"> <li>• Read the scale</li> <li>• Calculate the refractive index of</li> </ul>
8. Surface tension of liquid using traveling microscope(03)	<ul style="list-style-type: none"> <li>• Find the least count of vernier on microscope</li> <li>• Focus the microscope to the lower meniscus &amp; bent</li> </ul>	<ul style="list-style-type: none"> <li>• Read the scale</li> <li>• Calculate height of liquid rise</li> <li>• Calculate the surface tension of</li> </ul>
9. Coefficient of viscosity by capillary method(03)	<ul style="list-style-type: none"> <li>• Find the least count of vernier</li> <li>• Fix the capillary tube to aspiratory bottle</li> <li>• Find the mass of collected water</li> <li>• Find the pressure head</li> </ul>	<ul style="list-style-type: none"> <li>• Find the pressure head</li> <li>• Calculate rate of volume of liquid collected</li> <li>• Find the radius of</li> </ul>

10. Boyle's law verification (03)	<ul style="list-style-type: none"> <li>• Note the atmospheric pressure</li> <li>• Fix the quill tube to retort stand</li> <li>• Find the length of air column</li> <li>• Find the pressure of enclosed air</li> <li>• Find and compare the calculated value <math>P \times l</math></li> </ul>	<ul style="list-style-type: none"> <li>• Find the length of air column</li> <li>• Find the pressure of enclosed air</li> <li>• Find the value <math>P \times l</math></li> </ul>
11. Meter bridge(03)	<ul style="list-style-type: none"> <li>• Make the circuit connections</li> <li>• Find the balancing length</li> <li>• Calculate unknown resistance</li> <li>• Find the radius of wire</li> <li>• Calculate the specific resistance</li> </ul>	<ul style="list-style-type: none"> <li>• Find the balancing length</li> <li>• Calculate unknown resistance</li> <li>• Calculate the specific resistance</li> </ul>
12. Mapping of magnet lines of force(03)	<ul style="list-style-type: none"> <li>• Draw magnetic meridian</li> <li>• Placed the bar magnet in NN and NS directions</li> <li>• Draw magnetic lines of force</li> <li>• Locate the neutral points along equatorial and axial lines</li> </ul>	<ul style="list-style-type: none"> <li>• Draw magnetic lines of force</li> <li>• Locate the neutral points along equatorial and axial lines</li> </ul>

## CHEMISTRY LABORATORY

Subject Title	:	Chemistry Laboratory
Subject Code	:	TT -110
Periods per week	:	03
Total periods per year	:	45

### TIME SCHEDULE

S.No	Name of the Experiment	No. of Periods
1.	Familiarization of methods for Volumetric analysis	03
2.	Preparation of Std Na <sub>2</sub> CO <sub>3</sub> and making solutions of different	03
3.	Estimation of HCl solution using Std. Na <sub>2</sub> CO <sub>3</sub> solution	03
4.	Estimation of NaOH using Std. HCl solution	03
5.	Estimation of H <sub>2</sub> SO <sub>4</sub> using Std. NaOH solution	03
6.	Estimation of Mohr's Salt using Std. KMnO <sub>4</sub>	03
7.	Determination of acidity of water sample	03
8.	Determination of alkalinity of water sample	03
9.	Determination of total hardness of water using Std. EDTA	03
10.	Estimation of Chlorides present in water sample	03
11.	Estimation of Dissolved Oxygen (D.O) in water sample	03
12.	Determination of pH using pH meter	03
13.	Determination of conductivity of water and adjusting ionic strength	03
14.	Determination of turbidity of water	03
15.	Estimation of total solids present in water sample	03
	<b>Total:</b>	<b>45</b>

### Objectives:

#### Upon completion of the course the student shall be able to

- 1.0 Practice volumetric measurements (using pipettes, measuring jars, volumetric flask, burettes) and gravimetric measurements (using different types of balances), making dilutions, etc.
- 2.0 Practice making standard solutions with pre weighed salts and to make solutions of desired dilutions using appropriate techniques.
- 3.0 Conduct titrations adopting standard procedures and using Std. Na<sub>2</sub> CO<sub>3</sub> solution for estimation of HCl
- 4.0 Conduct titrations adopting standard procedures and using Std. HCl solution for estimation of NaOH
- 5.0 Conduct titrations adopting standard procedures and using Std. NaOH solution for estimation of H<sub>2</sub>SO<sub>4</sub>

- 6.0 Conduct titrations adopting standard procedures and using Std.  $\text{KMnO}_4$  solution for estimation of Mohr's Salt
- 7.0 Conduct titrations adopting standard procedures to determine the acidity of given samples of water (One ground water and one surface / tap water, and rain water if available)
- 8.0 Conduct titrations adopting standard procedures to determine the alkalinity of given samples of water (One ground water and one surface / tap water)
- 9.0 Conduct titrations adopting standard procedures to determine the total hardness of given samples of water (One ground water and one surface / tap water) using Std. EDTA solution
- 10.0 Conduct titrations adopting standard procedures to determine the chlorides present in the given samples of water and wastewater (One ground water and one surface / tap water)
- 11.0 Conduct the test using titrometric / electrometric method to determine Dissolved Oxygen (D.O) in given water samples (One sample from closed container and one from open container / tap water)
- 12.0 Conduct the test on given samples of water / solutions (like soft drinks, sewage, etc.) to determine their pH using standard pH meter
- 13.0 Conduct the test on given samples of water / solutions
  - a) To determine conductivity
  - b) To adjust the ionic strength of the sample to the desired value
- 14.0 Conduct the test on given samples of solutions (coloured and non coloured) to determine their turbidity in NTU
- 15.0 Conduct titrations adopting standard procedures to determine the total solids present in given samples of water (One ground water and one surface / tap water)

### Competencies and Key competencies to be achieved by the student

Name of the Experiment (No of Periods)	Competencies	Key competencies
Familiarization of methods for Volumetric analysis (03)	--	--
Preparation of Std $\text{Na}_2\text{CO}_3$ and making solutions of different dilution (03)	<ul style="list-style-type: none"> <li>▪ Weighing the salt to the accuracy of .01 mg</li> <li>▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette</li> <li>▪ Making appropriate dilutions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Weighing the salt to the accuracy of .01 mg</li> <li>▪ Measuring the water with volumetric flask, measuring jar, volumetric pipette and graduated pipette</li> <li>▪ Making appropriate dilutions</li> </ul>
Estimation of HCl solution using Std. $\text{Na}_2\text{CO}_3$ solution (03)	<ul style="list-style-type: none"> <li>▪ Cleaning the glassware and rinsing with appropriate solutions</li> <li>▪ Making standard solutions</li> <li>▪ Measuring accurately the standard solutions and titrants</li> <li>▪ Filling the burette with titrant</li> <li>▪ Fixing the burette to the stand</li> <li>▪ Effectively Controlling the flow of the titrant</li> <li>▪ Identifying the end point</li> <li>▪ Making accurate observations</li> <li>▪ Calculating the results</li> </ul>	<ul style="list-style-type: none"> <li>▪ Making standard solutions</li> <li>▪ Measuring accurately the standard solutions and titrants</li> <li>▪ Effectively Controlling the flow of the titrant</li> <li>▪ Identifying the end point</li> <li>▪ Making accurate observations</li> </ul>
Estimation of NaOH using Std. HCl solution (03)		
Estimation of $\text{H}_2\text{SO}_4$ using Std. NaOH solution (03)		
Estimation of Mohr's Salt using Std. $\text{KMnO}_4$ (03)		
Determination of acidity of water sample (03)		
Determination of alkalinity of water sample (03)		
Determination of total hardness of water using Std. EDTA solution (03)		
Estimation of Chlorides present in water sample (03)		
Estimation of Dissolved Oxygen (D.O) in water sample (By titration method) (03)		



<p>Estimation of Dissolved Oxygen (D.O) in water sample (By electrometric method) (03)</p>	<ul style="list-style-type: none"> <li>▪ Familiarize with instrument</li> <li>▪ Choose appropriate 'Mode' / 'Unit'</li> <li>▪ Prepare standard solutions / buffers, etc.</li> <li>▪ Standardize the instrument with appropriate standard solutions</li> <li>▪ Plot the standard curve</li> <li>▪ Make measurements accurately</li> <li>▪ Follow Safety precautions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Prepare standard solutions / buffers, etc.</li> <li>▪ Standardize the instrument with appropriate standard solutions</li> <li>▪ Plot the standard curve</li> <li>▪ Make measurements accurately</li> </ul>
<p>Determination of pH using pH meter (03)</p>		
<p>Determination of conductivity of water and adjusting ionic strength to required level (03)</p>		
<p>Determination of turbidity of water (03)</p>		
<p>Estimation of total solids present in water sample (03)</p>	<ul style="list-style-type: none"> <li>▪ Measuring the accurate volume and weight of sample</li> <li>▪ Filtering and air drying without losing any filtrate</li> <li>▪ Accurately weighing the filter paper, crucible and filtrate</li> <li>▪ Drying the crucible in an oven</li> </ul>	<ul style="list-style-type: none"> <li>▪ Measuring the accurate volume and weight of sample</li> <li>▪ Filtering and air drying without losing any filtrate</li> <li>▪ Accurately weighing the filter paper, crucible and filtrate</li> </ul>

## COMPUTER FUNDAMENTALS LABORATORY

**Subject Title** : **Computer Fundamentals Laboratory**  
**Subject Code** : **TT-111**  
**Periods/Week** : **03**  
**Periods Per Year** : **90**

### Time Schedule

S. No.	Major Topics	No. of sessions each of 3 periods duration	No. of Periods
I.	Computer hardware Basics	02	06
II.	Windows Operating System	02	06
III.	MS Word	08	24
IV.	MS Excel	09	27
V.	MS PowerPoint	09	27
<b>Total</b>		<b>30</b>	<b>90</b>

**Rationale:** The knowledge of Computer usage has become a must for everyone, due to wide spread computer usage and related applications in all fields. This laboratory is designed to give the students hands on practice of Windows Operating System and MS Office to enable the students to use these skills in future courses.

#### **I. Computer Hardware Basics (Not for end examination)**

1. a) To familiarize with a Computer System and its hardware connections.  
b) To start and Shutdown a Computer correctly.  
c) To check the software details of the computer  
d) To practice Internal and External DOS commands
2. To check the hardware present in your computer.

#### **II. Windows's operating system (Not for end examination)**

3. To explore Windows Desktop
4. Working with Files and Folders
5. Windows Accessories: Calculator – Notepad – WordPad – MS Paint

#### **III. Practice with MS-WORD**

6. To familiarize with Ribbon layout of MS Word  
Home - Insert - Page layout – References – Review - View
7. To practice Word Processing Basics
8. To practice Formatting techniques

9. To insert a table of required number of rows and columns
10. To insert Objects, Clipart and Hyperlinks
11. To use Mail Merge feature of MS Word
12. To use Equations and symbols features

#### **IV. Practice with MS-EXCEL**

13. To familiarize with MS-EXCEL layout
14. To access and Enter data in the cells
15. To edit a spread sheet- Copy, Cut, Paste, and selecting Cells
16. To use built in functions and Formatting Data
17. To create Excel Functions, Filling Cells
18. To enter a Formula for automatic calculations
19. To practice Excel Graphs and Charts
20. To format a Worksheet in Excel, Page Setup and Print

#### **V. Practice with MS-POWERPOINT**

21. To familiarize with Ribbon layout features of PowerPoint 2007.
22. To create a simple PowerPoint Presentation
23. To set up a Master Slide in PowerPoint
24. To insert Text and Objects
25. To insert a Flow Charts
26. To insert a Table
27. To insert a Charts/Graphs
28. To insert video and audio
29. To practice Animating text and objects
30. To Review presentation

### Competencies and Key Competencies to be achieved by the students

Exp No.	Name of the Experiment	Competencies	Key Competencies
1 (a).	To familiarize with Computer system and hardware connections	<ul style="list-style-type: none"> <li>a. Identify the Parts of a Computer system a). CPU b) Monitor c) CD/DVD Drive d) Power Switch e) Start Button f) Reset Button</li> <li>b. Identify and connect various peripherals</li> <li>c. Identify and connect the cables used with computer system</li> <li>d. Identify various ports on CPU and connect Keyboard &amp; Mouse</li> </ul>	Connect cables to external hardware and operate the computer
1 (b).	To Start and Shut down Computer correctly	<ul style="list-style-type: none"> <li>a. Log in using the password</li> <li>b. Start and shut down the computer</li> <li>c. Use Mouse and Keyboard</li> </ul>	<ul style="list-style-type: none"> <li>a. Login and logout as per the standard procedure</li> <li>b. Operate mouse &amp; Keyboard</li> </ul>
1 (c).	To explore Windows Desktop	<ul style="list-style-type: none"> <li>a. Familiarize with Start Menu, Taskbar, Icons and Shortcuts</li> <li>b. Access application programs using Start menu, Task manager</li> <li>c. Use Help support</li> </ul>	<ul style="list-style-type: none"> <li>a. Access application programs using Start menu</li> <li>b. Use taskbar and Task manager</li> </ul>
1(d).	To practice Internal and External DOS commands	<ul style="list-style-type: none"> <li>a. Practice Internal commands</li> <li>b. Practice External commands</li> </ul>	Familiarize with MS-DOS Commands
2.	To check the software details of the computer	<ul style="list-style-type: none"> <li>c. Find the details of Operating System being used</li> <li>d. Find the details of Service Pack installed</li> </ul>	Access the properties of computer and find the details
3.	To check the hardware present in your computer	<ul style="list-style-type: none"> <li>a. Find the CPU name and clock speed</li> <li>b. Find the details of RAM and Hard disk present</li> <li>c. Access Device manager using Control Panel and check the status of devices like mouse and key board</li> <li>d. Use My Computer to check the details of Hard Disk Drives and partitions</li> <li>e. Use the Taskbar</li> </ul>	<ul style="list-style-type: none"> <li>a. Access device manager and find the details</li> <li>b. Type /Navigate the correct path and Select icon related to the details required</li> </ul>
4.	Working with Files and Folders	<ul style="list-style-type: none"> <li>a. Create folders and organizing files in different folders</li> <li>b. Use copy / paste or move commands to organize files and folders</li> </ul>	<ul style="list-style-type: none"> <li>a. Create files and folders rename , arrange and search for the required folder/file</li> </ul>

Exp No.	Name of the Experiment	Competencies	Key Competencies
	Working with Files and Folders Continued....	<ul style="list-style-type: none"> <li>c. Arrange icons – name wise, size, type, Modified</li> <li>d. Search a file or folder and find its path</li> <li>e. Create shortcut for files and folders (in other folders) on Desktop</li> <li>f. Familiarize with the use of My Documents</li> <li>g. Familiarize with the use of Recycle Bin</li> </ul>	<ul style="list-style-type: none"> <li>b. Restore deleted files from Recycle bin</li> </ul>
5.	To use Windows Accessories: Calculator – Notepad – WordPad – MS Paint	<ul style="list-style-type: none"> <li>a. Familiarize with the use of Calculator</li> <li>b. Access Calculator using Run command</li> <li>c. Create Text Files using Notepad and WordPad and observe the difference in file size</li> <li>d. Use MS paint and create .jpeg, .bmp files using MS Paint</li> </ul>	<ul style="list-style-type: none"> <li>a. Use windows accessories and select correct text editor based on the situation.</li> <li>b. Use MS Paint to create /Edit pictures and save in the required format.</li> </ul>
6.	To familiarize with Ribbon layout of MS Word. – Home – Insert- Page Layout- References- Review-View	<ul style="list-style-type: none"> <li>a. Create/Open a document</li> <li>b. Use Save and Save as features</li> <li>c. Work on two documents simultaneously</li> <li>d. Choose correct Paper size and Printing options</li> </ul>	<ul style="list-style-type: none"> <li>a. Create a Document and name appropriately and save</li> <li>b. Set paper size and print options</li> </ul>
7.	To practice Word Processing Basics	<ul style="list-style-type: none"> <li>a. Typing text</li> <li>b. Keyboard usage</li> <li>c. Use mouse (Left click / Right click / Scroll)</li> <li>d. Use Keyboard shortcuts</li> <li>e. Use Find and Replace features in MS- word</li> <li>f. Use Undo and Redo Features</li> <li>g. Use spell check to correct Spellings and Grammar</li> </ul>	<ul style="list-style-type: none"> <li>a. Use keyboard and mouse to enter/edit text in the document.</li> <li>b. Use shortcuts</li> <li>c. Use spell check/ Grammar features for auto corrections.</li> </ul>
8.	To practice Formatting techniques	<ul style="list-style-type: none"> <li>a. Formatting Text</li> <li>b. Formatting Paragraphs</li> <li>c. Setting Tabs</li> <li>d. Formatting Pages</li> <li>e. The Styles of Word</li> <li>f. Insert bullets and numbers</li> <li>g. Themes and Templates</li> <li>h. Insert page numbers, header and footer</li> </ul>	<ul style="list-style-type: none"> <li>a. Format Text and paragraphs and use various text styles.</li> <li>b. Use bullets and numbers to create lists</li> <li>c. Use Templates /Themes</li> <li>d. Insert page numbers date, headers and footers</li> </ul>

Exp No.	Name of the Experiment	Competencies	Key Competencies
9.	To insert a table of required number of rows and columns	<ul style="list-style-type: none"> <li>a. Edit the table by adding the fields – Deleting rows and columns –inserting sub table – marking borders. Merging and splitting of cells in a Table</li> <li>b. Changing the background colour of the table</li> <li>c. Use table design tools</li> <li>d. Use auto fit – fixed row/ column height/length – Even distribution of rows / columns features</li> <li>e. Convert Text to table and Table to Text</li> <li>f. Use Sort feature of the Table to arrange data in ascending/descending order</li> </ul>	<ul style="list-style-type: none"> <li>a. Insert table in the word document and edit</li> <li>b. Use sort option for arranging data.</li> </ul>
10.	To Insert objects, clipart and Hyperlinks	<ul style="list-style-type: none"> <li>a. Create a 2-page document. &amp;Insert hyperlinks and Bookmarks.</li> <li>b. Create an organization chart</li> <li>c. Practice examples like preparing an Examination schedule notice with a hyperlink to Exam schedule table.</li> </ul>	<ul style="list-style-type: none"> <li>a. Insert hyperlinks &amp;Bookmarks</li> <li>b. Create organization charts/flow charts</li> </ul>
11.	To Use Mail merge feature of MS Word	<ul style="list-style-type: none"> <li>a. Use mail merge to prepare individually addressed letters</li> <li>b. Use mail merge to print envelopes.</li> </ul>	Use Mail merge feature
12.	To use Equations and symbols features.	<ul style="list-style-type: none"> <li>a. Explore various symbols available in MS Word</li> <li>b. Insert a symbol in the text</li> <li>c. Insert mathematical equations in the document</li> </ul>	Enter Mathematical symbols and Equations in the word document
13.	To Practice with MS-EXCEL	<ul style="list-style-type: none"> <li>a. Open /create an MS Excel spreadsheet and familiarize with MS Excel 2007 layout like MS office Button-</li> <li>b. Use Quick Access Toolbar- Title Bar- Ribbon-Worksheets- Formula Bar-Status Bar</li> </ul>	<ul style="list-style-type: none"> <li>a. Familiarize with excel layout and use</li> <li>b. Use various features available in toolbar</li> </ul>
14.	To access and Enter data in the cells	<ul style="list-style-type: none"> <li>a. Move around a Worksheet- Quick access -Select Cells</li> <li>b. Enter Data-Edit a Cell-Wrap Text-Delete a Cell Entry-Save a File-Close Excel</li> </ul>	<ul style="list-style-type: none"> <li>a. Access and select the required cells by various addressing methods</li> <li>b. Enter data and edit</li> </ul>

Exp No.	Name of the Experiment	Competencies	Key Competencies
15.	To edit spread sheet Copy, Cut, Paste, and selecting cells	<ul style="list-style-type: none"> <li>a. Insert and Delete Columns and Rows-Create Borders-Merge and Center</li> <li>b. Add Background Color-Change the Font, Font Size, and Font Color</li> <li>c. Format text with Bold, Italicize, and Underline-Work with Long Text-Change a Column's Width</li> </ul>	Format the excel sheet
16.	To use built in functions and Formatting Data	<ul style="list-style-type: none"> <li>a. Sort and filter data in a worksheet</li> <li>b. Perform Mathematical Calculations verify -AutoSum</li> <li>c. Perform Automatic Calculations-Align Cell Entries</li> </ul>	Use built in functions in Excel
17.	To enter a Formula for automatic calculations	<ul style="list-style-type: none"> <li>a. Enter formula</li> <li>b. Use Cell References in Formulae</li> <li>c. Use Automatic updating function of Excel Formulae</li> <li>d. Use Mathematical Operators in Formulae</li> <li>e. Use Excel Error Message and Help</li> </ul>	Enter formula for automatic calculations
18.	To Create Excel Functions, Filling Cells	<ul style="list-style-type: none"> <li>a. Use Reference Operators</li> <li>b. Work with sum, Sum if , Count and Count If Functions</li> <li>c. Fill Cells Automatically</li> </ul>	<ul style="list-style-type: none"> <li>a. Create Excel sheets involving cross references and equations</li> <li>b. Use the advanced functions for conditional calculations</li> </ul>
19.	To Practice Excel Graphs and Charts	<ul style="list-style-type: none"> <li>a. Produce an Excel Pie Chart</li> <li>b. Produce an Excel Column Chart</li> <li>c. Practice creating any Chart</li> </ul>	<ul style="list-style-type: none"> <li>a. Use data in Excel sheet to Create technical charts and graphs Produce Excel Line Graph</li> <li>b. Produce a Pictograph in Excel</li> </ul>
20.	To format a Worksheet in Excel, page setup and print	<ul style="list-style-type: none"> <li>a. Shade alternate rows of data</li> <li>b. Add currency and percent symbols</li> <li>c. Change height of a row and width of a column</li> <li>d. Change data alignment</li> <li>e. Insert Headers and Footers</li> <li>f. Set Print Options and Print</li> </ul>	<ul style="list-style-type: none"> <li>a. Format Excel sheet</li> <li>b. Insert headers &amp; footers and print</li> </ul>
21.	To familiarize with Ribbon layout & features of PowerPoint 2007.	Use various options in Home, insert, design, animation , slideshow, Review & View in the PowerPoint	Access required options in the tool bar

Exp No.	Name of the Experiment	Competencies	Key Competencies
22.	To create a simple PowerPoint Presentation	<ul style="list-style-type: none"> <li>a. Insert a New Slide into PowerPoint</li> <li>b. Change the Title of a PowerPoint Slide</li> <li>c. PowerPoint Bullets</li> <li>d. Add an Image to a PowerPoint Slide</li> <li>e. Add a Textbox to a PowerPoint slide</li> </ul>	<ul style="list-style-type: none"> <li>a. Create simple PowerPoint presentation with photographs/ClipArt and text boxes</li> <li>b. Use bullets option</li> </ul>
23.	To Set up a Master Slide in PowerPoint and add notes	<ul style="list-style-type: none"> <li>a. Create a PowerPoint Design Template</li> <li>b. Modify themes</li> <li>c. Switch between Slide master view and Normal view</li> <li>d. Format a Design Template Master Slide</li> <li>e. Add a Title Slide to a Design Template</li> <li>f. The Slide Show Footer in PowerPoint</li> <li>f. Add Notes to a PowerPoint Presentation</li> </ul>	<ul style="list-style-type: none"> <li>a. Setup Masterslide and format</li> <li>b. Add notes</li> </ul>
24.	To Insert Text and Objects	<ul style="list-style-type: none"> <li>a. Insert Text and objects</li> <li>b. Set Indents and line spacing</li> <li>c. Insert pictures/ clipart</li> <li>d. Format pictures</li> <li>e. Insert shapes and WordArt</li> <li>f. Use 3d features</li> <li>g. Arrange objects</li> </ul>	<ul style="list-style-type: none"> <li>Inset Text and Objects</li> <li>Use 3d features</li> </ul>
25.	To insert a Flow Chart / Organizational Charts	<ul style="list-style-type: none"> <li>a. Create a Flow Chart in PowerPoint</li> <li>b. Group and Ungroup Shapes</li> <li>c. Use smart art</li> </ul>	<ul style="list-style-type: none"> <li>Create organizational charts and flow charts using smart art</li> </ul>
26.	To insert a Table	<ul style="list-style-type: none"> <li>a. PowerPoint Tables</li> <li>b. Format the Table Data</li> <li>c. Change Table Background</li> <li>d. Format Series Legend</li> </ul>	<ul style="list-style-type: none"> <li>Insert tables and format</li> </ul>
27.	To insert a Charts/Graphs	<ul style="list-style-type: none"> <li>a. Create 3D Bar Graphs in PowerPoint</li> <li>b. Work with the PowerPoint Datasheet</li> <li>c. Format a PowerPoint Chart Axis</li> <li>d. Format the Bars of a Chart</li> <li>e. Create PowerPoint Pie Charts</li> <li>f. Use Pie Chart Segments</li> <li>g. Create 2D Bar Charts in PowerPoint</li> <li>h. Format the 2D Chart</li> <li>e. Format a Chart Background</li> </ul>	<ul style="list-style-type: none"> <li>Create charts and Bar graphs, Pie Charts and format.</li> </ul>



Exp No.	Name of the Experiment	Competencies	Key Competencies
28.	To Insert audio & video, Hyperlinks in a slide  Add narration to the slide	<ul style="list-style-type: none"> <li>a. Insert sounds in the slide and hide the audio symbol</li> <li>b. Adjust the volume in the settings</li> <li>c. Insert video file in the format supported by PowerPoint in a slide</li> <li>d. Use automatic and on click options</li> <li>e. Add narration to the slide</li> <li>f. Insert Hyperlinks</li> </ul>	<ul style="list-style-type: none"> <li>a. Insert Sounds and Video in appropriate format.</li> <li>b. Add narration to the slide</li> <li>c. Use hyperlinks to switch to different slides and files</li> </ul>
29.	To Practice Animation effects	<ul style="list-style-type: none"> <li>a. Apply transitions to slides</li> <li>b. To explore and practice special animation effects like <i>Entrance, Emphasis, Motion Paths &amp; Exit</i></li> </ul>	Add animation effects
30.	Reviewing presentation	<ul style="list-style-type: none"> <li>a. Checking spelling and grammar</li> <li>b. Previewing presentation</li> <li>c. Set up slide show</li> <li>d. Set up resolution</li> <li>e. Exercise with Rehearse Timings feature in PowerPoint</li> <li>f. Use PowerPoint Pen Tool during slide show</li> <li>g. Saving</li> <li>h. Printing presentation               <ul style="list-style-type: none"> <li>(a) Slides</li> <li>(b) Handout</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>a. Use Spell check and Grammar feature</li> <li>b. Setup slide show</li> <li>c. Add timing to the slides</li> <li>d. Setup automatic slide show</li> </ul>

# **III SEMESTER**

**DIPLOMA IN TEXTILE TECHNOLOGY**  
**SCHEME OF INSTRUCTIONS AND EXAMINATIONS**  
**(III SEMESTER)**

Subject Code	Name of the Subject	Instruction period / week		Total Period / sem	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
<b>THEORY:</b>								
TT-301	Engineering Mathematics – II	5	-	75	3	20	80	100
TT-302	Yarn Manufacture– I	5	-	75	3	20	80	100
TT-303	Fabric Manufacture – I	5	-	75	3	20	80	100
TT-304	Textile Chemical Processing – I	5	-	75	3	20	80	100
TT-305	Apparel Production Technology	4	-	60	3	20	80	100
<b>PRACTICAL:</b>								
TT-306	Yarn Manufacture Lab – I	-	6	90	3	40	60	100
TT-307	Fabric Manufacture Lab – I	-	6	90	3	40	60	100
TT-308	Communication Skills	-	3	45	3	40	60	100
TT-309	Textile Chemical Processing Lab – I	-	3	45	3	40	60	100
<b>TOTAL</b>		24	18	630		260	640	900

**ENGINEERING MATHEMATICS – III**  
(Common to all Branches)

Subject Title : Engineering Mathematics-III  
 Subject Code : TT-301  
 Periods per week : 05  
 Periods per Semester : 75

**Blue Print**

S. No	Major Topic	No of Periods	Weightage of Marks	Short Type			Essay Type		
				R	U	App	R	U	App
	<b>Unit - I</b>								
1	<b>Indefinite Integration</b>	15	21	1	1	0	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	<b>Unit - II</b>								
2	<b>Definite Integration and its applications</b>	35	60	1	1	3	1	1	$2\frac{1}{2}$
	<b>Unit - III</b>								
3	<b>Differential Equations</b>	25	29	2	1	0	1	1	0
	<b>Total</b>	75	110	4	3	3	$2\frac{1}{2}$	$2\frac{1}{2}$	30
			Marks:	12	9	9	25	25	30

**R: Remembering type**      37 marks  
**U: Understanding type**      34 marks  
**App: Application type**      39 marks

**Objectives:**

Upon completion of the subject the student shall be able to

**Unit-I**

**1.0 Indefinite Integration**

- 1.1 Explain the concept of Indefinite integral as an anti-derivative.
- 1.2 State the indefinite integral of standard functions and properties of Integrals  $\int (u + v) dx$  and  $\int ku dx$  where  $k$  is constant and  $u, v$  are functions of  $x$ .
- 1.3 Solve integration problems involving standard functions using the above rules.

1.4 Evaluate integrals involving simple functions of the following type by the method of substitution.

i)  $\int f(ax + b) dx$  where  $f(x)$  is in standard form.

ii)  $\int [f(x)]^n f'(x) dx$

iii)  $\int f'(x)/[f(x)] dx$

iv)  $\int f\{g(x)\} g'(x) dx$

1.5 Find the Integrals of  $\tan x$ ,  $\cot x$ ,  $\sec x$  and  $\operatorname{cosec} x$  using the above.

1.6 Evaluate the integrals of the form  $\int \sin^m \theta \cos^n \theta \cdot d\theta$  where  $m$  and  $n$  are positive integers.

1.7 Evaluate integrals of powers of  $\tan x$  and  $\sec x$ .

1.8 Evaluate the Standard Integrals of the functions of the type

i)  $\frac{1}{a^2 + x^2}$ ,  $\frac{1}{a^2 - x^2}$ ,  $\frac{1}{x^2 - a^2}$

ii)  $\frac{1}{\sqrt{a^2 + x^2}}$ ,  $\frac{1}{\sqrt{a^2 - x^2}}$ ,  $\frac{1}{\sqrt{x^2 - a^2}}$

iii)  $\sqrt{x^2 - a^2}$ ,  $\sqrt{x^2 + a^2}$ ,  $\sqrt{a^2 - x^2}$

1.9 Evaluate the integrals of the type

$$\int \frac{1}{a \pm b \sin \theta} d\theta, \int \frac{1}{a \pm b \cos \theta} d\theta \text{ and } \int \frac{1}{a \cos \theta \pm b \sin \theta \pm c} d\theta .$$

1.10 Evaluate integrals using decomposition method.

1.11 Evaluate integrals using integration by parts with examples.

1.12 State the Bernoulli's rule for evaluating the integrals of the form  $\int u \cdot v dx$ .

1.13 Evaluate the integrals of the form  $\int e^x [f(x) + f'(x)] dx$ .

## Unit-II

### (a) Understand definite integral and its properties

2.1 State the fundamental theorem of integral calculus

2.2 Explain the concept of definite integral.

2.3 Calculate the definite integral over an interval.

2.4 State various properties of definite integrals.

2.5 Evaluate simple problems on definite integrals using the above properties.

### (b) Real life applications of definite integrals

2.6 Explain definite integral as a limit of sum by considering an area.

2.7 Find the areas under plane curves and area enclosed between two curves using integration.

2.8 Obtain the volumes of solids of revolution.

2.9 Obtain the mean value and root mean square value of the functions in any given interval.

2.10 Explain the Trapezoidal rule, Simpson's 1/3 rules for approximation of integrals and provide some examples.

**(c) Certain special integrals: Laplace Transforms**

- 2.11 Write the definition of Laplace Transform and explain sufficient conditions for its existence.
- 2.12 Provide formulae for Laplace transforms of standard functions.
- 2.13 State Linear property, First shifting property, Change of Scale property for Laplace transforms. Solve simple problems using these properties.
- 2.14 Write formulae for Laplace transform of  $t^n f(t)$ ,  $\frac{f(t)}{t}$ ,  $f^{(n)}(t)$ ,  $\int_0^t f(u) du$  in terms of Laplace transform of  $f(t)$ . Provide simple examples on these functions.
- 2.15 Define unit step function and write the Laplace Transform of unit step function. State second shifting property.
- 2.16 Define inverse Laplace Transform and write inverse Laplace Transform of standard functions. Solve simple problems.
- 2.17 Write first shifting property of inverse Laplace Transform with examples
- 2.18 Define convolution of two functions and state convolution theorem with few examples for understanding only.

**(d) Understand the Fourier series expansion of functions**

- 2.19 Define Fourier series of a function on the interval  $(c, c + 2l)$  and state sufficient conditions for its existence. Write the Euler's formulae for determining the Fourier coefficients.
- 2.20 Find Fourier series of simple functions in the range  $(0, 2l)$ ,  $(0, 2\pi)$ ,  $(-l, l)$  and  $(-\pi, \pi)$ .
- 2.21 Find Fourier coefficients for even and odd functions in the interval  $(-l, l)$  and  $(-\pi, \pi)$  in simple examples.
- 2.22 Define half range Fourier sine and cosine series of a function over the interval  $(0, l)$  with examples.

### 3.0 Introduction to Differential Equations

- 3.1 Define a Differential equation, its order, degree
- 3.2 Form a differential equation by eliminating arbitrary constants.
- 3.3 Solve the first order first degree differential equations by the following methods:
  - i. Variables Separable.
  - ii. Homogeneous Equations.
  - iii. Exact Differential Equations
  - iv. Linear differential equation of the form  $dy/dx + Py = Q$ , where P and Q are functions of x or constants.
  - iv. Bernoulli's Equation (Reducible to linear form.)
- 3.4 Solve Differential equations of the type  $(aD^2 + bD + c)y = 0$  when the roots of the auxiliary equation are real and different, real and repeated, Complex conjugates.
- 3.5 Solve the higher order homogeneous differential equations with constant coefficients.
- 3.6 Explain the concept of complementary function, particular Integral and general solution of a differential equation.
- 3.7 Solve  $n^{\text{th}}$  order differential equation of the type  $f(D) y = X$  where  $f(D)$  is a polynomial of nth order and X is a function of the form  $k, e^{ax}, \text{Sin}ax, \text{Cos}ax, x^n$ .
- 3.8 Solve simple problems leading to engineering applications

## COURSE CONTENT

### Unit-I

#### Indefinite Integration:

1. Integration regarded as anti-derivative – Indefinite integral of standard functions. Properties of indefinite integral. Integration by substitution or change of variable. Integrals of the form  $\sin^m \theta \cdot \cos^n \theta$ . where m and n are positive integers. Integrals of  $\tan x$ ,  $\cot x$ ,  $\sec x$ ,  $\operatorname{cosec} x$  and powers of  $\tan x$ ,  $\sec x$  by substitution.

Evaluation of integrals which are reducible to the following forms :

$$i) \frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2}$$

$$ii) \frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}}$$

$$iii) \sqrt{x^2 - a^2}, \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}$$

Integration by decomposition of the integrand into simple rational, algebraic functions. Integration by parts, Bernoulli's rule.

### Unit-II

#### Definite Integral and its applications:

2. Definite integral-fundamental theorem of integral calculus, properties of definite integrals, evaluation of simple definite integrals. Definite integral as the limit of a sum. Area under plane curves – Area enclosed between two curves. Volumes of solids of revolution. Mean and RMS values of a function on a given interval. Trapezoidal rule, Simpson's 1/3 rule to evaluate an approximate value of a definite integral.

- . Definition, sufficient conditions for existence of Laplace Transform (LT), LT of elementary functions, linearity property, scale change property, first shifting property, multiplication by  $t^n$ , division by  $t$ , LT of derivatives and integrals, unit step function, LT of unit step function, second shifting theorem, inverse Laplace transforms- shifting theorems and change of scale property, multiplication by  $s^n$  and division by  $s$  – examples of inverse LT using partial fractions – convolution theorem (no proof).

Representation of a function in Fourier series over the interval  $(c, c + 2l)$ , Give sufficient conditions for existence of Fourier series. Euler's formulae for Fourier coefficients, Finding Fourier coefficients for simple functions, elementary even and odd functions. Define half range Fourier series.



### Unit -III

#### Differential Equations:

Definition of a differential equation-order and degree of a differential equation-formation of differential equations-solution of differential equation of first order, first degree: variable-separable, homogeneous, exact, linear differential equation, Bernoulli's equation.

Homogenous linear differential equations with constant coefficients of order two and higher with emphasis on second order.

Non-homogenous linear differential equations with constant coefficients of the form  $f(D)y = X$ , where  $X$  is in the form  $k$ ,  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ ,  $x^n$ , ( $n= 1,2$ ) – complimentary function, particular integral and general solution.

#### Reference Books:

1. Integral Calculus Vol.I, by M.Pillai and Shanti Narayan
2. Thomas' Calculus, Pearson Addison –Wesley Publishers
3. A Text book of Engg. Mathematics by B.S.Grawel
4. A Text book of Engg. Mathematics by B.V.Ramana- T.Mc Graw Hill Publishers

## YARN MANUFACTURE - I

Subject Title : YARN MANUFACTURE - I  
Subject Code : TT – 302  
Periods per week : 05  
Periods per semester : 75

### TIME SCHEDULE

S. No.	Major Topic	No. of Periods	Weightage of Marks	Short Questions	Essay Questions
1	Introduction to Yarn manufacture and Ginning	9	13	1	1
2	Mixing and Blending	10	16	2	1
3	Blow room –Opening and Cleaning	10	13	1	1
4	Blow room –Ancillary Equipment	9	13	1	1
5	Scutcher and Blow room lay outs	9	13	1	1
6	Carding	18	26	2	2
7	Draw frame	10	16	2	1
		<b>75</b>	<b>110</b>	<b>10</b>	<b>08</b>

### OBJECTIVES

Upon completion of the course, student shall be able to

#### 1 Understand Yarn Manufacture & Ginning

- 1.1. List different fibre properties considered for various mixings / blending
- 1.2. Explain the influence of raw material characteristics on short staple spinning
- 1.3. Ginning
  - 1.3.1. State the objects of ginning
  - 1.3.2. Explain the working of saw gin
  - 1.3.3. Explain the working of knife roller gin
  - 1.3.4. Explain the working of Double roller ginning machine
  - 1.3.5. State the general features of Automatic bale pressing machine
  - 1.3.6. Mention the pre ginning and post ginning treatments
  - 1.3.7. List the defects and causes in ginning
  - 1.3.8. List the parameters of effective Ginning Process

#### 2 Understand Mixing and Blending

- 2.1. State the Objects of blending
- 2.2. Define mixing, blending, weight blending and volume blending
- 2.3. Mention the types of blending or Stages of Blending operation

- 2.4. State the precautions to be taken while mixing different fibres
- 2.5. List the types of contamination & Trash in cotton
- 2.6. Explain the construction and working of Mixing bale opener
- 2.7. Explain the working of Automatic bale opening machines
  - 2.7.1. Unifloc / bale plucker
  - 2.7.2. Blendomat
- 2.8. Explain the method of mixing cotton in following Tuft blending installations
  - 2.8.1. Multi mixer
  - 2.8.2. Unimix

### **3 Understand Blow Room**

- 3.1. State the objectives / functions of blow room
- 3.2. Mention the sequence of Blow room processes
- 3.3. Define “ opening” and “cleaning” points in blow room
- 3.4. List the Major and minor cleaning points of blow room line
- 3.5. State the general factors affecting opening and cleaning
- 3.6. List the factors influencing intensity of opening and cleaning
- 3.7. Explain the principles and means of mechanical cleaning of cotton
- 3.8. Explain the construction, working and setting points of following cleaning machines
  - 3.8.1. Step cleaner
  - 3.8.2. Three bladed Beater
  - 3.8.3. Mono cylinder / Uni-clean
  - 3.8.4. ERM Cleaner /CLC cleaner
  - 3.8.5. Kirshner beater

### **4 Understand Ancillary equipments & Transport of material in Blow Room**

- 4.1. Ancillary equipment
  - 4.1.1. Explain the need, principle and installation of Gravity traps in blow room
  - 4.1.2. Explain the need, principle, types and installation of metal extractors
  - 4.1.3. Explain the importance and installation of fire protection systems
  - 4.1.4. Explain the working of Contamination sorter
  - 4.1.5. Explain the working principle of Dedusting machine “Dustex”
  - 4.1.6. State the advantages of dust filter bags
  - 4.1.7. Explain the Waste disposal system in a blow room
  - 4.1.8. Explain the Automatic Waste evacuation system
- 4.2. Transport of material
  - 4.2.1. Mention the two types of transport Viz. mechanical and pneumatic
  - 4.2.2. Explain Pneumatic transport with separation of air and material using Cylinder cages
  - 4.2.3. Explain the construction and working of Condenser
  - 4.2.4. Explain the working principle of Air separators
  - 4.2.5. Explain the functions of Two way distributor , by pass arrangement
  - 4.2.6. State the principles of Controlling material flow

### **5 Understand Scutcher and Blow room lay-outs**

- 5.1. Explain Automatic hopper feeder with reserve box
- 5.2. Explain Piano feeding mechanism
- 5.3. Explain the working of Cone drums
- 5.4. Draw the line diagram of Scutcher and explain the features

- 5.5. State the limitations of scutchers
- 5.6. Illustrate Modern developments in blow room
- 5.7. Explain the factors that determine the choice of blow room line
- 5.8. Discuss the differences in blow room line for low grade, medium grade and good grade cotton
- 5.9. Draw the flow chart showing typical blow room line
- 5.10. List Defects in blow room – causes and Remedies
- 5.11. Write the maintenance schedules for Blow Room machinery
- 5.12. Mention Blow Room Norms for Trash% in Lap, Cleaning Efficiency, Lap C.V.

## **6 Carding**

- 6.1. State the Objects of Carding
- 6.2. Define basic functions / actions of carding machine
- 6.3. Describe the Passage of material on a flat revolving carding machine
- 6.4. Understand the Licker in region of a card
  - 6.4.1. State the Objects of licker in region
  - 6.4.2. Explain the principal parts and functions of feed region of a card
  - 6.4.3. Explain the principal parts and functions of licker in region of a card
  - 6.4.4. Mention the factors that help transfer of fibres from licker in to cylinder
- 6.5. Understand the cylinder region of a card
  - 6.5.1. State the objects of cylinder region
  - 6.5.2. Explain the importance of principal parts of cylinder region of a card
  - 6.5.3. Explain the construction, movement and functions of flats
  - 6.5.4. Explain the theory of carding action between the cylinder and flats
  - 6.5.5. Mention the factors that help transfer of fibres from cylinder to doffer
  - 6.5.6. State the significance of Front plate and Back plate
- 6.6. Card clothing
  - 6.6.1. List different types of clothing used in carding
  - 6.6.2. Describe the Metallic wire clothing with respect to construction, design parameters and its merits and demerits
  - 6.6.3. State the advantages of metallic clothing over flexible
  - 6.6.4. Explain the factors influencing the effectiveness of card clothing
  - 6.6.5. List the factors that determine the choice of card clothing
- 6.7. Doffer region of a card
  - 6.7.1. Objects of doffer region
  - 6.7.2. State the factors that determine the transfer of fibres from cylinder to doffer
  - 6.7.3. Explain the passage of material and functions in doffing region of card
  - 6.7.4. Explain the Coiler mechanism of a carding machine
- 6.8. Maintenance & Settings
  - 6.8.1. Explain the objective, importance and methods of stripping
  - 6.8.2. Explain the importance and methods of grinding
  - 6.8.3. Draw the line diagram of carding machine and show the setting points.
  - 6.8.4. Discuss the effect of card settings on carding process
  - 6.8.5. Mention different types of gauges used for card setting
- 6.9. Developments in carding
  - 6.9.1. Explain the working of Flock feeder
  - 6.9.2. Explain the method of transport of material by chute feed system
  - 6.9.3. State the advantages of chute feed system
  - 6.9.4. Illustrate the developments in licker in region of a card
  - 6.9.5. Illustrate the developments in carding region

- 6.9.6. Illustrate the developments in web collecting region
- 6.9.7. Explain the importance and principles of auto levelling on a card.
- 6.10. Explain the influence of carding parameters on nep formation
- 6.11. Explain the theory of formation of fibre hooks in carding
- 6.12. Find the defects and remedies of card silver.
- 6.13. Tabulate different wastes generated in carding and their norms.
- 6.14. Explain the waste evacuation systems used in Carding.
- 6.15. Mention the maintenance activities carried out in Carding.
- 6.16. Mention the Quality parameters measured in Carding
- 6.17. Mention the norms for NRE in carding.
- 6.18. List out the Salient features of Modern Card

## **7 Understand Draw frame**

- 7.1. State the objects of Draw frame
- 7.2. Explain the passage of material and functions of in a draw frame with line diagram
- 7.3. State the principle of roller drafting
- 7.4. Explain the basic elements of roller drafting on a Draw frame.
- 7.5. Explain different types of top roller weighting systems
- 7.6. Explain different systems of drafting based on number of rollers
- 7.7. Define the terms – draft, break draft, main draft and total draft
- 7.8. Define Drafting Waves and Roller Slip in Draw frame.
- 7.9. List various stop motions on a draw frame
- 7.10. Mention the Draw frame silver defects and remedies.
- 7.11. State the importance of Auto leveler in Draw frame
- 7.12. Mention the important quality parameters measured in Draw frame.
- 7.13. Mention the norms for U% and CV% of Draw frame sliver.
- 7.14. Explain the important features of modern draw frame.
- 7.15. Mention the maintenance activities carried out in Draw frame.

## **COURSE CONTENT**

### **1 Introduction to Yarn Manufacture & Ginning**

Fibre properties considered for various mixing/blending-Influence of raw material characteristics on short staple spinning –Ginning-Objects of ginning-Working of saw gin, knife roller gin and Double roller ginning machine-General features of Automatic bale pressing machine-Mention the pre ginning and post --ginning treatments-Defects in ginning and their causes and remedies.

### **2 Mixing and Blending**

Objects of blending-Define mixing, blending, weight blending and volume blending -Types of blending or Stages of Blending operation-Precautions to be taken while mixing different fibres-Types of contamination & Trash in cotton -Construction and working of Mixing hopper bale opener, Automatic bale opening machines, Unifloc/bale plucker, Blendomat etc- Tuft blending installations -Multi mixer –Unimix.

### **3 Opening and Cleaning**

Objectives / functions of blow room -The sequence of Blow room process - Different components of Blow room machinery -Define “ opening” and

“cleaning” points in blow room - Major and minor cleaning points of blow room line-General factors affecting opening and cleaning -Different types of opening devices and opening variants -Factors influencing intensity of opening and cleaning -Principles and means of mechanical cleaning of cotton-Construction, working and setting points of following cleaning machines -Step cleaner-Axi flow Cleaner -Rieter Uni clean -Mono cylinder -ERM Cleaner -Kirshner beater -CVT/ CLC cleaner

#### **4 Ancillary equipment & Transport of material in Blow Room**

Ancillary equipment & Transport of material in Blow Room-Ancillary equipment -Principle and installation of Gravity traps, metal extractors and fire protection systems -Working of Contamination sorter-Working principle of Dedusting machine “Dustex”-Automatic Waste evacuation system-Transport of material -Two types of transport Viz. mechanical and pneumatic -Pneumatic transport with separation of air and material using Cylinder cages- construction and working of Condenser-Working principle of Air separators -Functions of Two way distributor , by pass arrangement-Principles of Controlling material flow.

#### **5 Scutcher and Blow room lay outs**

Scutcher and Blow room lay outs -Scutcher-Automatic hopper feeder with reserve box-Piano feeding mechanism -Cone drums -Draw the line diagram of Scutcher and explain the features-Limitations of scutchers - Modern developments in blow room -Blow room lay outs -Factors that determine the choice of blow room line-Differences in blow room line for low grade, medium grade and good grade cotton-Flow chart showing typical blow room line Miscellaneous –List Defects in blow room – causes and Remedies-Maintenance schedules for Blow Room-Blow Room Norms-Trash% in Lap, Cleaning Efficiency, Lap C.V%

#### **6 Carding**

Objects of Carding-Functions / actions of carding machine- Passage of material on a flat revolving carding machine- Licker in region of a card - Objects of licker in region -Principal parts and functions of feed region of a card -Principal parts and functions of licker in region of a card-Factors that help transfer of fibres from licker in to cylinder. Understand the cylinder region of a card -Objects of cylinder region -Importance of principal parts of cylinder region of a card-Construction, movement and functions of flats-Theory of carding action between the cylinder and flats -Factors that help transfer of fibres from cylinder to doffer -Significance of Front plate and Back plate -Card clothing -Different types of clothing used in carding-Metallic wire clothing with respect to construction, design parameters and its -merits and demerits -Advantages of metallic clothing over flexible -Factors influencing the effectiveness of card clothing -Factors that determine the choice of card clothing.

Doffer region of a card-Objects of doffer region -Factors that determine the transfer of fibres from cylinder to doffer -Passage of material and functions in

doffing region of card -Explain the Coiler mechanism of a carding machine- Maintenance & Settings Objective, importance and methods of stripping - Importance and methods of grinding-Line diagram of carding machine and show the setting points-Effect of card settings on carding process -Different types of gauges used for card setting -Developments in carding -Working of Flock feeder-Method of transport of material by chute feed system - Advantages of chute feed system -Developments in licker in region of a card -Developments in carding region -Web collecting device-Importance and principles of auto leveling on a card-Carding parameters on nep formation-Theory of formation of fibre hooks in carding -Defects and remedies of card silver.-Different wastes generated in carding and their norms-Waste evacuation systems used in Carding-Maintenance activities carried out in Carding- Quality parameters measured in Carding-Norms for NRE in carding- Salient features of Modern Card

## 7 Draw frames

Objects of Draw frame-Passage of material and functions of in a draw frame with line diagram -Principle of roller drafting-Basic elements of roller drafting on a Draw frame-Different types of top roller weighting systems-Different systems of drafting based on number of rollers -Terms – draft, break draft, main draft and total draft - Drafting Waves and Roller Slip in Draw frame-Variou stop motions on a draw frame - Draw frame silver defects and remedies-Importance of Auto leveler in Draw frame-Important quality parameters measured in Draw frame-Norms for U% and CV% of Draw frame sliver-Important features of modern draw frame-Maintenance activities carried out in Draw frame.

## REFERENCE BOOKS

- |    |  |   |               |
|----|--|---|---------------|
| 1. | Opening and closing                    | - | W.A. Hunter.  |
| 2. | Cotton spinning                        | - | W.S. Taggart. |
| 3. | Cotton opening and picking Vol. 1 to 3 | - | G.R. Merill.  |
| 4. | Manual of cotton spinning Vol. 1 to 3  | - | Butter Worth. |
| 5. | Spun yarn Technology Vol.1 & 2         | - | A.V. Mani.    |
| 6. | Cotton spinning                        | - | A.T.A.        |
| 7. | Volumes of Spinning                    | - | KLEIN.        |
| 8. | Spun Yarn Technology                   | - | OXTOBY.       |
| 9. | Hand Book of Yarn Production           | - | P.K.Lord      |

## FABRIC MANUFACTURE - I

Subject Title	:	FABRIC MANUFACTURE - I
Subject Code	:	TT – 303
Periods per week	:	05
Periods per semester	:	75

### TIME SCHEDULE

S. No.	Major Topic	No. of Periods	Weightage of Marks	Short Questions	Essay Questions
1	Weaving Preparatory	18	26	2	2
2	Basics of Weaving	5	06	2	
3	Primary motions of a loom	16	23	1	2
4	Secondary motions of a loom	9	13	1	1
5	Auxiliary motions and loom accessories	17	26	2	2
6	Weaving Faults and Fabric defects	10	16	2	1
		<b>75</b>	<b>110</b>	<b>10</b>	<b>08</b>

### OBJECTIVES

Upon completion of the course, student shall be able to

#### 1.0 Understand Weaving preparatory

- 1.1 Understand the basics of weaving preparatory
  - 1.1.1 List the sequence of Operations involved in weaving preparatory.
  - 1.1.2 List the objects of various weaving preparatory process.
  - 1.1.3 List different types of yarn packages
  - 1.1.4 Draw the flow chart showing various processes in conversion of yarn to fabric
- 1.2 Weft winding / Pirn winding
  - 1.2.1 State the object of weft winding
  - 1.2.2 Explain the passage of material, parts and functions of automatic pirn winding machine
  - 1.2.3 Importance of bunch of yarn on a pirn
  - 1.2.4 Reasons for obsolescence of weft winding
- 1.3 Warping
  - 1.3.1 State the objects of Warping
  - 1.3.2 Define the two types of warping systems



- 1.3.3 Explain different types of creels used in warping
- 1.3.4 Explain the passage of Warp through high speed automatic beam warping machine.
- 1.3.5 Explain the passage of material, parts and functions of high speed automatic Sectional warping machine.
- 1.3.6 Mention common defects in warp beams
- 1.4 Sizing
  - 1.4.1 State the objects of sizing
  - 1.4.2 List various ingredients used in sizing of warp
  - 1.4.3 Explain the importance, functions and materials of various sizing ingredients
  - 1.4.4 Common size recipe for cottons and polyester / cotton blends
  - 1.4.5 Mention different stages in preparation of size paste
  - 1.4.6 Mention different Techniques of sizing
  - 1.4.7 Give the classification of sizing machines
  - 1.4.8 Explain the passage of material through slasher sizing machine.
  - 1.4.9 Explain the Shirley automatic size box
  - 1.4.10 Explain different principles of drying the sized yarn
  - 1.4.11 List various control devices on sizing machines
  - 1.4.12 Explain the Sizing of synthetic yarns (continuous filament, zero twist, textured)
  - 1.4.13 State the advantages and disadvantages of dry and wet splitting
  - 1.4.14 State the sizing defects and their remedies.
- 1.5 Looming
  - 1.5.1 List various types of looms in operations
  - 1.5.2 State the objects of looms in operations
  - 1.5.3 Explain different methods of drawing in and denting in operations
  - 1.5.4 State the principle of gaiting a new warp

## **2.0 Understand Basics of fabric manufacture**

- 2.1 Mention different methods of fabric manufacture
- 2.2 State the principle of fabric formation by weaving
- 2.3 Define basic terms - warp, weft and loom.
- 2.4 Explain the passage of warp on a plain power loom
- 2.5 Classify motions/ mechanisms of a loom
- 2.6 Define the primary, secondary and auxiliary motions of a loom
- 2.7 Classify weaving machines
- 2.8 State the method of indicating loom timing

## **3.0 Understand Primary motions of a loom**

- 3.1 Understand Shedding mechanism
  - 3.1.1 State the objects of Shedding.
  - 3.1.2 Mention different types of shedding mechanisms.
  - 3.1.3 Explain different types of shed formations and state their relative merits and demerits
  - 3.1.4 Define Positive and Negative tappet shedding
  - 3.1.5 Explain the mechanism of Negative Tappet Shedding found on a plain power loom.
  - 3.1.6 Explain different types of the heald reversing motions for negative tappet shedding
  - 3.1.7 Define the terms throw of tappet and depth of shed

- 3.1.8 Need for counter shaft arrangement
- 3.1.9 Define normal shedding, early shedding and late shedding
- 3.1.10 List the advantages and disadvantages of tappet shedding.
- 3.2 Understand picking mechanism
  - 3.2.1 State the objects of Picking
  - 3.2.2 Mention different Methods of picking.
  - 3.2.3 List the types of shuttle picking mechanisms
  - 3.2.4 Explain the cone over pick mechanisms
  - 3.2.5 Explain the Side lever under pick mechanism
  - 3.2.6 Explain the functions of picking accessories
  - 3.2.7 State the demerits of shuttle picking.
  - 3.2.8 State the salient features of good picking
  - 3.2.9 Shuttle flight and its timing
  - 3.2.10 Factors affecting shuttle traverse over the race board
- 3.3 Understand Beat up Mechanism
  - 3.3.1 State the object of beat up mechanism.
  - 3.3.2 Explain the crank and crank arm Beat up mechanism
  - 3.3.3 State the functions of reed
  - 3.3.4 Define eccentricity of the sley

#### **4.0 Understand Secondary motions of a loom**

- 4.1 Understand the Let off motion.
  - 4.1.1 State the objects of Let off motion.
  - 4.1.2 Define negative and positive type of let off motions
  - 4.1.3 Explain the Working of negative let off motion and its limitations.
  - 4.1.4 Know the conditions of good let off motion.
  - 4.1.5 Mention the demerits of Negative Let off motion.
  - 4.1.6 Mention different types of back rests
  - 4.1.7 Derive the formula for frictional force in negative let off motion
  - 4.1.8 Explain the mechanism of Bartlett positive let off motion
- 4.2 Understand the take up mechanism.
  - 4.2.1 State the objects of Take up motion.
  - 4.2.2 Give the classification of take up motions.
  - 4.2.3 Define negative and positive take up motion
  - 4.2.4 Explain the working of 7 wheel Take-up motion.
  - 4.2.5 Explain the working of Anti crack motion
  - 4.2.6 Explain the worm and worm wheel type positive take up motion
  - 4.2.7 Show different cloth winding systems by simple diagrams

#### **5.0 Understand Auxiliary Motions & Loom accessories**

- 5.1 Understand the weft Stop motion.
  - 5.1.1 State the objects of stop motions.
  - 5.1.2 Mention the types of weft stop motion
  - 5.1.3 Explain the working of Side weft fork motion
  - 5.1.4 Explain the working of Centre weft fork motion.
  - 5.1.5 Compare side & center weft fork motions
- 5.2 Understand warp stop motion.
  - 5.2.1 State the objects of warp stop motions.
  - 5.2.2 List the types of warp stop motions.
  - 5.2.3 Explain the mechanism of electrical warp stop motion.
- 5.3 Understand the warp protector motion.

- 5.3.1 State the objects and types of warp stop motions.
- 5.3.2 Explain the mechanism of loose reed motion.
- 5.3.3 Explain the mechanism of fast reed motion.
- 5.3.4 Compare loose reed and fast reed motion
- 5.3.5 Explain the principle of electromagnetic warp protector motion
- 5.4 Temples
  - 5.4.1 State the need for temples on a power loom
  - 5.4.2 Objects of temples on a power loom
  - 5.4.3 List different types of temples
- 5.5 Loom drives and brake
  - 5.5.1 Mention different types and functions of Loom drive
  - 5.5.2 State the advantages of individual loom drive
  - 5.5.3 State the advantages of group drive in a loom shed
  - 5.5.4 Explain the brake mechanism of a power loom
- 5.6 Loom accessories
  - 5.6.1 Define the hand of the shuttle
  - 5.6.2 Mention the types of healds
  - 5.6.3 State the properties of ideal picker
  - 5.6.4 State the advantages of plastic picker
  - 5.6.5 State the function of Picking bands
  - 5.6.6 State the functions of Buffer
  - 5.6.7 State the functions and care of reed

## **6.0 Understand Weaving faults and Fabric defects**

- 6.1 Warp breaks
  - 6.1.1 Discuss various causes of warp breaks
  - 6.1.2 Explain the factors affecting the warp breaks
- 6.2 Fabric cover
  - 6.2.1 Define the term cover factor and give the formula
  - 6.2.2 Explain different methods of improving the cover of the fabrics
- 6.3 Loom faults
  - 6.3.1 List the causes and remedies of shuttle fly out
  - 6.3.2 List the causes and remedies of shuttle trap
- 6.4 Fabric defects
  - 6.4.1 Tabulate fabric defects as Major and minor
  - 6.4.2 Classify as warp defects, weft defects and fabric defects
  - 6.4.3 Discuss the causes and remedies for warp defects in the fabrics
  - 6.4.4 Discuss the causes and remedies for weft defects in the fabric
  - 6.4.5 Discuss the causes and remedies for fabric defects
- 6.5 Grading
  - 6.5.1 Mention different grades of fabric

## **COURSE CONTENT**

### **1. Weaving preparatory**

Basics of weaving preparatory -sequence of Operations involved in weaving preparatory-objects of various weaving preparatory process-different types of yarn packages -flow chart showing various processes in conversion of yarn to fabric-Weft winding / Pirn winding -object of weft winding -passage of material, parts and functions of automatic pirn winding machine -Importance of bunch of yarn on a pirn -Reasons for obsolescence of weft winding -Warping -objects of Warping -Definition of the two types of warping systems -types of creels used in warping -passage of Warp through high speed automatic beam warping machine-passage of material, parts and functions of high speed automatic Sectional warping machine-common defects in warp beams Sizing -objects of sizing-ingredients used sizing of warp-importance, functions and materials of various sizing ingredients -Common size recipe for cottons and polyester / cotton blends -stages in preparation of size paste -different Techniques of sizing -classification of sizing machines -passage of material through slasher sizing machine-different types of creels used in sizing-Shirley automatic size box -different principles of drying the sized yarn -various control devices on sizing machines -Sizing of synthetic yarns (continuous filament, zero twist, textured) -principle of single end sizing -advantages and disadvantages of dry and wet splitting -sizing defects and their remedies.-Looming -various of looming in operations-objects of looming in operations -different methods of drawing in and denting in operations-principle of gaiting a new warp .

### **2. Basics of fabric manufacture**

Basics of fabric manufacture -different methods of fabric manufacture -principle of fabric formation by weaving -basic terms - warp, weft and loom.-the passage of warp on a plain power loom -basic motions of a loom -primary, secondary and auxiliary motions of a loom -Classification of weaving machines -method of indicating loom timing

### **3. Primary motions of a loom**

Primary motions of a loom-Understand Shedding mechanism-objects of Shedding.-different types of shedding mechanisms-different types of shed formations and state their relative merits and demerits -Positive and Negative tappet shedding-mechanism of Negative Tappet Shedding mechanism found on a plain power loom-different types of the heald reversing motions for negative tappet shedding -Define the term throw of tappet and depth of shed -counter shaft arrangement -normal shedding, early shedding and late shedding -advantages and disadvantages of tappet shedding-picking mechanism-objects of Picking-different Methods of picking-shuttle picking mechanisms -cone over pick mechanisms-Side lever under pick mechanism -functions of picking accessories -Demerits of shuttle picking-salient features of good picking-Shuttle flight and its timing -Factors affecting shuttle traverse over the race board -Beat up Mechanism-object of beat up mechanism.-mechanism of crank and crank arm Beat up mechanism-functions of reed -Define eccentricity of the sley

### **4. Secondary motions of a loom**

Secondary motions of a loom-Left off motion-objects of Let off motion.-negative and positive type of let off motions -Working of negative let off motion and its limitations.-conditions of good let off motion.-demerits of Negative Let off motion.-different types

-of back rests -formula for frictional force in negative let off motion -mechanism of Bartlett positive let off motion -the take up mechanism.-objects of Take up motion.-classification of take up motions-negative and positive take up motion -working of 7 wheel Take-up motion.-working of Anti crack motion -worm and worm wheel type positive take up motion -cloth winding systems

### 5. Auxiliary Motions & Loom accessories

Auxiliary Motions & Loom accessories-the weft Stop motion-objects of stop motions-types of weft stop motion-working of Side weft fork motion-working of Centre weft fork motion-Comparison between side & center weft fork motions-warp stop motion-objects of warp stop motions-types of warp stop motions-mechanism of electrical warp stop motion-warp protector motion-objects and types of warp stop motions-mechanism of loose reed motion-mechanism of fast reed motion-Comparison between loose reed and fast reed motion -principle of electromagnetic warp protector motion -Temples -need for temples on a power loom -Objects of temples on a power loom -different types of temples -different functions of Loom drive -Define different functions of Loom drive -advantages of individual loom drive -advantages of group drive in a loom shed -brake mechanism of a power loom -Loom accessories -hand of the shuttle -the types of healds -properties of ideal picker-advantages of plastic picker -function of Picking bands -functions of Buffer-functions and care of reed.

### 6. Weaving faults and Fabric defects

Weaving faults and Fabric defects -Warp breaks -causes of warp breaks -factors affecting the warp breaks -Fabric cover -cover factor and the formula -methods of -improving the cover of the fabrics -Loom faults -causes and remedies of shuttle fly out -causes and remedies of shuttle trap -Fabric defects - fabric defects as Major and minor -Classification of warp defects, weft defects and fabric defects -causes and remedies for warp defects in the fabrics-causes and remedies for weft defects in the fabric -causes and remedies for fabric defects -Grading -different grades of fabric .

### REFERENCE BOOKS

- |   |   |                   |
|---|---|-------------------|
| 1. Yarn Preparation – I & II                | - | Sen Gupta         |
| 2. Sizing materials, Methods and Machines - | - | Ajgoanker         |
| 3. Weaving Mechanism I & II                 | - | N.N. Benarje      |
| 4. Plain Weaving motions                    | - | K.T. Aswani       |
| 5. Fabric Manufacture                       | - | Hasmukharai       |
| 6. Woven Fabric Production-I                | - | NCUTE             |
| 7. Principles of Weaving                    | - | Marks & Robin Son |
| 8. Weaving conversion of Yarn to Fabric-    | - | Lord & Mohammed   |

## TEXTILE CHEMICAL PROCESSING - I

**Sub Title** : **Textile Chemical Processing-I**

**Subject Code** : **TT – 304**

**Periods per week** : **05**

**Periods per semester** : **75**

### TIME SCHEDULE

S. No.	Major Topic	No. of Periods	Weightage of Marks	Short Questions	Essay Questions
1.	Introduction	4	03	1	
2.	Singeing and Desizing	9	13	1	1
3.	Scouring	9	13	1	1
4.	Bleaching	8	13	1	1
5.	Mercerizing	9	13	1	1
6	Preparation of Wool	10	16	2	1
7	Preparation of Silk Material	9	13	1	1
8	Preparation of semi synthetic & synthetic fibers	17	26	2	2
	<b>Total</b>	<b>75</b>	<b>110</b>	<b>10</b>	<b>8</b>

## **OBJECTIVES**

Upon the completion of the subject the student should be able to

### **1 Introduction to Chemical Processing**

1.1 Mention the Requirement of water for dye house

1.1.1 Define - Hard water & soft water, Temporary and permanent hardness

1.1.2 Give the expression of hardness

1.1.3 Mention different methods of water softening

1.2 Understand Theory of wetting

1.2.1 Define - Surface tension, contact angle, wetting and detergency, surface activity and surfactants

1.2.2 Mention types of surface active agents – anionic, cationic and examples for each

1.3 Give the sequence of operations in chemical processing

### **2 Singeing & Desizing**

2.1 Understand the process of Singeing

2.1.1 State the objects of singeing

2.1.2 State the principles and working of

2.1.2.1 plate singeing

2.1.2.2 roller singeing

2.1.2.3 gas singeing

2.1.3 state the principle of yarn singeing

2.2 understand the process of Desizing

2.2.1 state the objects of desizing

2.2.2 know the basic principle of following methods of desizing

2.2.2.1 Rot steeping

2.2.2.2 Acid steeping

2.2.2.3 Enzymatic steeping

2.2.2.4 Chlorine desizing

### **3 Scouring**

- 3.1 State the objects and importance of scouring.
- 3.2 Know the principle of scouring.
- 3.3 Mention the types of kiers
- 3.4 Know the Kier boiling chemicals and assistants
- 3.5 Explain Kier boiling process
- 3.6 List the precautions to be taken for Scouring of colored goods.

### **4 Bleaching**

- 4.1 Objects of Bleaching
- 4.2 Various bleaching agents
- 4.3 Method of bleaching with hypo chlorites
- 4.4 Comparison of bleaching with Sodium Hypochlorite and Calcium Hypochlorite
- 4.5 Precautions to be taken during hypochlorite bleaching
- 4.6 Define souring
- 4.7 Know the procedure for Bleaching of colored woven fabrics
- 4.8 Know the properties and Chemical behavior of Hydrogen Peroxide.
- 4.9 Express the Strength of Hydrogen Peroxide.
- 4.10 Explain the method of Bleaching with Hydrogen Peroxide
  - 4.10.1 Batch Process
  - 4.10.2 Continuous bleaching
  - 4.10.3 Continuous Scouring and Bleaching by Using J-Box.
- 4.11 Compare of peroxide bleaching with chlorite bleaching
- 4.12 Mention merits of peroxide bleaching

### **5 Mercerizing**

- 5.1 Define mercerizing
- 5.2 State the objects of mercerizing
- 5.3 Explain the principle of Mercerizing
- 5.4 Mention the methods of measuring cotton mercerizing.
- 5.5 Understand the effects of free and restricted shrinkage
- 5.6 Yarn mercerizing
  - 5.6.1 Explain hank mercerizing



- 5.6.2 Explain warp mercerizing
- 5.7 Explain fabric mercerizing
  - 5.7.1 Understand machinery for cloth mercerizing

## **6 Preparation of wool**

- 6.1 Methods of scouring of raw wool and their principles
  - 6.1.1 Explain the principle of Emulsion scouring method
  - 6.1.2 Explain the principle of suint scouring methods
  - 6.1.3 Explain the principle of solvent extraction method
- 6.2 Explain the process of Scouring of woolen and worsted yarns
- 6.3 Explain the process of Scouring
- 6.4 Explain the process of Crabbing
- 6.5 Explain the process Milling
- 6.6 Explain the process of Carbonizing
- 6.7 Explain the process of Bleaching
- 6.8 Explain the process of Anti shrink or non felting treatment of wool

## **7 Preparation of Silk**

- 7.1 Objects of Degumming of Silk
- 7.2 Methods of Degumming of silk
  - 7.2.1 Explain the process of Alkaline method
  - 7.2.2 Explain the process of Detergent method
  - 7.2.3 Explain the process of Enzyme method
- 7.3 Bleaching of silk
  - 7.3.1 Explain the process of Stoving method
  - 7.3.2 Explain the process of Peroxide method
- 7.4 Explain the process of Single bath Degumming and bleaching
- 7.5 State the objects of Weighting of silk
- 7.6 Explain the Method of weighting
- 7.7 List the advantages and disadvantages of weighting of silk

## **8 Preparation and dyeing of semi synthetic & synthetic materials**

- 8.1 Explain the Preparation process of viscose
- 8.2 Explain Preparation of Acetate
- 8.3 Explain Preparation of acetate
- 8.4 Explain Preparation of Polyester
  - 8.4.1 Sequence of processing
  - 8.4.2 Desizing
  - 8.4.3 Scouring
  - 8.4.4 Mercerizing
  - 8.4.5 Bleaching
  - 8.4.6 Anti pilling
  - 8.4.7 Anti static finish
  - 8.4.8 Heat setting
- 8.5 Explain the Preparation of nylon
  - 8.5.1 Scouring
  - 8.5.2 Bleaching
- 8.6 Explain the Preparation of acrylic
  - 8.6.1 Scouring
  - 8.6.2 Bleaching

## **CONTENTS**

### **2 Introduction to Chemical Processing**

- 2.1 Requirement of water for dye house
- 2.2 Theory of wetting
- 2.3 Sequence of operations in chemical processing

### **3 Singeing & Desizing**

- 3.1 Singeing
- 3.2 Objects of singeing
  - 3.2.1 Methods of
    - 3.2.1.1 plate singeing
    - 3.2.1.2 roller singeing
    - 3.2.1.3 gas singeing
  - 3.2.2 principle of yarn singeing

- 3.3 Desizing
  - 3.3.1 Objects of desizing
  - 3.3.2 Rot steeping, Acid steeping, Enzymatic steeping, Chlorine desizing

#### **4 Scouring**

- 4.1 Objects and importance of scouring.
- 4.2 Principle of scouring, Definition and Types of kiers
- 4.3 Kier boiling chemicals and assistants
- 4.4 Detailed study Kier boiling process
- 4.5 Precautions for Scouring of colored goods.

#### **5 Bleaching**

- 5.1 Objects of Bleaching
- 5.2 Various bleaching agents
- 5.3 Method of bleaching with hypo chlorites
- 5.4 Comparison of bleaching with Sodium Hypochlorite and Calcium Hypochlorite
- 5.5 Precautions to be taken during hypochlorite bleaching
- 5.6 Souring
- 5.7 Bleaching of colored woven fabrics
- 5.8 Properties and Chemical behavior of Hydrogen Peroxide.
- 5.9 Expressing the Strength of Hydrogen Peroxide.
- 5.10 Method of Bleaching with Hydrogen Peroxide
  - 5.10.1 Batch Process
  - 5.10.2 Continuous bleaching
  - 5.10.3 Continuous Scouring and Bleaching by Using J-Box.
- 5.11 Comparison of peroxide bleaching with chlorite bleaching
- 5.12 Merits of peroxide bleaching

#### **6 Mercerizing**

- 6.1 Definition and objects of mercerizing
- 6.2 Principle of Mercerizing
- 6.3 Methods of measuring cotton mercerizing.
- 6.4 Effects of free and restricted shrinkage

- 6.5 Yarn mercerizing
- 6.6 Fabric mercerizing
- 6.7 Machinery for cloth mercerizing

## **7 Preparation of wool**

- 7.1 Methods of scouring of raw wool and their principles
- 7.2 Scouring of woolen and worsted yarns
- 7.3 Scouring of fabrics
- 7.4 Crabbing
- 7.5 Milling
- 7.6 Carbonizing
- 7.7 Bleaching
- 7.8 Anti shrink or non felting treatment of wool

## **8 Preparation of Silk**

- 8.1 Objects of Degumming of Silk
- 8.2 Methods of Degumming of silk
- 8.3 Bleaching of silk
- 8.4 Single bath Degumming and bleaching
- 8.5 Objects of Weighting of silk
- 8.6 Method of weighting
- 8.7 Advantages and disadvantages of weighting of silk

## **9 Preparation and dyeing of semi synthetic & synthetic materials**

- 9.1 Preparation of viscose
- 9.2 Preparation of Acetate
- 9.3 Preparation of acetate
- 9.4 Preparation of Polyester
- 9.5 Preparation of nylon
- 9.6 Preparation of acrylic

## REFERENCE BOOKS

- 1) Technology of Textile Processing Vol.1 to 5 -- V.A SHENAI
- 2) Bleaching Dyeing and Chemical  
Technology of Textile Fibres -- E.R Trotman
- 3) Scouring, Bleaching, Mercerising  
And Dyeing of Cellulose Fibres -- R.S Prayag
- 4) Mercerizing – J T Marsh

## APPAREL PRODUCTION TECHNOLOGY

**Subject Title** : APPAREL PRODUCTION TECHNOLOGY

**Subject Code** : TT – 305

**Periods per week** : 4

**Periods per semester** : 60

### TIME SCHEDULE

S.No.	Major Topics	No. of Periods	Weightage Of Marks	Short Answer Type	Essay Type
1.	Classification of Garments and Measurements	6	13	1	1
2.	Patterning and Grading	7	16	2	1
3.	Spreading, cutting and sorting	6	13	1	1
4	Sewing Technology	8	13	1	1
5	Production Technology	8	13	1	1
6	Fusing, pressing and packing	6	13	1	1
7	Fashion Design	9	13	1	1
8	Merchandising	10	16	2	1
	<b>Total</b>	<b>60</b>	<b>110</b>	<b>10</b>	<b>08</b>

## **OBJECTIVES**

*On completion of this subject, a student should be able to*

**Comprehend the following.**

### **1.0 CLASSIFICATION OF GARMENTS AND MEASUREMENTS**

- 1.1 Classification of Garment for men and women.
- 1.2 Fabric Selection for Garments based on Fabric properties.
- 1.3 Theory of human anatomy.
- 1.4 Importance of measurements.
- 1.5 Methods of taking important body Measurement.

### **2.0 PATTERNING AND GRADING**

- 2.1 Importance of paper patterns.
- 2.2 Types of paper patterns.
- 2.3 Principles of pattern drafting.
- 2.4 Study of pattern making of top and bottom garments.
- 2.5 Study of grading of various component of garments.
- 2.6 Study of marker planning.

### **3.0 SPREADING, CUTTING AND SORTING**

- 3.1 Objectives of spreading.
- 3.2 Methods of spreading.
- 3.3 Types of Cutting machines.
- 3.4 Study of assorting, stickering and bundling.

### **4.0 SEWING TECHNOLOGY**

- 4.1 Stitch and Classification of Stitches.
- 4.2 Seam and Different types of Seams.
- 4.3 Sewing aids/tools.

- 4.4 Parts of Sewing machine.
- 4.5 Study of Various types of Sewing machines.
- 4.6 Study of trimmings.
- 4.7 Selection of needle and thread for different garment.

## **5.0 PRODUCTION TECHNOLOGY**

- 5.1 List the operational characteristics of a production system.
- 5.2 List the various types of production systems.
- 5.3 List the production systems which fall under Manual Production systems.
- 5.4 Explain the characteristics of Making through system.
- 5.5 Explain the main features of Section or process system with a layout.
- 5.6 Explain the principles and main features of Progressive bundle system with a layout.
- 5.7 Explain the basic features of Straight line or 'synchro' system.
- 5.8 List the production systems which fall under Mechanical Transport systems.
- 5.9 Explain the basic features and operation of Selective conveyor belt system.
- 5.10 Explain the essential features and operational principles of Unit production system.
- 5.11 Enumerate the advantages of Unit production system.
- 5.12 Explain the characteristics and working of Quick response sewing system.

## **6.0 FUSING, PRESSING AND PACKING**

- 6.1 Objects of fusing.
- 6.2 Base Cloth and Resin Coating Systems.
- 6.3 Effects of Parameters like temperature, Pressure and time.
- 6.4 Pressing and types of Pressing.
- 6.5 Machinery of Pressing.
- 6.6 Pressing Controls.
- 6.7 Handling Systems of material.
- 6.8 Types of packing and Packing materials.
- 6.9 Labels and Tags.



## **7.0 FASHION DESIGN**

- 7.1 Social psychology of Clothing.
- 7.2 Study of Customer requirements.
- 7.3 Terms like Fashion, innovation, Style.
- 7.4 Requirements of the Design.
- 7.5 Colour Concept.
- 7.6 Designer and quality Control.
- 7.7 Fashion Garments Vs Basic Garments.

## **8.0 MERCHANDISING**

- 8.1 Define the term merchandising
- 8.2 Give the flow chart of merchandising process in garment industry
- 8.3 State the responsibilities of merchandiser
- 8.4 Define the following terms in Garment export house
  - a. FOB b. CIF c. BOM d. Order confirmation e. Purchase order
  - f. Master L/C g. Sampling
- 8.5 List the different types of samples
- 8.6 Explain in detail about production line set up to be followed in garment industry
- 8.7 Define the terms final inspection and Third party inspection
- 8.8 Define the terms In-line Inspection and On-line inspection
- 8.9 Define the follow-up in merchandising
- 8.10 Explain in detail about the merchandising process from fabric stage to packing stage

## **COURSE CONTENTS**

### **1.0 Classification of Garments and Measurements**

- 1.1 Garment Classification for Men and Women.
- 1.2 Fabric Selection for Garments and Properties.
- 1.3 Eight Head theory of Human Anatomy.
- 1.4 Measurements and its importance.
- 1.5 Method of Taking important body measurements for Gents and Ladies Garments.

### **2.0 Patterning And Grading**

- 2.1 Patterning importance of Paper patterns.
- 2.2 Types of paper patterns.
- 2.3 Principles of Pattern Drafting.
- 2.4 Study of Pattern making of Top and Bottom Garments.
- 2.5 Grading – Study of Grading of Various Components of Top and Bottom Garments.
- 2.6 Marker planning – computer Aided pattern making and Grading systems.

### **3.0 Spreading, Cutting And Sorting**

- 3.1 Spreading – Objectives of Spreading.
- 3.2 Methods of Spreading.
- 3.3 Cutting – Hand Shear and different types of Cutting Machines Such as Straight Knife, Bend Knife, Circular Knife, Computer Controlled Cutting Knife etc.,
- 3.4 Assorting.
- 3.5 Stickers.
- 3.6 Bundling.

## **4.0**

### **Sewing Technology**

- 4.1 Stitch and Classification of Stitch.
- 4.2 Seam and Different types of Seams.
- 4.3 Sewing Aids/Tools.
- 4.4 Parts of Sewing Machine.
- 4.5 Study of Various types of Sewing Machine such as lock Stitch, Chain Stitch, Over lock, Flat lock, Button Holding, Buttoning and computer controlled Sewing Machines Timing diagram for lock stitch.
- 4.6 Trimmings.
- 4.7 Selection of Needle and Sewing thread. Study of Construction of Top and Bottom and Garments.
- 4.8 Individual and Group Production Systems.

## **5.0 PRODUCTION TECHNOLOGY**

- 5.1 Operational characteristics of a production system.
- 5.2 Types of production systems.
- 5.3 Production systems which fall under Manual Production systems.
- 5.4 Characteristics of Making through system.
- 5.5 Features of Section or process system with a layout.
- 5.6 Principles and main features of Progressive bundle system with a layout.
- 5.7 Features of Straight line or 'synchro' system.
- 5.8 Production systems which fall under Mechanical Transport systems.
- 5.9 Basic features and operation of Selective conveyor belt system.

- 5.10 Essential features and operational principles of Unit production system.
- 5.11 Advantages of Unit production system.
- 5.12 Characteristics and working of Quick response sewing system.

## **6.0 Fusing, Pressing And Packing**

- 6.1 Fusing.
- 6.2 Base Cloth.
- 6.3 Resins coating systems.
- 6.4 Temperature, Time, Pressure.
- 6.5 Peel Strength.
- 6.6 Pressing and Types of Pressing.
- 6.7 Basic Components of Under Pressing.
- 6.8 Machinery and Equipment Pressing.
- 6.9 Top Pressing Controls.
- 6.10 Handling systems.
- 6.11 Packing.
  - 6.10.A Different types of Packing.
  - 6.10.B Packing Materials.
  - 6.10.C Labels and tags.

## **7.0 Fashion Design**

- 7.1 NATURE OF DESIGN
- 7.2 Clothing and the body.
- 7.3 Social Psychology of Clothing.
- 7.4 Life Style-Study of Customer requirements- Fashion Innovation  
Style – Design system and Practice.
- 7.5 Requirements of the Design.  
Colour Concept.  
Designer and Quality control.  
Fashion Garments Vs Basic Garments.

## **8.0 MERCHANDISING**

- 8.1 Merchandising
- 8.2 Flow chart of merchandising process in garment industry
- 8.3 Responsibilities of merchandiser
- 8.4 Garment export house
  - a. Fob b. Cif c. Bom d. Order confirmation e. Purchase order
  - f. Master l/c g. Sampling
- 8.5 Different types of samples
- 8.6 Production line set up to be followed in garment industry
- 8.7 Final inspection and third party inspection
- 8.8 In-line inspection and on-line inspection
- 8.9 Follow-up in merchandising
- 8.10 Merchandising process from fabric stage to packing stage

### **REFERENCE BOOKS**

- 1. Garment Technology -- Talukdar.
- 2. Garment Design -- NIFT, New Delhi.
- 3. Garment Manufacture -- NIFT, New Delhi.
- 4. Hayden peggall, "The Complete Dress Marker". Marshall Cavindish, London, 1984.
- 5. Hayden peggall, "Introduction to Dress Making". Marshall Caverdish, London, 1985.
- 6. Laing, R., "Fundamentals of stitches and seams", Textile Institute, Manchester, 1995.
- 7. Chuter, A.J., "Introduction to clothing production management", Blackwell Science, U.K., 1995.
- 8. Cookin, G. "Introduction to clothing manufacture", Blackwell Sceince, U.K., 1991.

9. Carr, H. and Latham, b, "The Technology of Clothing Manufacture", Blackwell Science, U.K., 1994.
10. Bary N., "Dress Pattern Designing, The Basic Principles of Cut and Fit", Blackwell Science, U.K., 1996.

## YARN MANUFACTURE LAB PRACTICE – I

Subject title : YARN MANUFACTURE LAB PRACTICE - I  
Subject code : TT - 306  
Periods per week : 06  
Periods per semester : 90

### TIME SCHEDULE

S. No.	List of Experiments	No. of Periods
A.	Ginning Experiments	06
B	Blow Room Experiments	42
C	Carding Experiments	24
D	Drawing Experiments	18
	<b>Total</b>	<b>90</b>

\* A minimum of 13 experiments need to be conducted in a semester

### LIST OF EXPERIMENTS

#### A. Ginning Experiments

- 1) Draw the passage of material and explain the working of Double roller gin and calculate the speeds through gearing diagram

#### B. Experiments in Blow room

- 2) Draw the passage of material through Mixing Bale Opener and calculate the speeds through Gearing Diagram.
- 3) Draw the passage of material through Auto mixer / Unimix / Multi-Mixer and calculate the speeds through Gearing Diagram.
- 4) Draw the passage of material through Step Cleaner and calculate the speeds through Gearing Diagram.
- 5) Draw the passage of material through ERM cleaner and calculate the speeds through Gearing Diagram.
- 6) Draw the passage of material through Lap forming unit and calculate the speeds through Gearing Diagram.
- 7) Study the Auxiliary equipments - Metal Detectors, Fire prevention system, Fire Detectors, By pass arrangement and Two way distributor
- 8) Draw the line diagram showing the Blow room lay outs for short , medium and long

#### C. Experiments in Carding

- 9) Draw gearing diagram of carding machine and find out the speeds of Cylinder, Licker-in , Feed roller, Doffer, Flats, Doffer comb, Calendar rollers and Coiler calendar rollers.

- 10) Draw the gearing diagram of a carding machine and find Draft in different regions and also find Total draft, Draft constant and Tension draft.
- 11) Draw the gearing diagram and find the formula for Production constant and Production change wheel
- 12) Draw the diagram of a carding machine and show the setting places

**C. Experiments in Draw frame**

- 13) Draw the gearing diagram of draw frame and obtain the speeds of different drafting rollers and creel roller
- 14) Draw the gearing diagram of draw frame and obtain the All Drafts and Draft Constants
- 15) Draw the gearing diagram of draw frame and obtain the formula for Production constant

**Competencies and Key competencies to be achieved by the student**

S.No.	Name of the Experiment	Objectives	Key competencies
1	Draw the passage of material through a ginning machine and calculate speeds through gearing diagram	<ol style="list-style-type: none"> <li>1. Identify the machine</li> <li>2. Identify the major parts of machine</li> <li>3. Identify the functions of major parts</li> <li>4. Observe the machine in running condition</li> <li>5. Observe the setting points on the machine</li> <li>6. Draw the gearing diagram</li> <li>7. Calculate the speeds of major parts</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Draw the gearing diagram</li> <li>4. Calculate the speeds of major parts</li> </ol>
2	Draw the passage of material through Mixing Bale Opener and calculate the speeds through Gearing Diagram	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Observe the machine in running condition</li> <li>4. Check the speeds and setting using tacho meter and gauges</li> <li>5. Observe the setting points on the machine</li> <li>6. Draw the gearing diagram</li> <li>7. Calculate the speeds of major parts</li> <li>8. Calculate the beats / inch of the beater</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Draw the gearing diagram</li> <li>4. Calculate the beats / inch of the beater</li> </ol>



3	Draw the passage of material through Unimix / Multi-Mixer / Aeromixer and calculate the speeds through Gearing Diagram	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Observe the machine in running condition</li> <li>4. Observe the setting points on the machine</li> <li>5. Draw the gearing diagram</li> <li>6. Calculate the speeds of major parts</li> <li>7. Calculate the beats / inch of the beater</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Draw the gearing diagram</li> <li>4. Calculate the speeds of major parts</li> </ol>
4, 5	Draw the passage of material through Step Cleaner / ERM cleaner and calculate the speeds through Gearing Diagram.	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Observe the machine in running condition</li> <li>4. Observe the setting points on the machine</li> <li>5. Draw the gearing diagram</li> <li>6. Calculate the speeds of major parts</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify setting points on the machine</li> <li>3. Draw the gearing diagram</li> <li>4. Calculate the speeds of major parts</li> </ol>
6	Draw the passage of material through Lap forming unit (Scutcher) and calculate the speeds through Gearing Diagram.	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Observe the machine in running condition</li> <li>4. Observe the setting points on the machine</li> <li>5. Draw the gearing diagram</li> <li>6. Calculate the speeds of major parts</li> <li>7. Calculate the production rate</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Draw the gearing diagram</li> <li>4. Calculate the production rate</li> </ol>
7	Study of Auxiliary equipments - Metal Detectors, fire prevention system, Fire detectors, By pass arrangement and two way distributor	<ol style="list-style-type: none"> <li>1. Identify each mechanism in the blow room line</li> <li>2. Identify the functions of each mechanism</li> <li>3. Observe the blow room line and locate these mechanisms</li> <li>4. Draw the line diagram for each mechanism</li> <li>5. Identify settings and adjustments</li> <li>6. Observe the functioning of each mechanism</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify each mechanism in the blow room line</li> <li>2. Identify the functions of each mechanism</li> <li>3. Draw the line diagram for each mechanism</li> <li>4. Identify settings and adjustments</li> </ol>

8	Draw a line diagram showing the sequence of machines in Blow Room and Lay-out. ( Carried out after a mill visit)	<ol style="list-style-type: none"> <li>1. Identify the type of raw material</li> <li>2. Observe the Blow room for sequence of machines</li> <li>3. Identify all the machines and take a note of it</li> <li>4. Draw a line diagram showing the sequence of machines</li> <li>5. Compare the differences in sequence for different grades of cotton</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the type of raw material</li> <li>2. Identify all the machines and take a note of it</li> <li>3. Draw a line diagram showing the sequence of machines</li> </ol>
9	Draw gearing diagram of carding machine and find out the speeds of Cylinder, Licker- in , Feed roller, Doffer, Flats, Doffer comb, Calendar rollers and Coiler calendar rollers.	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Observe the machine in running condition</li> <li>4. Observe the setting points on the machine</li> <li>5. Draw the gearing diagram</li> <li>6. Calculate the speeds of major parts</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Draw the gearing diagram</li> <li>4. Calculate the speeds of major parts</li> </ol>
10	Draw the gearing diagram of a carding machine and find Draft in different regions ie Total draft, Draft constant and Tension draft.	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Observe the connections through gearing</li> <li>3. Draw the gearing diagram</li> <li>4. Identify draft change pinion</li> <li>5. Calculate the speeds of major parts</li> <li>6. Calculate the draft in different zones</li> <li>7. Calculate the draft constant</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the driving pulleys to the major parts</li> <li>2. Draw the gearing diagram</li> <li>3. Calculate the draft in different zones</li> <li>4. Obtain the draft constant</li> </ol>
11	Draw the gearing diagram and find the formula for Production constant and Production change wheel	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Observe the connections through gearing</li> <li>3. Draw the gearing diagram related to production</li> <li>4. Identify production change pinion</li> <li>5. Calculate the speeds of major parts</li> <li>6. Calculate the production constant</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Draw the gearing diagram related to production</li> <li>3. Calculate the production constant</li> </ol>

12	Draw the diagram of a carding machine and show the setting places	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Measure the setting between different parts on the machine</li> <li>3. Observe the settings for different grades of cotton</li> <li>4. Identify setting points of the machine</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Measure the setting between different parts on the machine</li> <li>3. Identify setting points of the machine</li> </ol>
13	Disassemble and Assemble the parts of Drafting system on a draw frame	<ol style="list-style-type: none"> <li>1. Identify the drafting system and its major parts</li> <li>2. Disassemble the parts of drafting system</li> <li>3. Identify the parts and their functions</li> <li>4. Clean the parts</li> <li>5. Assemble the parts</li> <li>6. Run the machine in idle condition</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the drafting system and its major parts</li> <li>2. Disassemble the parts of drafting system</li> <li>3. Assemble the parts</li> <li>4. Run the machine in idle condition and verify for correct movement of parts</li> </ol>
14	Draw the gearing diagram of draw frame and obtain the All Drafts and Draft Constants	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts of drafting system</li> <li>2. Identify the gearing connected to drafting rollers</li> <li>3. Observe the gearing to each drafting roller</li> <li>4. Identify draft change pinion</li> <li>5. Draw the gearing diagram</li> <li>6. Calculate the speeds of each roller</li> <li>7. Calculate the draft in each zone and total draft</li> <li>8. Obtain the draft constant</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts of drafting system</li> <li>2. Identify draft change pinion</li> <li>3. Draw the gearing diagram</li> <li>4. Calculate the speeds of each roller</li> <li>5. Calculate the draft in each zone and total draft</li> <li>6. Obtain the draft constant</li> </ol>
15	Draw the gearing diagram of draw frame and obtain the formula for Production constant	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Observe the connections through gearing</li> <li>3. Draw the gearing diagram related to production</li> <li>4. Identify production change pinion</li> <li>5. Calculate the speeds of major parts</li> <li>6. Calculate the production constant</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Draw the gearing diagram related to production</li> <li>3. Calculate the production constant</li> </ol>

## FABRIC MANUFACTURE LAB –I

**Subject Title** : **FABRIC MANUFACTURE LAB -I**

**Subject Code** : **TT – 307**

**Periods per week** : **06**

**Periods per semester** : **90**

### TIME SCHEDULE

S. No.	Major Topic	No. of Periods
A	Weaving Preparatory and Basics of loom	24
B	Primary motions of a loom	36
C	Secondary motions of a loom	15
D	Auxiliary motions and loom accessories	15
	<b>TOTAL</b>	<b>90</b>

\*A minimum of 20 experiments need to be conducted in each semester

### LIST OF EXPERIMENTS

#### A. Weaving Preparatory and Basic loom

- 1) Study the Parts and functions of Fully automatic Cone winding machine
- 2) Study the Parts and functions of Beam warping machine
- 3) Study the Parts and functions of Sectional warping machine
- 4) Preparation of sections for a given warp pattern of fabric on a sectional warping machine
- 5) Study the Parts and functions of High speed automatic spindle less pirn winding machine
- 6) Preparation of drawing and denting plan for a given fabric
- 7) know the different parts and functions in the passage of material through a plain power loom

#### B. Primary motions of a loom

- 8) Dismantling and assembling of Tappet shedding mechanism and to study the parts and functions of the mechanism
- 9) Dismantling and assembling of Over Pick Mechanism and to study the parts and functions of the mechanism
- 10) Dismantling and assembling of cone Under pick mechanism and to study the parts and functions of the mechanism
- 11) Dismantling and assembling of Side lever Under pick mechanism and to study the parts and functions of the mechanism
- 12) Dismantling and assembling of Beat up mechanism and to study the parts and functions of the mechanism

**C. Secondary motions of a Loom**

- 13) Dismantling and assembling of negative let off motion
- 14) Dismantling and assembling of positive let off motion
- 15) Dismantling and assembling of 7 wheel take up motion
- 16) Dismantling and assembling of positive take up motion
- 17) Dismantling and assembling of Anti crack mechanism

**D. Auxiliary motions of a loom**

- 18) Dismantling and assembling of side weft fork motion
- 19) Dismantling and assembling of centre weft fork motion
- 20) Dismantling and assembling of Loose reed motion
- 21) Dismantling and assembling of Fast reed motion
- 22) Dismantling and assembling of loom brake mechanism

**Competencies and Key competencies to be achieved by the student**

s.no	Objective	competency	Key competency
1	Study the Parts and functions of Fully automatic Cone winding machine	<ol style="list-style-type: none"> <li>1. Identification of parts</li> <li>2. Observe the functions of different parts</li> <li>3. Dismantling of parts</li> <li>4. Assembling the parts</li> <li>5. Run the machine successfully</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of parts</li> <li>2. Dismantling of parts</li> <li>3. Assembling the parts</li> </ol>
2,3	Study the Parts and functions of Beam warping machine / Sectional Warping machine	<ol style="list-style-type: none"> <li>1. Identification of parts</li> <li>2. Observe the functions of different parts</li> <li>3. Observe the loading empty beam</li> <li>4. Observe unloading of full beam</li> <li>5. Practice to set the length of warp beam</li> <li>6. Run the machine successfully</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of parts</li> <li>2. Setting up the machine to run</li> <li>3. Run the machine successfully</li> </ol>
4	Preparation of sections for a given pattern of fabric on sectional warping machine	<ol style="list-style-type: none"> <li>1. Identify the no of ends in each section and their colours</li> <li>2. Arrange the cones in the creel as per pattern</li> <li>3. Set the machine parameters</li> <li>4. Run the machine successfully</li> </ol>	<ol style="list-style-type: none"> <li>1. Arrange the cones in the creel as per pattern</li> <li>2. Set the machine parameters</li> <li>3. Run the machine successfully</li> </ol>
5	Study the Parts and functions of High speed automatic spindle less pirn winding machine	<ol style="list-style-type: none"> <li>1. Identify the parts - healds and reed and tools required</li> </ol>	<ol style="list-style-type: none"> <li>2. Observe the fabric pattern and yarn particulars</li> </ol>

6	Preparation of plan and Practice of Drawing in and Denting in operations for a loom	<ol style="list-style-type: none"> <li>3. Identify the parts - healds and reed and tools required</li> <li>4. Observe the fabric pattern and yarn particulars</li> <li>5. Draw the design, drawing in and denting in plans on point paper</li> <li>6. Select Heald and Reed of suitable count</li> <li>7. Practice drawing in operation</li> <li>8. Practice denting in operation</li> <li>9. Practice gaiting on loom</li> </ol>	<ol style="list-style-type: none"> <li>1. Draw the design, drawing in and denting in plans on point paper</li> <li>2. Practice drawing in operation</li> <li>3. Practice denting in operation</li> <li>4. Practice gaiting on loom</li> </ol>
7	Study the different parts and functions in the passage of material through a plain power loom	<ol style="list-style-type: none"> <li>1. Identification of constructional parts of the plain power loom</li> <li>2. Identification of functions of each part</li> <li>3. Observe the functions of different parts</li> <li>4. Dismantling of basic parts of a loom</li> <li>5. Assembling the basic parts of a loom</li> <li>6. Practice running a plain power loom</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of constructional parts of the plain power loom</li> <li>2. Dismantling of basic parts of a loom</li> <li>3. Assembling the basic parts of a loom</li> <li>4. Run the loom successfully</li> </ol>
8	Dismantling and assembling of Tappet shedding mechanism and run shedding mechanism on a loom	<ol style="list-style-type: none"> <li>1. Identification of parts of the shedding mechanism</li> <li>2. Identification of functions of each part</li> <li>3. Observe the functions of different parts</li> <li>4. Observe the shed formation</li> <li>5. Dismantling of the parts</li> <li>6. Assembling the parts</li> <li>7. Practice running a loom with shedding mechanism</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of parts of the shedding mechanism</li> <li>2. Dismantling of the parts</li> <li>3. Assembling the basic parts of a loom</li> <li>4. Practice running a loom with shedding mechanism</li> </ol>
9, 10 & 11	Dismantling and assembling of Cone over pick / Under Pick mechanism ( Side lever and Cone)	<ol style="list-style-type: none"> <li>1. Identification of parts of the picking mechanism</li> <li>2. Identification of functions of each part</li> <li>3. Observe the functions of different parts</li> <li>4. Observe the correct movement of shuttle on the race board</li> <li>5. Dismantling of the parts</li> <li>6. Assembling the parts</li> <li>7. Practice running a loom with picking mechanism</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of parts of the picking mechanism</li> <li>2. Dismantling of the parts</li> <li>3. Assembling the parts</li> <li>4. Practice running a loom with picking mechanism</li> </ol>

12	Dismantling and assembling of Beat up mechanism and run the beat up mechanism	<ol style="list-style-type: none"> <li>1. Identification of parts of the Beat up mechanism</li> <li>2. Identification of functions of each part</li> <li>3. Observe the functions of different parts</li> <li>4. Identify setting points</li> <li>5. Dismantling of the parts</li> <li>6. Assembling the basic parts of a loom</li> <li>7. Practice correct settings</li> <li>8. Practice running a loom with beat up mechanism</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of parts of the Beat up mechanism</li> <li>2. Dismantling of the parts</li> <li>3. Assembling the parts</li> <li>4. Practice running a loom with beat up mechanism</li> </ol>
13, 14	Dismantling and assembling of Negative let off mechanism / Positive let off mechanism	<ol style="list-style-type: none"> <li>1. Identification of parts of the let off mechanism</li> <li>2. Identification of functions of each part</li> <li>3. Observe the functions of different parts</li> <li>4. Dismantling of the parts</li> <li>5. Assembling the parts</li> <li>6. Practice running a loom with let off motion</li> <li>7. Adjust the warp tension while running the loom</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of parts of the negative let off mechanism</li> <li>2. Dismantling of the parts</li> <li>3. Assembling the parts</li> <li>4. Adjust the warp tension while running the loom</li> </ol>
15, 16	Dismantling and assembling of 7 wheel take up mechanism / positive take up motion	<ol style="list-style-type: none"> <li>1. Identification of parts of the take up mechanism</li> <li>2. Identification of functions of each part</li> <li>3. Observe the functions of different parts</li> <li>4. Dismantling of the parts</li> <li>5. Calculate the dividend</li> <li>6. Assembling the parts</li> <li>7. Practice running a loom with take up motion</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of parts of the take up mechanism</li> <li>2. Dismantling of the parts</li> <li>3. Calculate the dividend</li> <li>4. Assembling the parts</li> <li>5. Practice running a loom with take up motion</li> </ol>
17	Dismantling and assembling of Anti crack mechanism and to study the parts and functions of anti crack mechanism	<ol style="list-style-type: none"> <li>1. Identification of parts</li> <li>2. Identification of functions of each part</li> <li>3. Observe the functions of different parts</li> <li>4. Identify setting points</li> <li>5. Dismantling of the parts</li> <li>6. Assembling the parts</li> <li>7. Practice correct settings</li> <li>8. Practice running a loom with anti crack mechanism</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of parts of the take up mechanism</li> <li>2. Dismantling of the parts</li> <li>3. Assembling the parts</li> <li>4. Practice running a loom with anti crack mechanism</li> </ol>

18, 19	Dismantling and assembling of Side weft fork / Centre weft fork mechanism.	<ol style="list-style-type: none"> <li>1. Identification of parts</li> <li>2. Identification of functions of each part</li> <li>3. Observe the functions of different parts</li> <li>4. Identify setting points</li> <li>5. Dismantling of the parts</li> <li>6. Assembling the parts</li> <li>7. Practice correct settings</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of parts of the weft fork mechanism</li> <li>2. Dismantling of the parts</li> <li>3. Assembling the parts</li> <li>4. Practice running a loom with weft fork mechanism</li> </ol>
20, 21	Dismantling and assembling of Loose reed / Fast mechanism	<ol style="list-style-type: none"> <li>1. Identification of parts</li> <li>2. Identification of functions of each part</li> <li>3. Observe the functions of different parts</li> <li>4. Identify setting points</li> <li>5. Dismantling of the parts</li> <li>6. Assembling the parts</li> <li>7. Practice correct settings</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of parts of the warp protector motion</li> <li>2. Dismantling of the parts</li> <li>3. Assembling the parts</li> <li>4. Practice correct settings</li> </ol>
22	Dismantling and assembling of Loom brake mechanism and practice.	<ol style="list-style-type: none"> <li>1. Identification of brake parts</li> <li>2. Observe the functioning of brake mechanism</li> <li>3. Identify setting points</li> <li>4. Dismantling of the parts</li> <li>5. Assembling the parts</li> <li>6. Practice stopping a loom smoothly</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of brake parts</li> <li>2. Dismantling of the parts</li> <li>3. Assembling the parts</li> <li>4. Practice stopping the loom smoothly</li> </ol>



## COMMUNICATION SKILLS

**SUBJECT TITLE** : COMMUNICATION SKILLS  
**SUBJECT CODE** : TT –308  
**PERIODS / WEEK** : 3  
**PERIODS / SEMESTER** : 45

### Introduction:

In the context of globalization, competence in speaking skills is the need of the hour. The gap between the needs of the industry and the curriculum can be bridged by enabling the students to hone their speaking and listening skills. This course aims at providing opportunities for practicing speaking.

### Objectives:

On completion of the course the students will be able to

- Strengthen their listening skills
- Strengthen their speaking skills

### TIME SCHEDULE

Sno.	Topic	Periods	Weightage of marks (End Exam )	Sessional marks	Total
1	Listening I	3	10	10	20
2	Listening II	3			
3	Introducing oneself	3	50	30	80
4	Describing objects	3			
5	Describing events	3			
6	Reporting past incidents	3			
7	Speaking from observation / reading	3			
8	JAM	6			
9	Group discussion	6			
10	Mock interviews	6			
11	Making presentations	6			
		45	60	40	100

**Competencies and key competencies to be achieved by the student**

<b>Topic</b>	<b>Teacher's input/ methodology</b>	<b>Students competence</b>
Listening I  Listening II	Pre- Listening –eliciting, pictures  While - Listening  Post –Listening –project , writing	Identifying the main idea,  Identifying specific details,  Identifying parallel and contradictory ideas  Drawing inferences,  Reasoning
Introducing oneself	Kinds of introduction --official/ personal, dynamic vocabulary,  Body language, Model introduction, Use of line ups	Use of simple present tense,  Sequencing,  Appropriate vocabulary
Reporting incidents	Group work /pair work,  Elicit,  Use of past tense,  Student presentations	Use of past tense,  Relevant vocabulary

Describing objects	Vocabulary ,  Use of adjectives,  Games—I spy,  Group presentations	Use of adjectives,  Dimensions,shapes  Compare and contrast,  sequence
Describing events	Group work/pair work  Use of appropriate tense	Use of appropriate tense,  sequencing
Reporting past incidents	Use of past tense,  Vocabulary	Use of past tense , sequencing

	Student presentations	
Speaking from observation/reading	Group work/pair work, Reading techniques ,	Use of past tense, Summarising , evaluating, comprehension
JAM	Effective techniques , Good beginning , conclusion, tips, Use of line ups	Vocabulary, Sequencing, Fluency, Thinking spontaneously
Group discussion	Expressing opinion, body language,	Expressing opinion, agree/ disagree, fluency,Persuasive and leadership skills
Mock interview	FAQs , body language	Role play, body language,
Making presentations	Student presentations	Using charts , pictures, interpreting data, sequencing,PPTs

Communicative methodology (CLT) should be used to create an interactive class. Apart from the suggestions given teachers are free to innovate to use any activity to improve the language competence of students . Attention can also be given to improve the accent and intonation of students.

Note:

\* This subject is a theory subject.

\*\* The workload should be calculated as theory workload.

\*\*\*Examinations in the subject will be treated as a practical one.

## TEXTILE CHEMICAL PROCESSING LAB - I

<b>Sub Title</b>	:	Textile <b>CHEMICAL PROCESSING LAB - I</b>
<b>Subject Code</b>	:	<b>TT –309</b>
<b>Periods per week</b>	:	<b>03</b>
<b>Periods per semester</b>	:	<b>45</b>

### TIME SCHEDULE

<b>S. No.</b>	<b>List of Experiments</b>	<b>No. of Periods</b>
1.	Preparation of Cotton for Dyeing	18
2.	Preparation of Wool for Dyeing	12
3.	Preparation of Silk for Dyeing	09
4.	Preparation of Semi Synthetic materials for dyeing	03
5.	Preparation of Synthetic fabrics for Dyeing	03
	<b>TOTAL</b>	<b>45</b>

### OBJECTIVES

**On completion of this subject student should be able to**

#### **1. Preparation of Cotton for Dyeing**

- 1.1. understand the method of desizing the given cotton material
- 1.2. understand the method of scouring the given cotton material
- 1.3. understand the method of bleaching the given cotton material

#### **2. Preparation of Wool for Dyeing**

- 2.1. understand the method of Carbonization of wool
- 2.2. understand the method of Scouring of wool

2.3. understand the method of Bleaching of wool

**3. Preparation of Silk for Dyeing**

3.1. understand the method of Scouring of Silk

3.2. understand the method of Bleaching of Silk

**4. Preparation of Semi Synthetic materials for dyeing**

4.1. understand the method of Preparation of viscose materials for dyeing

**5. Preparation of Synthetic materials for dyeing**

5.1. understand the method of Desizing of given polyester material

5.2. understand the method of Scouring of given polyester material

5.3. understand the method of Bleaching of given polyester

**CONTENTS**

**6. Preparation of Cotton for Dyeing**

6.1. Desizing of given cotton material

6.2. Scouring of given cotton material

6.3. Bleaching of given cotton material

**7. Preparation of Wool for Dyeing**

7.1. Carbonization of wool

7.2. Scouring of wool

7.3. Bleaching of wool

**8. Preparation of Silk for Dyeing**

8.1. Scouring of Silk

8.2. Bleaching of Silk

**9. Preparation of Semi Synthetic materials for dyeing**

9.1. Preparation of viscose materials for dyeing

**10. Preparation of Synthetic materials for dyeing**

10.1. Desizing of given polyester material

10.2. Scouring of given polyester material

10.3. Bleaching of given polyester material

# **IV SEMESTER**

**DIPLOMA IN TEXTILE TECHNOLOGY  
SCHEME OF INSTRUCTIONS AND EXAMINATIONS**

**(IV SEMESTER)**

Subject Code	Name of the Subject	Instruction period / week		Total Period / sem	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
<b>THEORY:</b>								
TT-401	Yarn Manufacture– II	5	-	75	3	20	80	100
TT-402	Fabric Manufacture – II	5	-	75	3	20	80	100
TT-403	Textile Chemical Processing – II	5	-	75	3	20	80	100
TT-404	Textile Calculations	4	-	60	3	20	80	100
TT-405	Textile Testing & Quality Control – I	5		75	3	20	80	100
<b>PRACTICAL:</b>								
TT-406	Yarn ManufactureLab – II		6	90	3	40	60	100
TT-407	Fabric ManufactureLab – II	-	6	90	3	40	60	100
TT-408	Textile Chemical Processing Lab – II	-	3	45	3	40	60	100
TT -409	Textile Testing Lab – I	-	3	45	3	40	60	100
<b>TOTAL</b>		24	18	630		260	640	900

## YARN MANUFACTURE - II

Subject Title	:	YARN MANUFACTURE - II
Subject Code	:	TT - 401
Periods per week	:	05
Periods per semester	:	75

### TIME SCHEDULE

S. No.	Major Topics	No. of Periods	Weightage Of Marks	Short Answer Type	Essay Type
1.	Comber	18	26	2	2
2.	Simplex	18	26	2	2
3.	Ring Frames	20	29	3	2
4.	Winding	09	13	1	1
5	Finishing	10	16	2	1
	<b>Total</b>	<b>75</b>	<b>110</b>	<b>10</b>	<b>08</b>

### OBJECTIVES

Upon completion of the course student shall be able to

#### 1. Understand Combers

- 1.1. State the Objects of combing
- 1.2. State the advantages of combing process / combed yarns
- 1.3. Methods of preparing stock and presenting to the combing machine
  - 1.3.1. Explain the process of lap doubling ( Sliver lap followed by ribbon lap)
  - 1.3.2. Explain the process of Sliver doubling ( Super lap / Uni lap)
  - 1.3.3. Comparison between sliver lap machine and Ribbon lap machine
- 1.4. Explain the passage of material through a modern comber
- 1.5. Explain the Sequence of operations in a rectilinear comber
- 1.6. List the Parameters influencing the combing operation
- 1.7. Explain the influence of following feed stock parameters on combing process
  - 1.7.1. Fiber orientation ( parallelism)
  - 1.7.2. Sheet thickness
  - 1.7.3. Evenness of lap sheet
  - 1.7.4. Removal of hooks
  - 1.7.5. Pre comb draft
- 1.8. Explain the influence of machine components and settings on combing
- 1.9. List the important comber settings
- 1.10. Mention the types of Combing based on Noil %
- 1.11. List the factors governing the Comber waste %
- 1.12. Explain the methods of Control of comber noil
- 1.13. Mention the Causes of fiber loss in combing
- 1.14. List the faults arising in combing
- 1.15. Enumerate the features of Modern comber



## **2. Understand Speed Frame**

- 2.1. List the objects /functions of Fly frame
- 2.2. Explain the Passage of material in a simplex frame with line diagram.
- 2.3. Explain the main operations / Functions of Fly frame
- 2.4. Describe the following elements in drafting arrangement - Aprons, Pressure on top rollers, Condenser, Spacers, Traversing
- 2.5. State the advantages of apron drafting on a fly frame
- 2.6. Explain the functions of following elements of Fly frame
  - 2.6.1. The spindle
  - 2.6.2. The flyer
  - 2.6.3. Flyer top
  - 2.6.4. Presser arm
- 2.7. State the principle of Imparting twist on fly frame
- 2.8. Explain the process of Winding the bobbin in following respects
  - 2.8.1. Speed relations
  - 2.8.2. Winding principle
  - 2.8.3. Package build
  - 2.8.4. Bobbin drive
- 2.9. State the difference between Flyer lead Vs Bobbin lead
- 2.10. Explain the principle of cone drum drive transmission
- 2.11. Explain the working of Lifter motion
- 2.12. Explain the working mechanism of Builder motion in the following respects
  - 2.12.1. Shifting of cone built
  - 2.12.2. Reversing the movement of bobbin rail
  - 2.12.3. Shortening of lift
- 2.13. Explain following Monitoring devices
  - 2.13.1. Sliver stop motion , Roving stop motion, Blower apparatus
- 2.14. Explain the Automation in fly frame in the following areas
  - 2.14.1. Doffing and transport of bobbins to the ring frame
- 2.15. Mention the defects in speed frame process

## **3. Understand Ring frame**

- 3.1. Mention the Objects / Functions of Ring frames
- 3.2. Explain the passage of material on a ring frame.
- 3.3. Explain the types of creels
- 3.4. Drafting arrangement
  - 3.4.1. Mention the main draft and break draft for different count ranges
  - 3.4.2. State the significance of Inclination of roller drafting system
  - 3.4.3. State the importance of traverse motion
  - 3.4.4. Explain different Fiber guiding devices by ( using aprons )
  - 3.4.5. Explain the features of Roller clearer & Pneumafil
- 3.5. Explain the any one high draft drafting system
- 3.6. State the advantages of high drafting system
- 3.7. Explain the following Yarn guiding devices  
Thread guide, Lappets, Balloon control ring and Separators
- 3.8. Understand the importance of Ring
  - 3.8.1. Discuss different forms & materials of ring
  - 3.8.2. State the characteristics of good ring
  - 3.8.3. State the guidelines of Running in a new ring

- 3.9. Understand the importance of Traveler
  - 3.9.1. State the Function of traveler
  - 3.9.2. List different forms of travelers commonly used
  - 3.9.3. Mention different Wire profiles of the traveler
  - 3.9.4. State the requirements of material of the traveler
  - 3.9.5. State the influence of Traveler mass
  - 3.9.6. State the importance of Traveler clearer
  - 3.9.7. List the factors influencing traveller life
- 3.10. Explain the Winding process of cops in the following aspects
  - 3.10.1. Winding principle
  - 3.10.2. The builder motion
  - 3.10.3. Traversing of Ring rail
  - 3.10.4. Yarn content and building cam
  - 3.10.5. Variation in the speed of traveler
  - 3.10.6. Effects on traveller
- 3.11. Explain the Insertion of twist in the yarn in the following aspects
  - 3.11.1. Direction of twist
  - 3.11.2. Twist multipliers
  - 3.11.3. Twist levels for different count ranges
  - 3.11.4. Twist and its effect on yarn characteristics
  - 3.11.5. Variation in the yarn twist
- 3.12. Explain the Structure and winding of cop in the following aspects
  - 3.12.1. Form of cop
  - 3.12.2. Formation of the base
  - 3.12.3. Formation of the conical layer
- 3.13. Explain the process of doffing
  - 3.13.1. Preparation for the doff
  - 3.13.2. Normal doffing
  - 3.13.3. Automatic doffing
- 3.14. Explain following Auxiliary equipment
  - 3.14.1. End breakage aspirator
  - 3.14.2. Roving stop motion
  - 3.14.3. Travelling cleaners
  - 3.14.4. Monitoring
  - 3.14.5. Automatic cop transport
- 3.15. Mention the change places in ring frame
- 3.16. List the motors used in practice for machine drive
- 3.17. List the Differences between variable speed drive and dual motor speed drive
- 3.18. Enumerate the salient features of modern ring frame

#### **4. Understand Winding**

- 4.1. Yarn winding
  - 4.1.1. Objects of winding
  - 4.1.2. Mention the Types of yarn packages
  - 4.1.3. Explain the passage of material through Autoconer
  - 4.1.4. Function of Balloon breaker / Unwinding accelerator
  - 4.1.5. Explain different types of yarn tensioners
  - 4.1.6. Explain different types of yarn clearers
  - 4.1.7. Define clearing efficiency, knot factor and quality factor
  - 4.1.8. Explain the principles of different Traversing methods
  - 4.1.9. Define precision and non precision winding

- 4.1.10. State the functions of
  - 4.1.10.1. Waxing device
  - 4.1.10.2. Anti patterning device
- 4.1.11. Explain different types of Stop motions
- 4.1.12. Explain different types of knots and their quality
- 4.1.13. Splicing
  - 4.1.13.1. Define splicing
  - 4.1.13.2. State the Principles of splicing
  - 4.1.13.3. State the Characteristics of spliced yarns
  - 4.1.13.4. List the Advantages of splicing
- 4.1.14. State the difference between knotted yarn sliced yarn
- 4.1.15. Mention different types of Bobbin cradle ( cone / cheese holder)
- 4.1.16. Define angle of wind and winds per double traverse
- 4.1.17. Define open wind and close wind
- 4.1.18. Define conacity of package
- 4.1.19. State the need for foster cone / taper cone
- 4.1.20. State the requirements of wound package for different end uses
- 4.2. Explain the effect, causes and rectification of following common yarn faults
  - 4.2.1. Thick places, Thin places, Slub, Snarl, Oil stained yarn, Bad piecing  
Hairiness, Kitty yarn, foreign matter, Neppy yarn, Oily slub, Spun in fly
- 4.3. Explain the effect, causes and rectification following yarn package defects
  - 4.3.1. Soft build of cone, Slough off, Ring cuts, Ribbon wound cone, Ring  
shaped cone, Low cop content, Improper build, Stitching on cone, Bell  
shaped cone, Nose bulging, Collapsed cone

## **5. Understand Finishing**

- 5.1. Doubling
  - 5.1.1. Mention the Objects of Doubling
  - 5.1.2. Explain the passage of material through doubler winding machine
  - 5.1.3. Explain the Wet doubling process
  - 5.1.4. Explain the Passage of material through ring doubler.
  - 5.1.5. Explain the working of two for one twister.(T.F.O)
  - 5.1.6. Explain Twist direction and take up in doubled yarns
  - 5.1.7. List the uses of doubled yarns
  - 5.1.8. List some typical products of doubling / varieties of doubled yarns
- 5.2. Reeling, Bundling and Baling
  - 5.2.1. State the objects of Reeling
  - 5.2.2. Describe Passage of material on a Reeling machine
  - 5.2.3. Mention the differences between Straight reeling and cross reeling
  - 5.2.4. Mention the Methods of doffing the hanks
  - 5.2.5. Mention the Methods of tying up of hanks
  - 5.2.6. State the objects of Bundling.
  - 5.2.7. Explain the Bundling press ( mechanical bundling)
  - 5.2.8. Explain the method of Bundling weight correction
  - 5.2.9. State the objects of Baling
- 5.3. Singeing or Gassing
  - 5.3.1. Objects of yarn singeing
  - 5.3.2. Describe the yarn gassing process
- 5.4. Yarn conditioning
  - 5.4.1. Objects of conditioning
  - 5.4.2. Describe the Yarn Conditioning Process

## **COURSE CONTENT**

### **1. Combers**

Objects of combing -Advantages of combing process / combed yarns-Preparing stock and presenting to the combing machine-Passage of material through a modern comber -Sequence of operations in a rectilinear comber-Parameters influencing the combing operation -Influence of following feed stock parameters on combing process -Fiber orientation ( parallelism) -Sheet thickness-Evenness of lap sheet-Removal of hooks -Pre comb draft -Influence of machine components and settings on combing - Important comber settings -Types of Combing based on Noil %-Factors governing the Comber waste % -Methods of Control of comber noil -Causes of fiber loss in combing -Faults arising in combing -Features of Modern comber

### **2. Speed Frame**

Objects /functions of Fly frame - Passage of material in a simplex frame with -line diagram.-Main operations / Functions of Fly frame -Following elements in drafting arrangement - Aprons, Pressure on top rollers, Condenser, Spacers, Traversing - Advantages of apron drafting on a fly frame -Functions of following elements of Fly frame -The spindle-The flyer -Flyer top-Presser arm -Principle of Imparting twist on fly frame -Process of Winding the bobbin in following respects --Speed relations - Winding principle-Package build -Bobbin drive -Difference between Flyer lead Vs Bobbin lead -Principle of -one drum drive transmission -Working of Lifter motion - Working mechanism of Builder -otion in the following respects -Shifting of cone built - Reversing the movement of bobbin rail -Shortening of lift -Following Monitoring devices -Sliver stop motion , Roving stop motion, Blower apparatus -Automation in fly frame in the following areas -Doffing and transport of bobbins to the ring frame - Defects in speed frame process

### 3. Ring frame

Objects / Functions of Ring frames-Passage of material on a ring frame-Types of creels -Drafting arrangement -Main draft and break draft for different count ranges- Significance of Inclination of roller drafting system -Importance of traverse motion - Different Fiber guiding devices by ( using aprons ) -Features of Roller clearer & Pneumafil -High draft drafting system -Advantages of high drafting system - Yarn guiding devices -Thread guide, Lappets, Balloon -ontrol ring and Separators - Importance of Ring -Different forms & materials of ring -Characteristics of good ring- Guidelines of Running in a new ring -Importance of Traveler - function of traveler - Different forms of travelers commonly used-Different Wire profiles of the traveler - Requirements of material of the traveler -Influence of Traveler mass -Importance of Traveler clearer --Factors influencing traveller life -Winding process of cops in the following aspects -Winding principle - builder motion -Traversing of Ring rail -Yarn content and building cam -Variation in the speed of traveler -Effects on traveller - Insertion of twist in the yarn in the following aspects -Direction of twist -Twist multipliers-Twist levels for different count ranges -Twist and its effect on yarn characteristics -Variation in the yarn twist - Structure and winding of cop in the following aspects -Form of cop -Formation of the base -Formation of the conical layer -Process of doffing -Preparation for the doff-Normal doffing -Automatic doffing - Following Auxiliary equipment -End breakage aspirator -Roving stop motion - Travelling cleaners -Monitoring -Automatic cop transport -Change places in ring frame-Motors used in practice for -machine drive - Differences between variable speed drive and dual motor speed drive-Salient features of modern ring frame

#### **4. Winding**

Yarn winding –Winding- Types of yarn packages -Passage of material through Autoconer -Function of Balloon breaker / Unwinding accelerator--Different types of yarn tensioners-Different types of yarn clearers -Define clearing efficiency, knot factor and quality factor -Principles of different Traversing methods-Precision and non precision winding -Functions of -Waxing device-Anti patterning device -Different types of Stop motions -Different --types of knots and their quality -Splicing - Principles of splicing - Characteristics of spliced -arns - Advantages of splicing-Difference between knotted yarn sliced yarn-Types of Bobbin cradle ( cone / cheese holder)-Define angle of wind and winds per double traverse -Define open wind -and close wind -Define conacity of package -Need for foster cone / taper cone -Requirements of wound package for different end uses -Effect, causes and rectification of following common yarn faults -Thick places, Thin places, Slub, Snarl, Oil stained yarn, Bad piecing- Hairiness, Kitty yarn, foreign matter, Neppy yarn, Oily slub, Spun in fly-package defects -Soft build of cone, Slough off, Ring cuts, Ribbon wound cone, Ring shaped cone, Low cop content, Improper build, Stitching on cone, Bell shaped cone, Nose bulging, Collapsed cone

#### **5. Finishing**

Doubling- Objects of Doubling-Passage of material through doubler winding machine - Wet doubling process - Passage of material through ring doubler.-Working of two for one -twister.(T.F.O)- Twist direction and take up in doubled yarns -The uses of doubled yarns -Typical products of doubling / varieties of doubled yarns -Reeling, Bundling and Baling -Objects of Reeling- Passage of material on a Reeling machine- Differences between Straight reeling and cross reeling- Methods of doffing the hanks- Methods of tying up of hanks-Objects of Bundling.-Bundling press ( mechanical bundling)-Method of Bundling weight correction -Objects of Baling-Singeing or

Gassing -Objects of yarn singeing -Yarn gassing process -Yarn conditioning -Objects of conditioning - Yarn Conditioning Process

## **REFERENCE BOOKS**

1. Manual of Textile Technology :
2. Short staple spinning series : Vol 1,3,4 – W.Klein
3. Elements of Combing - Dr. A.R. Khare
4. Elements of Ring spinning and Doubling - Dr. A.R.Khare
5. Spun Yarn Technology – A.Venkatasubramani

## FABRIC MANUFACTURE - II

<b>Subject Title</b>	:	<b>FABRIC MANUFACTURE - II</b>
<b>Subject Code</b>	:	<b>TT - 402</b>
<b>Periods per week</b>	:	<b>05</b>
<b>Periods per semester</b>	:	<b>75</b>

### TIME SCHEDULE

S. No.	Major Topics	No. of Periods	Weightage Of Marks	Short Answer Type	Essay Type
1.	Automatic Looms.	10	16	2	1
2.	Dobby Shedding.	10	16	2	1
3.	Jacquard Shedding.	18	26	2	2
4	Weft Patterning	9	13	1	1
5	Shuttleless looms	28	39	3	3
	<b>Total</b>	<b>75</b>	<b>110</b>	<b>10</b>	<b>8</b>

### OBJECTIVES

Upon completion of the course student shall be able to

#### 1.0 Understand Automatic Looms

- 1.1 Mention demerits of Non-automatic looms.
- 1.2 State the features of an automatic loom
- 1.3 State the Advantages of Automatic looms.
- 1.4 Understand the working of automatic pirn changing loom.
  - 1.4.1 List essential attachments for pirn changing automatic loom
  - 1.4.2 Explain the mechanical weft feeler mechanism
  - 1.4.3 Explain the electrical weft feeler mechanism
  - 1.4.4 Explain the constructional parts of pirn changing automatic loom.
  - 1.4.5 Explain the pirn changing mechanism
- 1.5 Explain bobbin loader mechanism
- 1.6 Explain the automatic loom wind

#### 2.0 Understand Dobby Shedding

- 2.1 State the Limitations of tappet shedding
- 2.2 State the importance of Dobby shedding
- 2.3 Compare doobby shedding with Tappet shedding
- 2.4 Classification of doobbies
- 2.5 Define Single lift and double lift doobby.
- 2.6 Define Positive and Negative Dobby
- 2.7 Understand the Negative doobby
  - 2.7.1 Explain the construction of Double lift double jack (Chimax doobby)
  - 2.7.2 Explain the working of Double lift double jack (Chimax doobby)
  - 2.7.3 Define Right hand and Left hand doobby



- 2.7.4 Position of feelers for right hand and left hand dobbie
- 2.7.5 Heald reversing motion on negative dobbie
- 2.8 Cam dobbie
  - 2.8.1 State the advantages of Cam dobbie
  - 2.8.2 Explain the working mechanism of Northrop negative cam dobbie
  - 2.8.3 Explain the working mechanism of Staubli paper pattern negative cam dobbie
  - 2.8.4 Mention the advantages of paper pattern cards over the wooden lags
- 2.9 Positive dobbie
  - 2.9.1 Advantages of positive dobbie
  - 2.9.2 Explain the working mechanism of Staubli Positive cam dobbie
- 2.10 Rotary dobbie
  - 2.10.1 Advantages of rotary dobbie
  - 2.10.2 Explain the working mechanism of Rotary dobbie
- 2.11 Cross border dobbie
  - 2.11.1 Explain the mechanism of two cylinder Climax cross border dobbie
- 2.12 Mention different types of Pick finding devices for dobbies
- 2.13 Mention different types of dobbie mountings
- 2.14 Explain the mechanism of positive type of electronic dobbie

### **3.0 Understand Jacquard Shedding**

- 3.1 Explain different types of shed formations
- 3.2 Classify of Jacquards
- 3.3 List the principal parts of Jacquard shedding machine
- 3.4 Explain the functions of principal parts of Jacquard
- 3.5 Simple Jacquards
  - Explain the basic principles, characteristics and working of
  - 3.5.1 Single lift Single cylinder Jacquard.
  - 3.5.2 Double lift, Single cylinder Jacquard
  - 3.5.3 Double lift, Double cylinder Jacquard
  - 3.5.4 Open shed Jacquard
- 3.6 Harness building / system
  - 3.6.1 List various parts of Jacquard harness system
  - 3.6.2 Describe functions of various parts of harness system
- 3.7 Jacquard harness Mounting
  - 3.7.1 Define and show the two Systems of Harness mounting
  - 3.7.2 Explain the two Systems of Harness mounting
  - 3.7.3 Relative Merits and demerits of two systems of harness mounting
- 3.8 Harness design ties
  - 3.8.1 Mention different types of Jacquard harness Ties
  - 3.8.2 Explain different types of Jacquard harness Tie Ups
- 3.9 Pattern card preparation
  - 3.9.1 Sketching the design on point paper
  - 3.9.2 State the importance of first hook of the Jacquard
  - 3.9.3 State the Casting out principle

- 3.9.4 List the Preliminary steps to card cutting
- 3.9.5 Explain preparation of pattern card on piano card cutting machine
- 3.9.6 Method of Jacquard card lacing
- 3.9.7 Function of Jacquard card cradle
- 3.10 Mention different methods of increasing the figuring capacity of a Jacquard
- 3.11 Explain the working sequence of Staubli Electronic Jacquard.

#### **4.0 Understand Weft Patterning**

- 4.1 Weft patterning on shuttle loom
  - 4.1.1 Classify multiple box looms
  - 4.1.2 Disadvantages of circular box motion
  - 4.1.3 Explain the construction of Eccle's 4×1 drop box motion.
  - 4.1.4 Explain the working cycle of Eccle's 4×1 drop box motion.
  - 4.1.5 Explain the pattern chain preparation for 4×1 drop box motion
- 4.2 Describe the pattern cards on \$
- 4.3 Describe Weft patterning on Shuttleless looms

#### **5.0 Understand Shuttleless looms**

- 5.1 Introduction to shuttleless looms
  - 5.1.1 List the disadvantages of shuttle looms
  - 5.1.2 Classification of unconventional weaving machines
  - 5.1.3 List the common features of all unconventional weaving machines
  - 5.1.4 Understand the following features of unconventional weaving machines
  - 5.1.5 Explain the Types of Unconventional selvages
  - 5.1.6 Explain the working of Weft accumulator with measuring system
  - 5.1.7 List the advantages of using weft accumulators
- 5.2 Mention yarn quality requirement and yarn preparation
- 5.3 Tabulate unconventional weaving machines with respect to width, maximum speed, weft insertion rate and field of application
- 5.4 List the factors to be considered while selecting type of loom for producing a particular fabric
- 5.5 Weft Insertion by Projectile
  - 5.5.1 List the main features of sulzer projectile weaving machine
  - 5.5.2 State the advantages of projectile weaving
  - 5.5.3 Explain Different phases of weft insertion on a projectile loom
  - 5.5.4 Mention the quality characteristics of projectile woven cloth.
  - 5.5.5 State the limitations of Sulzer weaving machines
- 5.6 Weft insertion by Rapier
  - 5.6.1 Classify rapier shuttle less looms on number of rapiers, method of weft insertion, type of rapier and positioning of weft
  - 5.6.2 State the principle of double rapier weaving
  - 5.6.3 State the principle of two phase rapier
  - 5.6.4 Explain the Method of weft insertion and cyclic operations in Dewas system of rapier weft insertion

- 5.6.5 Explain the Method of weft insertion and cyclic operations in Gabler system of rapier weft insertion
- 5.6.6 Draw the sketches of rapier heads used on Dornier loom and Somet loom
- 5.6.7 State the merits and demerits of rapier weaving.
- 5.7 Weft Insertion by Air Jet and Water Jet
  - 5.7.1 Give the characteristics features of Air Jet looms
  - 5.7.2 Mention the essential requirements for Air Jet weft insertion.
  - 5.7.3 Explain the working principle of Maxbo – Murata Air Jet loom
  - 5.7.4 Explain the requirements of air for Air jet weaving
  - 5.7.5 Explain the operation of Air jet main nozzle during weft insertion
  - 5.7.6 Explain the following types of traverse aids for maintaining air flow
    - 5.7.6.1 Confuser
    - 5.7.6.2 Relay jets
  - 5.7.7 List the practical problems encountered during air jet weft insertion
  - 5.7.8 Mention the merits and demerits of Air Jet loom
  - 5.7.9 Write the differences between Air jet and Water jet looms
  - 5.7.10 State the Merits and demerits of water jet looms

## **COURSE CONTENT**

### **1. Automatic Looms**

Demerits of Non-automatic looms.-the features of an automatic loom-Advantages of Automatic looms.-Understand the working of automatic pirn changing loom.-essential attachments for pirn changing automatic loom -mechanical weft feeler mechanism- electrical weft feeler mechanism-pirn changing mechanism - bobbin loader mechanism -the automatic loom winder

### **2. Dobby Shedding**

Limitations of tappet shedding-importance of Dobby shedding-Compare dobbie shedding with Tappet shedding -Classification of dobbies -Single lift and double lift dobbie.-Positive and Negative Dobby-the Negative dobbie -construction of Double lift double jack (Chimax dobbie)-the working of Double lift double jack (Chimax dobbie)-Right hand and Left hand dobbie-Position of feelers for right hand and left hand dobbie -Heald reversing motion on negative dobbie -Cam dobbie -advantages of Cam dobbie-working mechanism of Northrop negative cam dobbie -

working mechanism of Staubli paper pattern negative cam dobbie -advantages of paper pattern cards over the wooden lags-Positive dobbie -Advantages of positive dobbie -working mechanism of Staubli Positive cam dobbie -Rotary dobbie -rotary dobbie -working mechanism of Rotary dobbie -Cross border dobbie -mechanism of two cylinder Climax cross border dobbie -different types of Pick finding devices for dobbies -different types of dobbie mountings -Explain the mechanism of positive type of electronic dobbie

### 3. **Jacquard Shedding**

Different types of shed formations -Classify of Jacquards-principal parts of Jacquard shedding machine-the functions of principal parts of Jacquard -Simple Jacquards -basic principles, characteristics and working of-Single lift Single cylinder Jacquard.-Double lift, -single cylinder Jacquard-Double lift, Double cylinder Jacquard-Open shed Jacquard-Harness building / system-parts of Jacquard harness system -functions of various parts of harness system-Jacquard harness Mounting -the two Systems of Harness mounting-two Systems of Harness mounting-Relative Merits and demerits of two systems of harness mounting -Harness design ties- different types of Jacquard harness Ties -types of Jacquard harness Tie Ups-pattern card preparation -Sketching the design on point paper-importance of first hook of the Jacquard-Casting out principle-Preliminary steps to card cutting- preparation of pattern card on piano card cutting machine-Method of Jacquard card lacing -Function of Jacquard card cradle --methods of increasing the figuring capacity of a Jacquard -working sequence of Staubli Electronic Jacquard

**4. Weft Patterning**

Weft patterning on shuttle loom - multiple box looms-Disadvantages of circular box motion

-construction of Eccle's 4×1 drop box motion.-working cycle of Eccle's 4×1 drop box

motion.-pattern chain preparation for 4×1 drop box motion -the pattern cards -Weft

patterning on Shuttleless looms

**5. Shuttleless looms**

Introduction to shuttleless looms -disadvantages of shuttle looms-Classification of

unconventional weaving machines-common features of all unconventional

weaving machines-Understand the following features of unconventional weaving

machines -Types of Unconventional selvages-working of Weft accumulator with

measuring system -advantages of using weft accumulators -unconventional

weaving machines with respect to -width, maximum speed, weft insertion rate

and field of application -to be considered while selecting type of loom for

producing a particular fabric-Weft Insertion by Projectile -advantages of projectile

weaving-Explain Different phases of weft insertion on a projectile loom -the

quality characteristics of projectile woven cloth.-the limitations of Sulzer weaving

machines--Weft insertion by Rapier -Classify rapier shuttle less looms on number

of rapiers, method of weft insertion, type of rapier and positioning of weft -

principle of double rapier weaving -principle of two phase rapier -Method of weft

insertion and cyclic operations in Dewas system of rapier weft insertion -Method

of weft insertion and cyclic operations in Gabler system of rapier weft insertion -

sketches of rapier heads used on Dornier loom and Somet loom -merits and

demerits of rapier weaving-Weft Insertion by Air Jet and Water Jet -

characteristics features of Air Jet looms-essential requirements for Air Jet weft

insertion.-working principle of Maxbo – Murata Air Jet loom-requirements of air

for Air jet weaving -operation of Air jet main nozzle during weft -insertion -

following types of traverse aids for maintaining air flow -Confuser -Relay jets - practical problems encountered during air jet weft insertion -the merits and demerits of Air Jet loom-Write the differences between Air jet and Water jet looms -Merits and demerits of water jet looms.

### **REFERENCE BOOKS**

1. WEAVING – Methods, Machines and mechanism ---- Talukdar.
2. Woven Fabric Production – II ---- NCUTE.
3. Weaving Mechanism – I & II ---- N.N. Benarjee.

## TEXTILE CHEMICAL PROCESSING - II

Sub Title	:	Textile Chemical Processing-II
Subject Code	:	TT – 403
Periods per week	:	05
Periods per semester	:	75

### TIME SCHEDULE

S.No.	Major Topics	No. of Periods	Weightage Of Marks	Short Answer Type	Essay Type
1.	Fundamentals of color science	3	03	1	
2.	Basic terms related dyes and Dyeing	2	03	1	
3.	Dyeing of Cotton with Water soluble dyes	9	13	1	1
4.	Dyeing Cotton with water insoluble dyes	9	13	1	1
5.	Dyeing of Wool & Silk	9	13	1	1
6	Dyeing of Synthetic fibers	9	13	1	1
7	Dyeing Machinery	8	13	1	1
8	Printing	9	13	1	1
9	Finishing -Asthetic	9	13	1	1
10	Finishing-Functional	8	13	1	1
	<b>Total</b>	<b>75</b>	<b>110</b>	<b>10</b>	<b>08</b>

## **OBJECTIVES**

Upon the completion of the subject the student should be able to

### **1 Fundamentals of color Science**

#### 1.1 Basic concepts of color science

- 1.1.1 Define color
- 1.1.2 Understand the perception of color
- 1.1.3 State the Color mixing laws – additive and subtractive

#### 1.2 Eye and color vision

- 1.2.1 Understand the mechanism of color vision
- 1.2.2 Explain the color vision theories
- 1.2.3 Mention the defects in color vision

### **2 Basics of dyes and dyeing**

#### 2.1 Dyes

- 2.1.1 Define dye molecule
- 2.1.2 Compare Dyes and Pigments
- 2.1.3 Classify coloring matter
- 2.1.4 Differentiate between natural and synthetic dyes
- 2.1.5 Explain the sources & scope of natural dyes
- 2.1.6 State the general features and properties of various dyes

#### 2.2 Define the following general terms used in dyeing

- 2.2.1 Material to Liquor Ratio
- 2.2.2 Percent shade & percent exhaustion
- 2.2.3 Standing baths
- 2.2.4 Topping & stripping
- 2.2.5 Reserve dyeing & cross dyeing
- 2.2.6 Color fastness property

#### 2.3 Understand the general mechanism of dyeing

- 2.3.1 Know the forces responsible for dye fixation on fibers
- 2.3.2 Define adsorption, absorption and fixation
- 2.3.3 Understand the role of additives in dyeing
- 2.3.4 List the dyes commonly used for different textile fibers



### **3 Dyeing of cotton with water soluble dyes**

#### 3.1 Dyeing of cotton with Direct dyes

- 3.1.1 State the basic principle
- 3.1.2 List the chemicals used and conditions of dyeing
- 3.1.3 Know the after treatments given to direct dyed material
- 3.1.4 Explain the procedure of topping direct dyes
- 3.1.5 Explain the procedure of stripping direct dyes

#### 3.2 Dyeing of cotton with reactive dyes

- 3.2.1 Understand the principle of dyeing
- 3.2.2 Explain the methods of dyeing
- 3.2.3 Explain the stripping of dyed material

### **4 Dyeing of Cotton with Water insoluble dyes**

#### 4.1 Explain the process of Dyeing cotton with sulphur dyes

- 4.1.1 Dissolving the dye stuff
- 4.1.2 Dyeing method
- 4.1.3 After treatment
- 4.1.4 Bronzing of shades
- 4.1.5 Tendering of sulphur block

#### 4.2 Explain the process of dyeing cotton with vat dyes

- 4.2.1 Vatting
- 4.2.2 Dyeing procedure
- 4.2.3 Different methods of applying vat dyes
- 4.2.4 Leuco vat dyeing process
- 4.2.5 Pigment dyeing process
- 4.2.6 Standfast molten metal dyeing
- 4.2.7 Dyeing of cotton with solubilised vat dyes

#### 4.3 Explain the principle of dyeing of cotton with naphthol colors

- 4.3.1 Application of naphthols
- 4.3.2 Developing

#### 4.4 Explain the Principles of dyeing cotton with

- 4.4.1 Mineral khaki
- 4.4.2 Aniline black

### **5 Dyeing of wool and Silk**

#### 5.1 Explain basic principles involved in dyeing of wool with

- 5.1.1 Acid dyes
- 5.1.2 Metal complex dyes
- 5.1.3 Reactive dyes
- 5.1.4 Vat dyes

5.2 Explain basic principles involved in dyeing of silk with

- 5.2.1 Acid dyes
- 5.2.2 Metal complex dyes
- 5.2.3 Reactive
- 5.2.4 Solubilised vat

## **6 Dyeing of Polyester**

6.1 List the dyes used for polyester and difficulties in dyeing polyester

6.2 Explain the methods of dyeing polyester with disperse dyes

- 6.2.1 Using dyes of small molecular size
- 6.2.2 Carrier dyeing method
- 6.2.3 Thermosol method of dyeing
- 6.2.4 Detailed study of High pressure high temperature dyeing

6.3 Explain Dyeing of polyester cotton blends

6.4 Explain Basic principles of dyeing nylon and dyes used for Nylon

6.5 Explain Basic principles of dyeing Acrylic and dyes used for Acrylic

## **7 Dyeing Machinery**

7.1 Explain the basic principles of dyeing in dyeing machinery and classification based on it

- 7.1.1 Movement of material with stationary liquor
- 7.1.2 Movement of liquor with stationary material
- 7.1.3 Movement of both material and liquor

7.2 Explain the method of dyeing Loose cotton fiber in

- 7.2.1 Simplex, Jagenburg,
- 7.2.2 Obermair loose cotton dyeing machine

7.3 State the advantages and disadvantages of loose cotton dyeing

7.4 Explain following yarn dyeing machines

- 7.4.1 Hank dyeing machine
- 7.4.2 Package dyeing machines
  - 7.4.2.1 Cop dyeing machine
  - 7.4.2.2 Cheese dyeing machine

#### 7.4.2.3 Beam warp dyeing machine

#### 7.5 Explain following Fabric dyeing machines

- 7.5.1 Jigger
- 7.5.2 Winch, padding mangles
- 7.5.3 Stand fast molten metal dyeing machine
- 7.5.4 Advantages and disadvantages of different machines

### **8 Printing**

#### 8.1 Explain the basic principles involved in following methods of printing

- 8.1.1 Block
- 8.1.2 Stencil
- 8.1.3 Screen
- 8.1.4 Roller
- 8.1.5 Automatic flat bed
- 8.1.6 Rotary screen
- 8.1.7 Advantages and disadvantages of various methods

#### 8.2 Explain the basic principles involved in different Styles of printing

- 8.2.1 Direct, Discharge , Discharge cum resistance
- 8.2.2 Conversion style, Madder style, Crimp
- 8.2.3 Carbonized style, Foam , Flock
- 8.2.4 Damask, Kalamkari

#### 8.3 Explain the procedure for preparation of print paste

- 8.3.1 Various ingredients and their functions
- 8.3.2 Preparation of cloth for printing

#### 8.4 List the after treatments of printed goods

- 8.4.1 Ageing
- 8.4.2 Steaming
- 8.4.3 Dinging
- 8.4.4 Raising
- 8.4.5 Fixing
- 8.4.6 Curing, washing and cleaning
- 8.4.7 Drying
  - 8.4.7.1 Thermo fixing
  - 8.4.7.2 Superheated steaming

## **9 Finishing – Aesthetic**

9.1 State the objects of finishing

9.2 Classify the finishes

9.3 Mention different Finishes for different fibers

9.4 Drying

9.4.1 State the Importance of drying

9.4.2 Mention the Methods of drying

9.4.3 Explain Cylinder drying

9.4.4 State Advantages and disadvantages of cylinder drying

9.4.5 Explain the principle of Hot air drying on stente

9.5 Explain following methods of Calendaring

9.5.1 Friction calendaring

9.5.2 Chasing calendaring

9.5.3 Embossing

9.5.4 Schreiner

9.6 Explain the principle and method of Sanforising

9.6.1 Mention the Need for pre shrinking

9.6.2 Explain Pre shrinking process

9.7 State the objects of Raising and shearing

9.8 State the objects of Heat setting

9.9 State the objects of Anti crease finishing

9.10 State the objects of Parchmentising

9.11 State the objects of Starch finishing

## **10 Finishing - functional**

10.1 Explain the principle of Mildew proofing and the chemicals used

10.2 Explain the principle of Rot proofing and the chemicals used

10.3 Explain the principle of Moth proofing and the chemicals used

10.4 Explain the principle of Flame proofing and the chemicals used

10.5 Explain the principle of Water proofing and water repellency the chemicals used

## **COURSE CONTENT**

### **1 Fundamentals of color Science**

1.1 Basic concepts of color science

1.2 Eye and color vision

### **2 Basics of dyes and dyeing**

2.1 Dyes , Pigments

2.2 Classification of coloring matter

2.3 Differences between natural and synthetic dyes

2.4 Natural dyes – sources & scope of natural dyes

2.5 General features and properties of various dyes

2.6 General terms used in dyeing

2.7 General mechanism of dyeing

### **3 Dyeing of cotton with water soluble dyes**

3.1 Dyeing of cotton with Direct dyes

3.2 Dyeing of cotton with reactive dyes

### **4 Dyeing of Cotton with Water insoluble dyes**

General principles involved in

4.1 Dyeing of cotton with sulphur dyes

4.2 Dyeing of cotton with vat dyes

4.3 Dyeing of cotton with naphthol colors

4.4 Principles of dyeing cotton with

### **5 Dyeing of wool and Silk**

5.1 Basic principles involved in dyeing of wool with

5.1.1 Acid dyes

5.1.2 Metal complex dyes

5.1.3 Reactive dyes

5.1.4 Vat dyes

5.2 Basic principles involved in dyeing of silk with

5.2.1 Acid dyes

5.2.2 Metal complex dyes

5.2.3 Reactive

5.2.4 Solubilised vat

## **6 Dyeing of Polyester**

- 6.1 Dyes used for polyester and difficulties in dyeing polyester
- 6.2 Methods of dyeing polyester with disperse dyes
- 6.3 Dyeing of polyester cotton blends
- 6.4 Basic principles dyeing nylon and dyes used for Nylon
- 6.5 Basic principles dyeing Acrylic and dyes used for Acrylic

## **7 Dyeing Machinery**

- 7.1 Basic principles of dyeing in dyeing machinery and classification based on it
- 7.2 Loose cotton fiber dyeing machines
- 7.3 Yarn dyeing machines
- 7.4 Yarn Package dyeing machines
- 7.5 Fabric dyeing machines

## **8 Printing**

- 8.1 Methods of printing
- 8.2 Advantages and disadvantages of various methods
- 8.3 Styles of printing
- 8.4 Preparation of print paste
- 8.5 Various ingredients and their functions
- 8.6 Preparation of cloth for printing
- 8.7 After treatments of printed goods
- 8.8 Drying

## **9 Finsihing – Asthetic**

- 9.1 Objects of finishing
- 9.2 Classification of finishes
- 9.3 Finishes for different fibers
- 9.4 Drying
- 9.5 Calendering
- 9.6 Sanforising
- 9.7 Raising and shearing
- 9.8 Heat setting
- 9.9 Anti crease finshing
- 9.10 Parchmentising
- 9.11 Starch finishing

## **10 Finishing - functional**

- 10.1 Mildew proofing
- 10.2 Rot proofing
- 10.3 Moth proofing
- 10.4 Flame proofing
- 10.5 Water proofing and water repellency

## **REFERENCE BOOKS**

- 1) Technology of Textile Processing Vol.1 to 5 -- V.A SHENAI
- 2) Bleaching Dyeing and Chemical  
Technology of Textile Fibres -- E.R Trotman
- 3) Printing -- R.S Prayag
- 4) Finishing -- R S praya

## TEXTILE CALCULATIONS

Subject Title	:	TEXTILE CALCULATIONS
Subject Code	:	TT-404
Periods / Week	:	04
Periods / Semester	:	60

### TIME SCHEDULE

S.NO	Major Topic	Periods	Weightage of marks	Short Type	Essay Type
1	Basic Mathematics	4	3	1	-
2	Fibre and Yarn Dimensions	6	16	2	1
3	Spinning Calculations	20	39	3	3
5	Yarn Preparation	10	26	2	2
6	Weaving Calculations	10	16	2	1
7	Production Planning	10	10	-	1
<b>TOTAL</b>		<b>60</b>	<b>110</b>	<b>10</b>	<b>8</b>

### OBJECTIVES

Upon completion of the course student shall be able to

#### 1 Understand Basic Mathematics

- 1.1 Basic units in FPS & Metric system
- 1.2 Conversion factors to convert units from one system to the other
- 1.3 Perimeter, Area, Surface area and Volume of basic geometrical shapes
- 1.4 Calculation of Surface speed

#### 2 Solve problems on Fiber and Yarn Dimensions

- 2.1 Definition of L/ D ratio, Micronaire
- 2.2 Finding the yarn diameter based on yarn number
- 2.3 Yarn numbering systems – Direct and Indirect
- 2.4 Definition and formula for count in each system
- 2.5 Finding the count of yarn from the length and weight
- 2.6 Finding the length of yarn in a given weight of yarn of known count
- 2.7 Finding the weight of given length of yarn of given count
- 2.8 Conversion factors among Ne, Tex and Denier systems
- 2.9 Count of folded yarn (Resultant count) in the Direct and indirect systems

#### 3 Solve problems on Calculations in Spinning

##### 3.1 Blow room

- 3.1.1 Bale density
- 3.1.2 Lap count based on length and weight
- 3.1.3 Number of blows / inch of a beater



- 3.1.4 Individual and combined Waste % of beaters
- 3.1.5 Total waste % in blow room
- 3.1.6 Cleaning efficiency of a beater
- 3.1.7 Cleaning efficiency of blow room
- 3.1.8 Lint loss % in droppings

### **3.2 Solve problems on Carding**

- 3.2.1 Rate of lap feed
- 3.2.2 Calculation of mechanical drafts based on surface speeds
- 3.2.3 Calculation of actual draft from hank of sliver and hank of lap
- 3.2.4 Relation between Mechanical draft and Actual draft
- 3.2.5 Finding change wheel from draft and draft constant
- 3.2.6 Card production
- 3.2.7 Cleaning efficiency of a card
- 3.2.8 Waste % and Invisible loss in carding

### **3.3 Solve problems on Draw frame**

- 3.3.1 Drafts – creel table draft, break draft, main draft, web draft and total draft based on the rpm and diameter of the rollers
  - 3.3.2 Relation among draft, Draft constant and change wheel
  - 3.3.3 Draw frame production
  - 3.3.4 Draw frame efficiency based on production
- 3.3.5 Finding the hank of delivery sliver from hank of feed sliver, number of doublings and draft

### **3.4 Solve problems on Combing**

- 3.4.1 Finding Lap weight / length or Hank of lap from hank of feed sliver
- 3.4.2 Production of sliver lap machines from lap weight / length
- 3.4.3 Production of ribbon lap machine from lap weight / length
- 3.4.4 Mechanical draft, Total draft & Technological draft
- 3.4.5 Production of the comber based on delivery rate
- 3.4.6 Production of the comber based on Feed rate
- 3.4.7 Individual and average noil % extracted

### **3.5 Solve problems on Speed frame**

- 3.5.1 Draft – break draft, main draft and total draft based on rpm and diameter
- 3.5.2 Relation between Twist and count of textile material in the direct and Indirect
- 3.5.3 Front roller speed (Rate of delivery)
- 3.5.4 Production of the speed frame
- 3.5.5 Efficiency of speed frame based on production

### **3.6 Solve problems on Ring spinning frame**

- 3.6.1 Draft– break draft, main draft and total draft based on surface speed
- 3.6.2 Front roller delivery rate
- 3.6.3 Twist in yarn
- 3.6.4 Relation between Twist and Count in direct and indirect systems
- 3.6.5 Calculation of twist from spindle speed and front roller delivery
- 3.6.6 Twist contraction
- 3.6.7 Production of a ring frame
- 3.6.8 Average spindle speed

- 3.6.9 Calculation of traveller speed
- 3.6.10 Yarn realization

#### **4 Solve problems on Yarn preparation**

##### 4.1 Winding

- 4.1.1 Calculation of Production of a cone / cheese winding machine
- 4.1.2 Time required to wind given weight / length of yarn
- 4.1.3 Number of drums required to wind given weight / length of yarn
- 4.1.4 Calculation of Yarn tension by tension devices
- 4.1.5 Yarn clearer setting for a given count of yarn
- 4.1.6 Yarn clearing efficiency
- 4.1.7 Production efficiency of a winding machine

##### 4.2 Warping

- 4.2.1 Average count of warp
- 4.2.2 Weight of yarn on the full beam
- 4.2.3 Calculation of beam count
- 4.2.4 Minimum mass of yarn for supply package
- 4.2.5 Time to complete a beam
- 4.2.6 Production of a warping machine
- 4.2.7 Warping machine running efficiency
- 4.2.8 Proportion of warper's beam to slasher beam
- 4.2.9 To find the width of section and number of ends in the section
- 4.2.10 Number of sections to be made

##### 4.3 Sizing

- 4.3.1 Size pick up & size add on
- 4.3.2 Weight of size required
- 4.3.3 Count of sized warp
- 4.3.4 Production of a sizing machine
- 4.3.5 Sizing machine running efficiency
- 4.3.6 Number of looms that could be fed by a slasher sizing machine

##### 4.4 Weft

- 4.4.1 Weft consumption
- 4.4.2 Weft insertion rate

#### **5 Solve problems on Weaving and fabric engineering calculations**

- 5.1 Heald calculations
- 5.2 Reed calculations – reed count
- 5.3 Take up and regain of warp and weft
- 5.4 Relation between reed count and reed width
- 5.5 Relation between Loom pick and picks per inch in the cloth
- 5.6 Average speed, average reed space, average picks
- 5.7 Production of a loom
- 5.8 Time required to weave given length of warp
- 5.9 Length of warp required per loom per hour
- 5.10 Warp and weft crimp in woven fabric
- 5.11 Weight of a fabric piece of given dimensions
- 5.12 Weight of warp and weft required to produce given piece of fabric
- 5.13 Warp, weft and fabric cover factor

#### **6 Solve problems Production planning**

- 6.1 Spin plan for a given count and production
- 6.2 Production plan for loom shed
- 6.3 Yarn costing

## COURSE CONTENT

### 1. Basic Mathematics

Basic units in FPS & Metric system -Conversion factors to convert units from one system to the other -Perimeter, Area, Surface area and Volume of basic geometrical shapes- Calculation of Surface speed

### 2. Problems on Fiber and Yarn Dimensions

Definition of L/ D ratio, Micronaire -yarn diameter -Yarn numbering systems – Direct and Indirect - formula for count in each system –yarn count problems - Conversion factors among Ne, Tex and Denier systems -Count of folded yarn (Resultant count) in the Direct and indirect systems

### 3. Calculations in Spinning

#### Blowroom

Bale density -Lap count based on length and weight -Number of blows / inch of a beater- Individual and combined Waste % of beaters -Total waste % in blow room - Cleaning efficiency of a beater - Cleaning efficiency of blow room -Lint loss % in droppings

#### Carding

Rate of lap feed- Calculation of mechanical drafts based on surface speeds Calculation of actual draft from hank of sliver and hank of lap -Relation between Mechanical draft and Actual draft -Finding change wheel from draft and draft constant -Card production- Cleaning efficiency of a card-Waste % and Invisible loss in carding

#### Draw frame

Drafts – creel table draft, break draft, main draft, web draft and total draft based on the rpm and diameter of the rollers -Relation among draft, Draft constant and change wheel - Draw frame production-Draw frame efficiency based on production -Finding the hank of delivery sliver from hank of feed sliver, number of doublings and draft

#### Combing

Finding Lap weight / length or Hank of lap from hank of feed sliver - Production of sliver lap machines from lap weight / length - Production of ribbon lap machine - Mechanical draft, Total draft & Technological draft - Production of the comber based on delivery rate and Feed rate -Individual and average noil % extracted

#### Speed frame

Draft – break draft, main draft and total draft based on rpm and diameter - Relation between Twist and count of textile material in the direct and Indirect - Front roller speed (Rate of delivery)- Production of the speed frame- Efficiency of speed frame based on production

#### Ring spinning frame

Draft– break draft, main draft and total draft based on surface speed - Front roller delivery rate -Twist in yarn - Relation between Twist and Count in direct and indirect systems -Calculation of twist from spindle speed and front roller delivery -Twist contraction - Production of a ring frame - Average spindle speed - Calculation of traveller speed - Yarn realization

## **Yarn preparation**

### **Winding**

Production of a cone / cheese winding machine -Time required to wind given weight / length of yarn - Number of drums required to wind given weight / length of yarn - Calculation of Yarn tension by tension devices -Yarn clearer setting for a given count of yarn -Yarn clearing efficiency-Production efficiency of a winding machine

### **Warping**

Average count of warp -Weight of yarn on the full beam-Calculation of beam count-Minimum mass of yarn for supply package-Time to complete a beam-Production of a warping machine -Warping machine running efficiency-Proportion of warper's beam to slasher beam -the width of section and number of ends in the section -Number of sections to be made

### **Sizing**

Size pick up & size add on -Weight of size required - Count of sized warp-Production of a sizing machine-Sizing machine running efficiency -Number of looms that could be fed by a slasher sizing machine -Weft consumption -Weft insertion rate

## **4. Problems on Weaving and fabric engineering calculations**

Heald calculations-Reed calculations – reed count-Take up and regain of warp and weft Relation between reed count and reed width-Relation between Loom pick and picks per inch in the cloth -Average speed, average reed space, average picks-Production of a loom -Time required to weave given length of warp -Length of warp required per loom per hour -Warp and weft crimp in woven fabric -Weight of a fabric piece of given dimensions -Weight of warp and weft required to produce given piece of fabric  
Warp, weft and fabric cover factors

## **5. Production planning**

Spin plan for a given count and production - Production plan for loom shed -Yarn costing

## **REFERENCE BOOKS**

1. Textile Mathematics Vol –I,II,III - Booth J E , The Textile Institution
2. Weaving Calculations – Sengupta, Taraporeval, Bombay
3. Elements of Raw cotton and Blow room – AR Khare
4. Elements of Carding and Drawing – AR Khare
5. Elements of Combing – AR Khare
6. Elements of Ring frame and Doubling – AR Khare

## TEXTILE TESTING & QUALITY CONTROL – I

Subject Title	:	TEXTILE TESTING & QUALITY CONTROL – I
Subject Code	:	TT – 405
Periods per week	:	05
Periods per semester	:	75

### TIME SCHEDULE

S. No.	Major Topics	No. of Periods	Weightage Of Marks	Short Answer Type	Essay Type
1.	Sampling and Humidity relations	10	16	2	1
2	Measurement of Fiber dimensions	18	26	2	2
3	Measurements of Yarn Dimensions	18	26	2	2
4	Tensile testing of fibres and yarns	09	13	1	1
5	Introduction to statistics	2	3	1	
6	Measurement of central tendency	9	13	1	1
7	Measurement of dispersion	9	13	1	1
TOTAL		75	110	10	8

### OBJECTIVES

Upon completion of the course student shall be able to

#### 1 Understand Sampling and Humidity relations

- 1.1 State the reasons for textile testing / objects of textile testing
- 1.2 Mention the Need for standardization of testing
- 1.3 Tabulate Routine tests conducted in textile mills and the method or instrument used for each
- 1.4 Sampling
  1. Define the terms used in sampling – consignment, test lot, sampling, random sample, biased sample, bulk sample, basic sample, laboratory sample, test specimen, package, container (case)
  2. Explain different Fiber sampling methods
  3. Explain different Yarn sampling methods
  4. Explain different Fabric sampling methods
- 1.5 Influence of Moisture
  1. Definitions - Humidity, Relative humidity, moisture content, moisture regain, standard atmosphere, standard regain
  2. List the principles of Measurement of relative humidity by
    - 1.5.2.1 Wet and Dry bulb hygrometer
  3. Discuss the influence of moisture on physical properties of textile fibres
  4. Discuss the influence of moisture on processing of textile material

- 1.6 Measurement of moisture content and regain
  1. Explain the method of measuring moisture on Automatic moisture oven
  2. Explain the Capacitative method of measuring moisture
  3. Explain the Factors affecting moisture regain of textile material
  4. Explain the Effect of regain of on fibre properties
  5. Mention the Standard regain of textile fibers
  6. Formula to find standard regain of a blend
- 1.7 State the method of Correction of invoice weight
- 1.8 State the principle of Control of testing room atmosphere
- 1.9 State the procedure of Conditioning of samples for testing

## **2 Understand Measurement of Fibre Dimensions**

- 2.1 Explain the Measurement of fibre length parameters using
  1. Digital fibrograph
  2. High Volume instrument
  3. Advanced Fibre Information System
  4. Discuss the Relationship between the results from different methods
- 2.2 Explain the Measurement of fiber fineness
  1. List and define different units of expressing fibre fineness
  2. List different methods of measuring fibre fineness
  3. Explain the method of Gravimetric method of measuring fibre fineness
  4. Explain the method of Projection microscope for fibre fineness measure
  5. State the Air flow principle for measuring fibre fineness
  6. Explain the method of ATIRA fibre fineness tester
  7. State the principle of Opto-electrical method on AFIS
- 2.3 Explain the Measurement of fibre maturity
  1. Importance of fibre maturity
  2. Classify different methods of measuring fiber maturity
  3. Explain Caustic soda swelling method of measuring fibre fineness
  4. State the principle of Polarized method
  5. State the principle of Differential dyeing method
  6. State the principle of Causticaire method
  7. Explain Airflow method of measuring fibre maturity
  8. Explain the measurement of fibre fineness by AFIS
  9. List the standards for maturity results obtained from different methods
- 2.4 Explain the principles of Measuring trash in cotton in the following instruments
  1. Shirley trash analyzer
  2. High volume instrument
  3. AFIS
- 2.5 Measurement of neps
  1. List different methods of estimating neps
  2. Explain the method of Nep measurement on AFIS
  3. Nep content of some Indian cotton varieties

## **3 Understand Measurement of yarn dimensions and properties**

- 3.1 Explain the Measurement of yarn count
  1. By measuring the weight of one lea
  2. By using Beasley balance
- 3.2 Measurement of yarn twist
  1. Define S twist and Z twist
  2. Derive the expression for TPI
  3. List the different types of twist testers and their principles

4. Explain the principle and working of Twist and untwist method twist tester
- 3.3 Testing yarn hairiness
  1. Explain the working principle of Uster yarn hairiness tester
  2. Explain the working principle of Zweigle hairiness tester
  3. Explain the factors affecting yarn hairiness
- 3.4 Testing of unevenness
  1. Explain Capacitance principle of measuring unevenness
  2. Define short, medium and long term variations
  3. Meaning of U% or CV% given by evenness tester
  4. Explain the principle of Uster evenness tester
  5. Interpretation of unevenness test results
  6. Define Index of irregularity
  7. List the Causes of unevenness
  8. Explain the Steps to control irregularity
  9. State the effect of yarn unevenness on other yarn properties and fabric properties
- 3.5 Testing of Imperfections
  1. State the principle of testing on Uster classimat
  2. Factors influencing classimat faults
    - 3.5.2.1 Reasons for imperfections
  3. List the measures to reduce classimat faults
- 3.6 Explain the principle of Measurement of yarn appearance by
  1. ASTM method
  2. Electronic instrument

#### **4 Understand Tensile testing of fibres and yarns**

- 4.1 Define the terms related to tensile properties – load, breaking load, stress, strain, breaking stress, breaking length, breaking extension, initial young's modulus, yield point, work of rupture, work factor
- 4.2 Stress – strain curves for different textile fibres
- 4.3 Different principles of tensile testing - CRL, CRE, CRT
- 4.4 Explain the Fibre strength testing on following instruments
  1. Stelometer
  2. Pressly fibre bundle strength tester
  3. High Volume instrument
  4. Single fibre strength tester
- 4.5 Explain the methods of Yarn strength testing
  1. Lea CSP
  2. Single yarn strength – tenso rapid / tensojet / tensomax

#### **5 Understand basics of Statistics**

- 5.1 Define Statistics.
- 5.2 State the functions of Statistics.
- 5.3 State the Scope and limitations of Statistics.
- 5.4 Define basic statistical terms –discrete and continuous variable, frequency, class interval
- 5.5 Mention different types of statistical series
- 5.6 Explain different methods of graphical representation of Statistical data.

## **6 Understand Measure of Central Tendency**

Solve the problems on following measures of Central tendency

- 6.1 Simple mean
- 6.2 Weighted arithmetic mean
- 6.3 Median
- 6.4 Mode

## **7 Measures of dispersion**

Solve the problems on following measures of dispersion

- 7.1 list the different types of measuring of dispersion
- 7.2 Range and Coefficient of range
- 7.3 Mean deviation and Coefficient of mean deviation
- 7.4 Standard deviation and Coefficient of standard deviation
- 7.5 Variance and Coefficient of Variation

## **COURSE CONTENT**

### **1. Sampling and Humidity relations**

Objects of textile testing -Importance for standardization of testing -Tabulate Routine tests conducted in textile mills and the method or instrument used for each -Sampling -Define the terms used in sampling – consignment, test lot, sampling, random sample, biased sample, bulk sample, basic sample-Laboratory sample, test specimen, package, container (case) -Different Fiber sampling methods -Different Yarn sampling methods-Different Fabric sampling methods-Influence of Moisture - Definitions - Humidity, Relative humidity, moisture content, moisture regain, standard atmosphere, standard regain-Principle of Measurement of relative humidity by -Wet and Dry bulb hygrometer-Influence of moisture on physical properties of textile fibers -Influence of moisture on processing of textile material -Measurement of moisture content and regain -Method of measuring moisture on Automatic moisture oven - Capacitative method of measuring moisture -Factors affecting moisture regain of textile material -Effect of regain of on fibre properties -Standard regain of textile fibers -Formula to find standard regain of a blend-Method of Correction of invoice weight - Principle of Control of testing room atmosphere -Procedure of Conditioning of samples for testing



## 2. **Measurement of Fibre Dimensions**

Measurement of fibre length parameters- using Digital fibrograph -High Volume instrument -Advanced Fibre Information System-Relationship between the results from different methods -Measurement of fiber fineness -Different units of expressing fibre fineness -Different methods of measuring fibre fineness -Method of Gravimetric method of measuring fibre fineness -Method of Projection microscope for fibre fineness measure-Air flow principle for measuring fibre fineness -Method of ATIRA fibre fineness tester - Opto-electrical method on AFIS -Measurement of fibre maturity -Importance of fibre maturity -Different methods of measuring fiber maturity-Caustic soda swelling method of measuring fibre fineness -Polarized method -Differential dyeing method - Causticaire method-Airflow method of measuring fibre maturity-Measurement of fibre fineness by AFIS -Standards for maturity results obtained from different methods -Principles of Measuring trash in cotton in the following instruments-Shirley trash analyzer -High volume instrument -AFIS -Measurement of neps-List different methods of estimating neps Method of Nep measurement on AFIS -Nep content of some Indian cotton varieties

## 3. **Measurement of yarn dimensions and properties**

Measurement of yarn count -By measuring the weight of one lea-By using Beasley balance -Measurement of yarn twist - S twist and Z twist -Derive the expression for TPI- different types of twist testers and their principles- working of Twist and untwist method twist tester-Testing yarn hairiness -Working principle of Uster yarn hairiness tester-Working principle of Zweigle hairiness tester -Factors affecting yarn hairiness-Testing of unevenness -Capacitance principle of measuring unevenness - short, medium and long term variations -Meaning of U% or CV% given by evenness tester - Principle of Uster evenness tester -Interpretation of unevenness test results -Define Index of irregularity - Causes of unevenness -Steps to control irregularity -Effect of yarn unevenness on other yarn properties and fabric properties -Testing of

Imperfections - testing on Uster classimat-Factors influencing classimat faults -  
Reasons for imperfections -Measures to reduce classimat faults - Measurement of  
yarn appearance by -ASTM method -Electronic instrument .

**4. Tensile testing of fibres and yarns**

Define the terms related to tensile properties – load, breaking load, stress, strain,  
breaking stress, breaking length, breaking extension, initial young's modulus, yield  
point, work of rupture, work factor-Stress – strain curves for different textile fibers -  
Different principles of tensile testing - CRL, CRE, CRT -Fibre strength testing on  
following -Instruments –Stelometer-Pressly fibre bundle strength tester-High Volume  
instrument -Single fibre strength tester - methods of Yarn strength testing -Lea CSP -  
Single yarn strength – tenso -rapid / tensojet / tensomax

**5. Introduction to Statistics**

Statistics.- functions of Statistics.- Scope and limitations of -statistics.- basic  
statistical terms –discrete and continuous variable, frequency, class interval- different  
types of statistical series -Different methods of graphical representation of Statistical  
data.

**6. Measure of Central Tendency**

Solve the problems on following measures of Central tendency-Simple mean -  
Weighted arithmetic mean –Median-Mode.

**7. Measures of dispersion**

Solve the problems on following measures of dispersion - different types of  
measuring of dispersion-Range and Coefficient of range-Mean deviation and -  
oefficient of mean deviation- Standard deviation and Coefficient of standard  
deviation-Variance and Coefficient of Variation

**REFERENCES BOOKS**

- |   |                       |
|---|-----------------------|
| 1. Textile Testing : Fibre, Yarn and Fabric | - Arindam Basu, SITRA |
| 2. Principles of Textile testing            | - JE Booth            |
| 3. Physical Testing of Textiles             | - BP Saville          |
| 4. Textile Testing                          | - Angappan            |

## YARN MANUFACTURE LAB - II

Subject Title	:	YARN MANUFACTURE LAB - II
Subject Code	:	TT – 406
Periods per Week	:	06
Periods per Semester	:	90

### TIME SCHEDULE

S.No.	List of Experiments	No. of Periods
A	Combers	24
B	Speed Frames	24
C	Ring Frames	24
D	Winding and Doubling Frame	15
E	Reeling machine	3
	<b>Total</b>	<b>90</b>

- A Minimum of 14 experiments need to be conducted

### LIST OF EXPERIMENTS

#### A. Combing experiments

- 1) To draw a line diagram showing the passage of material on a Sliver Lap machine, identify the parts, calculate the speeds of all rotating parts and total draft
- 2) To draw a line diagram showing the passage of material on a Ribbon Lap machine, identify the parts, calculate the speeds of all rotating parts and total draft
- 3) To draw a line diagram showing the passage of material on a Lap former, identify the parts, calculate the speeds of all rotating parts and total draft
- 4) To draw a line diagram showing the passage of material on a Comber, identify the parts, calculate the speeds of all rotating parts, total draft and production constant

#### B. Speed frame

- 5) Draw a gearing diagram showing the drives, calculate the speeds of all rotating parts, total draft, twist constant and production constant speed frame
- 6) Assemble and dismantling of the parts of building mechanism of a speed frame
- 7) Assembling and disassembling of drafting system of a Speed frame
- 8) Calculate the bobbin speed while winding on empty bobbin and full bobbin through the gearing diagram

#### C. Ring frame

- 9) Draw a gearing diagram showing the drives, calculate the speeds of all rotating parts, total draft, direction of twist, twist constant and production constant of a Ring frame
- 10) Assemble and dismantling of the parts of cop building mechanism of a ring frame
- 11) Assembling and disassembling of drafting system of a Ring frame

#### D. Winding and Doubling

- 12) To draw a line diagram showing the passage of material on a Autoconer, identify the parts and production constant
- 13) To draw a line diagram showing the passage of material on a Doubler winder, identify the parts and production constant
- 14) To draw a line diagram showing the passage of material on a Ring Doubling machine, identify the parts, calculate the speeds of all rotating parts, total draft, twist constant and production constant.

15) To draw a line diagram showing the passage of material on a TFO, identify the parts, calculate the speeds of all rotating parts, total draft, twist constant and production constant.

#### E. Reeling

16) To draw a line diagram showing the passage of material on a Reeling Machine, identify the parts and production constant.

#### Competencies and Key competencies to be achieved by the student

S. No.	Name of the Experiment	Objectives	Key Competencies
1, 2, 3	To draw a line diagram showing the passage of material on a Sliver Lap / Ribbon Lap / Unilap machine, identify the parts, calculate the speeds of all rotating parts and total draft	8. Identify the machine and its major parts 9. Identify the functions of major parts 10. Observe the machine in running condition 11. Observe the setting points on the machine 12. Draw the gearing diagram 13. Calculate the speeds of major parts	1. Identify the machine and its major parts 2. Identify the functions of major parts 3. Draw the gearing diagram 4. Calculate the total draft
4	To draw a line diagram showing the passage of material on a Comber, identify the parts, calculate the speeds of all rotating parts, total draft and production constant using gearing diagram	1. Identify the machine and its major parts 2. Identify the functions of major parts 3. Observe the machine in running condition 4. Observe the setting points on the machine 5. Draw the gearing diagram 6. Calculate the speeds of major parts 7. Calculate the draft constant, production constant	1. Identify the machine and its major parts 2. Identify the functions of major parts 3. Draw the gearing diagram 4. Calculate the draft constant, production constant
5	Draw a gearing diagram showing the drives, calculate the speeds of all rotating parts, total draft, twist constant and production constant of a speed frame	1. Identify the machine and its major parts 2. Identify the functions of major parts 3. Observe the machine in running condition 4. Observe the setting points on the machine 5. Draw the gearing diagram 6. Calculate the speeds of major parts 7. Calculate the draft constant, production constant, twist constant	1. Identify the machine and its major parts 2. Identify the functions of major parts 3. Draw the gearing diagram 4. Calculate the draft constant, production constant, twist constant
6	Assemble and dismantling of the parts of building mechanism of a speed frame	1. Identify the building mechanism on speed frame 2. Identify the major parts and their functions 3. Disassemble the parts 4. Observe the parts and identify their functions 5. Assemble the parts	1. Identify the building mechanism on speed frame 2. Identify the major parts and their functions 3. Disassemble the parts 4. Assemble the parts

7	Assembling and disassembling of drafting system of a Speed frame	<ol style="list-style-type: none"> <li>7. Identify the drafting system and its major parts</li> <li>8. Disassemble the parts of drafting system</li> <li>9. Identify the parts and their functions</li> <li>10. Clean the parts</li> <li>11. Assemble the parts</li> <li>12. Run the machine in idle condition</li> </ol>	<ol style="list-style-type: none"> <li>5. Identify the drafting system and its major parts</li> <li>6. Disassemble the parts of drafting system</li> <li>7. Assemble the parts</li> <li>8. Run the machine in idle condition and verify for correct movement of parts</li> </ol>
8	Calculate the bobbin speed while winding on empty bobbin and full bobbin through the gearing diagram.	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Observe the machine in running condition</li> <li>4. Observe the setting points on the machine</li> <li>5. Measure the speeds at different diameters of bobbin using tacho meter</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Measure the speeds at different diameters of bobbin using tacho meter</li> </ol>
9	Draw a gearing diagram showing the drives, calculate the speeds of all rotating parts, total draft, direction of twist, twist constant and production constant of a Ring frame	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Observe the machine in running condition</li> <li>4. Observe the setting points on the machine</li> <li>5. Draw the gearing diagram</li> <li>6. Calculate the speeds of major parts</li> <li>7. Calculate the draft constant, production constant, twist constant</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Draw the gearing diagram</li> <li>4. Calculate the draft constant, production constant, twist constant</li> </ol>
10	Disassemble and Assemble the parts of cop building mechanism of a ring frame	<ol style="list-style-type: none"> <li>1. Identify the building mechanism on speed frame</li> <li>2. Identify the major parts and their functions</li> <li>3. Disassemble the parts</li> <li>4. Observe the parts and identify their functions</li> <li>5. Assemble the parts</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the building mechanism on speed frame</li> <li>2. Identify the major parts and their functions</li> <li>3. Disassemble the parts</li> <li>4. Assemble the parts</li> </ol>
11	Assembling and disassembling of drafting system of a Ring frame	<ol style="list-style-type: none"> <li>1. Identify the drafting system and its major parts</li> <li>2. Disassemble the parts of drafting system</li> <li>3. Identify the parts and their functions</li> <li>4. Clean the parts</li> <li>5. Assemble the parts</li> <li>6. Run the machine in idle condition</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the drafting system and its major parts</li> <li>2. Disassemble the parts of drafting system</li> <li>3. Assemble the parts</li> <li>4. Run the machine in idle condition and verify for correct movement of parts</li> </ol>

12	To draw a line diagram showing the passage of material on a Autoconer	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Observe the machine in running condition</li> <li>4. Identify drives, Controlling instruments</li> <li>5. Observe the movement of material on the machines</li> <li>6. identify various controls on PLC unit</li> <li>7. Practice on setting the parameters on PLC panel</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. identify various controls on PLC unit</li> <li>4. Practice on setting the parameters on PLC panel</li> </ol>
13-15	To draw a line diagram showing the passage of material on a <b>Doubler Winder / Ring doubler / TFO</b>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Observe the machine in running condition</li> <li>4. Draw the gearing diagram</li> <li>5. Calculate the speeds of major parts</li> <li>6. Calculate the production constant</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Draw the gearing diagram</li> <li>4. Calculate the production constant</li> </ol>
16	Draw the line diagram showing the passage of material on a Reeling machine, identify the parts and find the production constant	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Observe the machine in running condition</li> <li>4. Draw the gearing diagram</li> <li>5. Calculate the speeds of major parts</li> <li>6. Calculate the production constant</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the machine and its major parts</li> <li>2. Identify the functions of major parts</li> <li>3. Draw the gearing diagram</li> <li>4. Calculate the production constant</li> </ol>

## FABRIC MANUFACTURE LAB - II

**Subject Title** : **FABRIC MANUFACTURE LAB - II**  
**Subject Code** : **TT – 407**  
**Periods per week** : **06**  
**Periods per semester:** **90**

### TIME SCHEDULE

S. No.	Major Topic	No. of Periods
A	Automatic Looms.	6
B	Dobby Shedding.	36
C	Jacquard Shedding.	24
D	Weft Patterning	12
E	Shuttleless looms	12
<b>TOTAL</b>		<b>90</b>

A minimum of 13 experiments need to be conducted

### LIST OF EXPERIMENTS

#### A. Automatic looms

- 1) Study the various parts and working Automatic pirn changing mechanism

#### B. Dobby shedding

- 2) Dismantling and assembling of Keighley Dobby shedding mechanism
- 3) Dismantling and assembling of Negative Paper pattern Cam doobby
- 4) Dismantling and assembling of Positive cam doobby
- 5) Dismantling and assembling of Rotary Dobby
- 6) Dismantling and assembling of Electronic Dobby
- 7) To develop the doobby pattern chain for given striped fabric with card saving and without card saving

#### C. Jacquard shedding

- 8) Dismantling and assembling of Single Cylinder Single Lift Jacquard machine
- 9) Dismantling and assembling of Single Cylinder Double Lift Jacquard machine
- 10) Dismantling and assembling of Double Cylinder Double Lift Jacquard machine
- 11) Prepare a pattern chain for given motif to produce on a jacquard machine

#### D. Drop box motion

- 12) Identify and study the parts of Drop box motion available in your laboratory to understand the mechanism.
- 13) Develop a pattern chain for a weft pattern to produce checks fabric using drop box mechanism on a loom

#### E. Shuttle less looms

- 14) Dismantling and Assembling of basic parts of Double Rapiet loom
- 15) Dismantling and Assembling of basic parts of Air jet loom

### Competencies and Key competencies to be achieved by the student

S. No	Experiment	competency	Key competency
1	Study the various parts and working Automatic pirn changing mechanism	<ol style="list-style-type: none"> <li>1. Identify the parts</li> <li>2. Identify the functions of different parts</li> <li>3. Observe the functions of different parts</li> <li>4. Disassemble the parts</li> <li>5. Assembling the parts</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the parts</li> <li>2. Disassemble the parts</li> <li>3. Assemble the parts</li> </ol>
2 - 6	Dismantling and assembling of Dobby shedding machine	<ol style="list-style-type: none"> <li>1. Identifying the constructional features of doobby shedding mechanism</li> <li>2. Identification of major parts</li> <li>3. Observe the working of Dobby to form shed</li> <li>4. Dismantling of parts of doobby shedding</li> <li>5. Assembling of the parts of doobby</li> <li>6. Connecting the doobby shedding to the loom mechanism</li> </ol>	<ol style="list-style-type: none"> <li>1. Identifying the constructional features of doobby shedding mechanism</li> <li>2. Identification of major parts</li> <li>3. Dismantling of parts of doobby shedding</li> <li>4. Assembling of the parts of doobby</li> </ol>
7	To develop the pattern chain for a doobby loom, for given striped fabric with card saving and without card saving	<ol style="list-style-type: none"> <li>1. Observe the given fabric pattern</li> <li>2. Draw the pattern on a point paper</li> <li>3. Identify number of healds required and the capacity of doobby required</li> <li>4. Draw the lifting plan on a point paper</li> <li>5. Practice the pegging operation on the lattice</li> </ol>	<ol style="list-style-type: none"> <li>1. Draw the pattern on a point paper</li> <li>2. Draw the lifting plan on a point paper</li> <li>3. Practice the pegging operation on the lattice</li> </ol>
8-10	Dismantling and assembling of Jacquard machine a) Single Cylinder Single Lift Jacquard machine b) Single Cylinder Double Lift Jacquard machine c) Double Cylinder Double Lift Jacquard machine	<ol style="list-style-type: none"> <li>1. Identifying the constructional features of Jacquard shedding mechanism</li> <li>2. Dismantling of parts of Jacquard shedding</li> <li>3. Identification of major parts and observing their functions</li> <li>4. Assembling of the parts of Jacquard</li> <li>5. Connecting the Jacquard shedding to the loom mechanism</li> <li>6. Run the Jacquard loom</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of major parts and observing their functions</li> <li>2. Dismantling of parts of Jacquard shedding</li> <li>3. Assembling of the parts of Jacquard</li> <li>4. Connecting the Jacquard shedding to the loom</li> </ol>
11	To develop the pattern chain for given figured fabric	<ol style="list-style-type: none"> <li>1. Observe the given figured pattern on the fabric</li> <li>2. Draw the figured pattern on a point paper</li> <li>3. Identify number of ends and picks in the repeat and identify the capacity of Jacquard required</li> <li>4. Draw the lifting plan on a point paper</li> <li>5. Practice the punching of lattice by hand / on piano card punching machine</li> </ol>	<ol style="list-style-type: none"> <li>1. Draw the figured pattern on a point paper</li> <li>2. Draw the lifting plan on a point paper</li> <li>3. Practice the punching of lattice by hand / on piano card punching machine</li> </ol>



12	Dismantling and assembling the parts of Drop box motion	<ol style="list-style-type: none"> <li>1. Identifying the constructional features of Drop box mechanism</li> <li>2. Dismantling of parts of Drop box motion</li> <li>3. Identification of major parts and observing their functions</li> <li>4. Assembling of the parts of Drop box motion</li> <li>5. Run the Drop box loom</li> </ol>	<ol style="list-style-type: none"> <li>1. Identification of major parts and observing their functions</li> <li>2. Dismantling of parts of Drop box motion</li> <li>3. Assembling of the parts of Drop box motion</li> <li>4. Run the Drop box loom</li> </ol>
13	Develop a pattern chain of for a drop box mechanism	<ol style="list-style-type: none"> <li>1. Observe the given fabric pattern</li> <li>2. Draw the pattern on a point paper</li> <li>3. Select the pattern cards as per the sequence of weft patter</li> <li>4. Make a trial run on the machine</li> <li>5. Run the loom using lattice</li> <li>6. Observe the produced fabric for concurrence with the sample</li> </ol>	<ol style="list-style-type: none"> <li>1. Draw the pattern on a point paper</li> <li>2. Select the pattern cards as per the sequence of weft patter</li> <li>3. Make a trial run on the machine</li> <li>4. Run the loom using lattice</li> <li>5. Observe the produced fabric for concurrence with the sample</li> </ol>
14	Study of basic parts of Double rapier loom	<ol style="list-style-type: none"> <li>1. Identify the parts of rapier picking mechanism</li> <li>2. Identify the functions of different parts</li> <li>3. Observe the functions of different parts</li> <li>4. Disassemble the parts</li> <li>5. Assembling the parts</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the parts</li> <li>2. Disassemble the parts</li> <li>3. Assemble the parts</li> </ol>
15	Study of basic parts of Air jet loom	<ol style="list-style-type: none"> <li>1. Identify the parts of Air jet picking mechanism</li> <li>2. Identify the functions of different parts</li> <li>3. Observe the functions of different parts</li> <li>4. Disassemble the parts</li> <li>5. Assembling the parts</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the parts</li> <li>2. Disassemble the parts</li> <li>3. Assemble the parts</li> </ol>

## TEXTILE CHEMICAL PROCESSING LAB - II

<b>Sub Title</b>	:	<b>TEXTILE CHEMICAL PROCESSING LAB - II</b>
<b>Subject Code</b>	:	<b>TT – 408</b>
<b>Periods per week</b>	:	<b>03</b>
<b>Periods per semester</b>	:	<b>45</b>

### TIME SCHEDULE

<b>S.No.</b>	<b>List of Experiments</b>	<b>No. of Periods</b>
1.	Dyeing of Cotton with water soluble dyes	15
2.	Dyeing of Cotton with water soluble dyes	09
3	Dyeing of Protein Fibers	06
4	Dyeing of synthetic fibers	03
5.	Dyeing Machinery	03
6.	Printing	09
	<b>Total</b>	<b>45</b>

### OBJECTIVES

On completion of this subject the student should be able to

#### 1. Dye the Cotton with following water soluble dyes

- 1.1. direct dyes
- 1.2. cold brand reactive dyes
- 1.3. hot brand reactive dyes
- 1.4. high exhaustion brand dyes
- 1.5. soluble vat dyes
- 1.6. azoic dyes

## **2. Dye the Cotton with following water insoluble dyes**

- 2.1. sulphur dyes
- 2.2. vat dyes
- 2.3. basic dyes by using mordant

## **3. Dye the Protein fibers**

- 3.1. acid dyes
- 3.2. metal complex dyes
- 3.3. chrome dyes
- 3.4. acid dyes
- 3.5. metal complex dyes

## **4. Dye the Synthetic fibers**

- 4.1. polyester with disperse dyes on HTHP dyeing machine
- 4.2. Nylon by using acid dyes
- 4.3. Nylon by using metal complex dyes
- 4.4. Nylon by using reactive dyes

## **5. Dyeing Machinery**

- 5.1. To understand the working of Jigger dyeing machine
- 5.2. To understand the working of Winch dyeing machine

## **6. Printing**

To understand

- 6.1.1. Roller printing machine.
- 6.1.2. Screen printing machine
- 6.1.3. Stencil printing machine
- 6.1.4. Printing of cloth samples by means of block printing.
- 6.1.5. Batik style

## **CONTENTS**

### **1. Dyeing of Cotton with Water soluble dyes**

- 1.1. Dyeing of cotton with direct dyes
- 1.2. Dyeing of cotton with cold brand reactive dyes
- 1.3. Dyeing of cotton with hot brand reactive dyes

- 1.4. Dyeing of cotton with high exhaustion brand dyes
- 1.5. Dyeing of cotton with soluble vat dyes
- 1.6. Dyeing of cotton with azoic dyes

## **2. Dyeing of Cotton with water insoluble dyes**

- 2.1. Dyeing of cotton with sulphur dyes
- 2.2. Dyeing of cotton with vat dyes
- 2.3. Dyeing of cotton with basic dyes by using mordant

## **3. Dyeing of Protein fibers**

- 3.1. Dyeing of wool with acid dyes
- 3.2. Dyeing of wool with metal complex dyes
- 3.3. Dyeing of wool with chrome dyes
- 3.4. Dyeing of Silk with acid dyes
- 3.5. Dyeing of Silk with metal complex dyes

## **4. Dyeing of Synthetic fibers**

- 4.1. Dyeing of polyester with disperse dyes on HTHP dyeing machine
- 4.2. Dyeing of Nylon by using acid dyes
- 4.3. Dyeing of Nylon by using metal complex dyes
- 4.4. Dyeing of Nylon by using reactive dyes

## **5. Dyeing Machinery**

- 5.1. To study the working of Jigger dyeing machine
- 5.2. To study the working of Winch dyeing machine

## **6. Printing**

- 6.1. Study the working of any one of the printing machines available in your
  - 6.1.1. Laboratory.
  - 6.1.2. Roller printing machine.
  - 6.1.3. Screen printing machine
  - 6.1.4. Stencil printing machine
- 6.2. Printing of cloth samples by means of block printing.
- 6.3. Printing of the given fabric with Batik and methods of doing Batik style in mono dyes and multi colors.

7.

## TEXTILE TESTING LAB - I

**Subject Title** : TEXTILE TESTING LAB - I  
**Subject Code** : TT - 409  
**Periods per week** : 03  
**Periods per semester:** 45

### TIME SCHEDULE

S.No	List of Experiments	No. of Periods
A	Measurement of Atmospheric conditions and moisture	18
B	Measurement of fiber Characteristics	24
C	Measurement of Yarn Characteristics	15
	<b>Total</b>	<b>45</b>

\* A minimum of 19 experiments need to be conducted in a semester

### LIST OF EXPERIMENTS

#### A. Measurement of atmospheric conditions

- 1) Measurement of relative humidity using wet and dry bulb hygrometer
- 2) Measurement of moisture in the textile material using infrared moisture measuring instrument
- 3) Measurement of moisture in the textile material using hot air drying oven

#### B. Measurement of fibre dimensions

- 4) Measurement of fiber length parameters using Digital fibrograph
- 5) Measuring fiber fineness using ATIRA fiber fineness tester
- 6) Measurement of fiber maturity by caustic soda swelling method
- 7) Measurement of trash content in the cotton using Trash analyzer
- 8) Measurement of fiber quality parameters using High Volume instrument
- 9) Measurement of fiber quality parameters using Advanced Fiber Information System

#### C. Measurement of yarn dimensions and properties

- 10) Explain the Measurement of yarn count using quadrant Balance
- 11) Explain the Measurement of yarn count using wrap reel and electronic balance
- 12) Measurement of yarn twist using twist tester
- 13) Testing yarn hairiness using yarn hairiness tester
- 14) Testing of unevenness using evenness tester
- 15) Testing of Imperfections using Uster classimat
- 16) Explain the principle of Measurement of yarn appearance by ASTM method
- 17) Explain the principle of Measurement of yarn appearance by Electronic instrument

#### D. Tensile testing of fibers and yarns

- 18) Explain the Fiber bundle strength testing on Stelometer
- 19) Presley fiber bundle strength tester
- 20) Measurement of lea strength and CSP of the given yarn
- 21) Measurement of single yarn strength

S.No.	Name of the Experiment	Competencies	Key competencies
1	Measurement of relative humidity using wet and dry bulb hygrometer	<ol style="list-style-type: none"> <li>1. Identify the instrument</li> <li>2. Identify the parts of instrument</li> <li>3. take the readings</li> <li>4. calculate the RH% using readings</li> <li>5. infer the results of RH% in atmosphere</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the parts of instrument</li> <li>2. take the readings</li> <li>3. calculate the RH% using readings</li> <li>4. infer the results of RH% in atmosphere</li> </ol>
2	Measurement of moisture in the textile material using infrared moisture measuring instrument	<ol style="list-style-type: none"> <li>1. Identify the instrument</li> <li>2. Identify the parts of instrument</li> <li>3. Connect the machine</li> <li>4. Operate the instrument</li> <li>5. take the readings</li> <li>6. infer the results of moisture in textiles</li> </ol>	<ol style="list-style-type: none"> <li>1. Connect the machine</li> <li>2. Operate the instrument</li> <li>3. infer the results of moisture in textiles</li> </ol>
3	Measurement of moisture in the textile material using hot air drying oven	<ol style="list-style-type: none"> <li>1. Identify the instrument</li> <li>2. Identify the operating switches of the oven</li> <li>3. set the temperature of the oven</li> <li>4. operate the machine</li> <li>5. weight the samples before and after</li> <li>6. infer the results of moisture in textiles</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the operating switches of the oven</li> <li>2. operate the machine</li> <li>3. infer the results of moisture in textiles</li> </ol>
4	Measurement of fiber length parameters using Digital fibrograph	<ol style="list-style-type: none"> <li>1. Identify the instrument</li> <li>2. Identify the parts and controls of the instrument</li> <li>3. Record various length parameters obtained from the machine ‘</li> <li>4. operate the instrument</li> <li>5. calculate uniformity ration and fiber quality index</li> <li>6. infer the results to assess the fiber quality</li> </ol>	<ol style="list-style-type: none"> <li>1. operate the instrument</li> <li>2. Record various length parameters obtained from the machine ‘</li> <li>3. calculate uniformity ratio and fiber quality index</li> </ol>
5	Measuring fiber fineness using ATIRA fiber fineness tester	<ol style="list-style-type: none"> <li>1. Identify the instrument and the parts of the instrument</li> <li>2. calibration of the instrument</li> <li>3. operate the machine</li> <li>4. Observe the air flow readings for different types of cotton</li> <li>5. Compare the readings with norms</li> <li>6. Conclude the fiber quality based on fineness</li> </ol>	<ol style="list-style-type: none"> <li>1. operate the machine</li> <li>2. take the readings</li> <li>3. Compare the readings with norms</li> <li>4. Conclude the fiber quality based on fineness</li> </ol>

6	Measurement of fiber maturity by caustic soda swelling method	<ol style="list-style-type: none"> <li>1. Identify the instrument and chemical used for maturity testing</li> <li>2. Operate the microscope</li> <li>3. Observe the changes in cross section of cotton fiber with caustic soda</li> <li>4. Segregate the mature, half mature and immature fibers</li> <li>5. Calculate maturity coefficient</li> <li>6. Infer the fiber quality based on maturity</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument and chemical used for maturity testing</li> <li>2. Segregate the mature, half mature and immature fibers</li> <li>3. Calculate maturity coefficient</li> <li>4. Infer the fiber quality based on maturity</li> </ol>
7	Measurement of trash content in the cotton using Trash analyzer	<ol style="list-style-type: none"> <li>1. Identify the machine used for trash analysis</li> <li>2. Weigh the cotton and feed to the machine</li> <li>3. Run the trash analyzer machine</li> <li>4. Observe the working of trash analyzer</li> <li>5. Calculate the % trash based on difference in weights</li> <li>6. Estimate the fiber quality based on trash %</li> </ol>	<ol style="list-style-type: none"> <li>1. Weigh the cotton and feed to the machine</li> <li>2. Run the trash analyzer machine</li> <li>3. Calculate the % trash based on difference in weights</li> <li>4. Estimate the fiber quality based on trash %</li> </ol>
8	Measurement of fiber quality parameters using High Volume instrument (HVI)	<ol style="list-style-type: none"> <li>1. Identify the machine and its parts</li> <li>2. Identify the parameters displayed</li> <li>3. Connect the machine</li> <li>4. Practice on usage of instrument</li> <li>5. Record the parameters that can be obtained by HVI</li> <li>6. Calculate the fiber quality index</li> <li>7. Interpret the results</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify, connect and use the machine</li> <li>2. Record the parameters that can be obtained by HVI</li> <li>3. Calculate the fiber quality index</li> <li>4. Interpret the results</li> </ol>
9	Measurement of fiber quality parameters using Advanced Fiber Information System	<ol style="list-style-type: none"> <li>1. Identify the machine and its parts</li> <li>2. Identify the parameters displayed</li> <li>3. Connect the machine</li> <li>4. Practice on usage of instrument</li> <li>5. Record the parameters that can be obtained by AFIS</li> <li>6. Calculate the fiber quality index</li> <li>7. Interpret the results</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify, connect and use the machine</li> <li>2. Record the parameters that can be obtained by AFIS</li> <li>3. Calculate the fiber quality index</li> <li>4. Interpret the</li> </ol>

10	Measurement of yarn count using Quadrant Balance and balance	<ol style="list-style-type: none"> <li>1. Identify the wrap reel and quadrant balance</li> <li>2. Operate the wrap reel</li> <li>3. Observe the scale on quadrant balance</li> <li>4. Select appropriate scale</li> <li>5. Take the reading on quadrant balance by keeping the lea</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the wrap reel and quadrant balance</li> <li>2. Operate the wrap reel</li> <li>3. Take the reading on quadrant balance by keeping the lea</li> </ol>
11	Measurement of yarn count using wrap reel and balance	<ol style="list-style-type: none"> <li>1. Identify the wrap reel</li> <li>2. Operate the wrap reel</li> <li>3. Identify the length of yarn wound</li> <li>4. Take the weight reading</li> <li>5. Calculate the count based on length and weight</li> </ol>	<ol style="list-style-type: none"> <li>1. Operate the wrap reel</li> <li>2. Identify the length of yarn wound</li> <li>3. Take the weight reading</li> <li>4. Calculate the count based on length and weight</li> </ol>
12	Measurement of yarn twist using twist tester	<ol style="list-style-type: none"> <li>1. Identify the twist tester and its parts</li> <li>2. Calculate the tension for given yarn</li> <li>3. Choose the tension</li> <li>4. Identify / set the specimen length on the instrument</li> <li>5. Operate the twist tester</li> <li>6. Take the reading of twist</li> <li>7. Calculate TPI</li> </ol>	<ol style="list-style-type: none"> <li>1. Choose the tension</li> <li>2. Operate the twist tester</li> <li>3. Take the reading of twist</li> <li>4. Calculate TPI</li> </ol>
13	Testing yarn hairiness using yarn hairiness tester	<ol style="list-style-type: none"> <li>1. Identify the hairiness tester and its parts</li> <li>2. Operate on hairiness tester</li> <li>3. Take the readings on the instrument</li> <li>4. Compare the readings with standards</li> <li>5. Estimate the yarn quality based on hairiness</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the hairiness tester and its parts</li> <li>2. Operate on hairiness tester</li> <li>3. Take the readings on the instrument</li> <li>4. Estimate the yarn quality based on hairiness</li> </ol>
14	Testing of unevenness using evenness tester	<ol style="list-style-type: none"> <li>1. Identify the unevenness tester</li> <li>2. Operate on unevenness tester</li> <li>3. Take the readings on the instrument</li> <li>4. Compare the readings with standards</li> <li>5. Estimate the yarn quality based on unevenness</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the unevenness tester and its parts</li> <li>2. Operate on unevenness tester</li> <li>3. Take the readings on the instrument</li> <li>4. Estimate the yarn quality based on unevenness</li> </ol>



15	Testing of Imperfections using Uster classimat	<ol style="list-style-type: none"> <li>1. Identify the instrument Uster classimat</li> <li>2. Define classimat yarn faults</li> <li>3. Operate on Uster classimat</li> <li>4. Take the readings on the instrument</li> <li>5. Estimate the yarn quality based on yarn faults obtained by classimat</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the Uster classimat instrument and its parts</li> <li>2. Operate on Uster classimat instrument Take the readings on the instrument</li> <li>3. Estimate the yarn quality based on Uster classimat yarn faults</li> </ol>
16,17	Measurement of yarn appearance by ASTM method / Electronic instrument	<ol style="list-style-type: none"> <li>1. Identify the instrument used for yarn appearance testing</li> <li>2. Operate the machine</li> <li>3. Observe the yarn appearance</li> <li>4. Compare the yarn boards with the standard ASTM photographs</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for yarn appearance testing</li> <li>2. Operate the machine</li> <li>3. Compare the yarn boards with the standard ASTM photographs</li> <li>4. Infer the results</li> </ol>
18, 19	Explain the Fiber bundle strength testing using Stelometer / Presley fiber bundle	<ol style="list-style-type: none"> <li>1. Identify the instrument used for fiber bundle strength testing</li> <li>2. Take the sample from the bulk of cotton material</li> <li>3. Operate the instrument</li> <li>4. Take the readings</li> <li>5. Interpret the results to assess the quality</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for fiber bundle strength testing and its parts</li> <li>2. Operate the instrument</li> <li>3. Take the readings</li> <li>4. Interpret the results to assess the quality</li> </ol>
20	Explain the single yarn strength testing using Single yarn strength tester	<ol style="list-style-type: none"> <li>1. Identify the instrument used for single yarn strength testing</li> <li>2. Take the sample from the yarn package</li> <li>3. Operate the instrument</li> <li>4. Take the readings</li> <li>5. Interpret the results</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for single yarn strength testing and the parts</li> <li>2. Operate the instrument</li> <li>3. Take the readings Interpret the results</li> </ol>
21	Measurement of lea strength and CSP of the given yarn	<ol style="list-style-type: none"> <li>1. Identify the instrument used for yarn lea strength testing and its parts</li> <li>2. Take the sample from the yarn package</li> <li>3. Operate the instrument</li> <li>4. Calculate the CSP</li> <li>5. Conclude about yarn quality</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for yarn lea strength testing and its parts</li> <li>2. Operate the instrument</li> <li>3. Calculate the CSP</li> </ol>

# **V SEMESTER**

**C-16-V SEMESTER**  
**SCHEME OF INSTRUCTION AND EXAMINATION**  
**TT-501-INDUSTRIAL TRAINING**

S No	Subject	Duration	Scheme of Examination		
			Nature	Item	Max. Marks
1.	Practical training in a Textile Industry or allied Industry	6 Months	Viva Voce & Log book	<u>At the Industry</u>	100
				1) First Assessment (At the end of 3 <sup>rd</sup> month)	
				2) Second Assessment (At the end of 6 <sup>th</sup> month )	100
				<u>At the Institution</u>	
				4 ) Log Book	30
				5) Training Report	30
			6) Seminar on training	40	
	Total for V semester				300

1.The Industrial training shall carry 300 marks and pass marks is 50%. A candidate failing to secure the minimum marks should complete it at his own expenses.

2. During Industrial training the candidate shall put a minimum of 90% attendance.

## INDUSTRIAL TRAINING SCHEME

### V/VI SEMESTERS

1. A candidate shall be assessed twice in the spell of industrial training i.e. at the end of third month and finally before he/she completes the industrial training
2. The assessment shall be carried out by a committee comprising of
  - (a) A representative of the Industry where the candidate is undergoing training
  - (b) A staff member of the concerned section of the polytechnic.
3. The assessment at the end of the third month and the end of training shall each carry 100 marks for the progress made during the corresponding period of training.
4. The remaining 100 marks are allotted as follows:
  - For the training report (Record) 30 marks,
  - For maintenance of log book 30 marks
  - For seminar 40 marks.

These are to be evaluated at the institution at the end of training by a committee consisting following staff members

- (1) Head of Section.
  - (2) External Examiner preferably from Industry
  - (3) Staff member who assessed the student during the Industrial Training.
- 
5. The progress made during the end of assessment will be evaluated on the basis of the following parameters.

## ASSESSMENT SCHEME

<b>S. No.</b>	<b>Name of the Parameter</b>	<b>Max. Marks Allotted for each Parameter</b>
1.	Attendance and punctuality	05
2.	Familiarity with Technical terms	06
3.	Familiarity with tools and material	10
4.	Attitude towards job	07
5.	Manual skills	04
6.	Application of knowledge	10
7.	Problem solving skills	10
8.	Comprehension and observation	04
9.	Safety and Environmental consciousness	03
10.	Human relations	04
11.	Ability to communicate	06
12.	Supervising ability	10
13.	General conduct during the period	06
14.	Maintenance of dairy	15
	<b>Total</b>	<b>100</b>

**OBJECTIVES:**

1. The student should undergo training in the industry the areas as mentioned below of any one for each semester.
  - a. **SPINNING.**
  - b. **WEAVING.**
  - c. **CHAMICAL PROCESSING.**
  - d. **MISCELLANIOUS TEXTILE UNITS (ALLIED TEXTILE INDUSTRIES)**

**For V/VI Semesters in assigned mill**

**INDUSTRIAL TRAINING PROGRAMME – IN SPINNING**

The student should undergo training in an Industry. Some recommended areas of work are as follows :

1. **Godown and mixing section.**
  1. Mixing different types of cotton with the mixing attendant.
  
2. **Blow Room.**
  1. To learn the work of the Bale Braker Attendant.
  2. To learn Doffing weighting and marking adjusting lap weight.
  3. To learn collection of waste machine wise.
  4. To learn the maintenance work of beaters like settings, inspection of blades, angle of grid bars and spikes of krishiner beater etc.
  5. To learn for oiling and greasing of various machines.
  6. To learn for attending of repairs along the fitter.
  7. To find out lap C.V.
  8. To calculate Lap rejection %.
  
3. **Carding.**
  1. To learn the replacement of full can.
  2. To learn deicing of silvers with the help of Can Tenter.
  3. To learn stripping of flats.

4. To learn settings of cards.
5. To learn grinding along with the grinders.
6. To learn oiling and greasing.
7. To learn the repairs along with the maintenance staff.
8. To learn the mounting of metallic cloth wire.
9. To learn for adjusting the settings at various points in carding machine.
10. To familiarize with the dust extraction it and crossed verge attachment.
11. To find out production calculations and efficiency.
12. Loss in efficiency due to stripping, grinding, cleaning in repairs want of lap etc., by snap survey method.
13. To learn nep counting.
14. To learn control of waste at different points.
15. To learn checking of heel and toe arrangement, lickening mounting.
16. To learn for card erection work along with the maintenance gang.
17. To find out card silver co-efficient of variation percentage.

#### **4. Drawing Frame.**

1. To take training in draw frame feeding, piecing and to attend over roller lapping etc., with the help of operator.
2. To take training in oiling, greasing settings and repairs etc., with the help of fitter.
3. To learn for stop motion repairs.
4. To calculate loss in efficiency.
5. To calculate loss in efficiency due to piecing, roller lapping change, pinion changing, clearing and repairs etc.
6. To learn hank of the drawing silver control.
7. To study silver breakers per 100 deliveries per one hour.

#### **5. Speed Frames.**

1. To learn fly frame feeding piecing and to attend overlapping etc., with the help of the fitter.
2. To learn in doffing along with doffing boys.
3. To learn in oiling, greasing settings and repairs etc., with the help of a fitter.
4. To learn to rectify the various defects with the help of the fitter.
5. To calculate production efficiency.
6. To calculate average idle spindle percentage.

7. Evenness study and hank control.
8. To calculate roving breaks per 100 spindles per one hour.
9. Study of roving hank in fly frames – overhauling – maintenance of differential gear and builder motion.
10. To learn in erection of fly frames - over hauling – maintenance of differential gear and builder motion.

**6. Spinning and doubling.**

1. To learn the work of piecers and doubler with help of sider.
2. To learn for doffing along with doffing boys.
3. To learn for the work with the fitter along with the cleaning gang when the machine is stopped for overhauling.
4. To learn the repairs along with the maintenance Jobber.
5. To learn spindle gauging and lappet gauging.
6. To learn for tape stitching along with the oiler.
7. To learn for oiling and greasing along with the oiler.
8. To learn changing of wheels and tin roller pulley at the time of counts conversions.
9. To learn for spindle oil topping, extraction, jacky pulley greasing, poker rod clearing and replacement of ring travelers along with the clearing gang.
10. To calculate machinery utilisation percentage.
11. To calculate production per frame per a shift of 8 hours in cages.
12. To calculate spindle point production in grams.
13. To calculate idle spindle percentage.
14. To study of end breakages per 100 spindles per 1 hour.
15. To find out C.V. percentage regarding spinning warping (count) and test (strength).

**7. Combing Sections.**

**The student will be trained in the section with the following duties.**

1. To learn in feeding of slivers from the card cans to the silver table and removing the finished laps and then to piece them in the ribbon lap machine with the help of silver lap machine Tenter.



2. To learn an feeding of sliver laps from the sliver lap machine, removing finished laps and then to piece them in the comber head with the help of ribbon lap machine Tenter.
3. To learn the threading of a new lap to the comber and piecing the broken web with the help of comber Tenter.
4. To learn different settings.
5. To set the combers for the required percentages of waste.

#### **8. Reeling.**

**The student will be given training in the following duties :**

1. To learn in reeling hanks and knots without defects and doffing them with the help of a reeler.
2. To check the circumstance of reels.
3. To learn the conversion of plain reeling into cross reeling (Double hank cross reeling and double hand plain reeling).
4. To calculate swift speed.
5. To calculate the waste percentage.
6. To learn for oiling and greasing along with the maintenance jobber.

#### **9. Bundling.**

1. To learn the work of dresser and presser in the section with the help of bundling workers.
2. To count the number of knots per bundle use per the count.
3. To take bundling wrapping.
4. To learn the method of packing for local and export.
5. To check the relative humidity percentage.
6. To learn for oiling and greasing.

#### **10. Baling.**

1. To learn the work of a baler with the help of baling worker.
2. To learn work of cutting the hessian cloth, craft paper, polythine paper, bale hoops and wooden sticks as per the requirements.
3. To learn student will be asked to collect the technical dates of all departments starting from blow room to bundling and baling. Also he will be tested at the end of training in all Department.

11. Energy Management.
12. Safety Features.
13. Quality Control.
14. ISO 9000 Certification.
15. Environmental Studies.
  - 15.1 Study the Air Pollution control methods and equipment.
    - Cleaning of gaseous effluents, particulate matter emission control, cyclones settling chambers, electrostatic precipitators, scrubbers etc.
    - Control of gaseous emissions.
  - 15.2 Study the cost concepts and issues in Environmental protection.
    - Pollution prevention costs, pollution costs, waste disposal cost, total damage costs and total costs of pollution control.
    - Optimum pollution, marginal costs of control, benefits from controlling pollution, total and marginal benefits from pollution control.
    - Efficiency in pollution control, efficient level of pollution efficient level of environmental quality, variation of these costs with environmental quality, limitations of cost benefit analysis.
  - 15.3 Study the concepts of Environmental Management.
    - Environmental Impact Assessment (EIA) : terminology and its objectives.
    - Environmental Audit (EA) : definition, objectives, benefits, general anatomy of Rule 14 of environmental (protection) act 1986, parts of statutory environmental audit report (A to I) and its significance.
    - Environmental law 1986 : scope, terms and components fundamental right to life, public interest litigation (PIL), duties of citizens and governments.
  - 15.4 Understand the importance of cleaner production.
    - Definitions, concept, benefits.
    - Factors contributing to cleaner production.
    - Case Studies.

**Note :** References to study the concepts of environmental studies.

## REFERENCE BOOKS

1. Karpagam, M., (1991) Environmental Economics – A Text book, Sterling Publishers Pvt. Ltd., New Delhi.
2. Ruff, E. Larry., (1970) The Economic Commonsense of Pollution, the public Interest No.19 (Spring 1970).
3. Barbier, Edward, B., (1989) Economics, Natural Resource Scarcity and Development, Earthscan Publications, London.
4. Kneese, Allen V., and Blair, T. Brower., Environmental Quality and Residual Management, John Hopkins University Press, Baltimore.
5. Environmental Impact Assessment by Canter, Larry W., Mc Graw Hill.
6. Cunningham P. William and Saigo. Barbara Woodworth 'Environmental Science – a Global Concern' Wm. C. Brown Publishers, USA.
7. Masters Gilbert. M, 'Introduction of Environmental Engineering and Science' Prentice – Hall India Pvt. Ltd., New Delhi 1998.
8. Pollution Prevention in the Electronics Industry – Developed by US.
9. Freeman m. Harry 'Industrial Pollution Prevention handbook' Mc Graw – Hill 1995.
10. Profitable Cleaner Production, Published by TANSTIA – ENF SERVICES CENTRE, Chennai.
11. Rao, M.N & Rao HV (1997) air Pollution, Tata Mc Graw – Hill, New Delhi.

## For V/VI Semesters in assigned mill

### INDUSTRIAL TRAINING PROGRAMME – IN WEAVING

The student should undergo training in an Industry. Some recommended areas of work are as follows :

#### Preparatory to Weaving :

##### 1. Warp Winding.

1. Learn the work of winder on warp winding machine.
  2. Learn feeding, knotting and doffing.
  3. Study the mechanisms of stop motions.
  4. Learn maintenance of cone and cheese winding machines.
  5. Learn about settings of tensioners yarn clearers.

6. Calculate production and efficiency.
7. Attend the repairs along the fitter.

**2. Pirn Winding (Weft winding).**

1. Learn the feeding of material for preparing pirns.
2. Learn the knotting and various jobs of pirn winder.
3. Study the operations of various automation devices and identify problems and scope for improvement.
4. Learn the operation of unifil loom winder.
5. Learn about bobbin loader and its operations.
6. Learn about gear plan, speeds, settings adjustments and energy management.
7. Attend repairs of pirn winder machines along the fitter.

**3. Warping.**

1. Learn the arrangement of creels.
2. Learn the jobs of warper on warping machine.
3. Study the operations of various stop motions, length indicator, beam lowering, lifting motion anti vibration devices.
4. Learn the warping methods of sectional warping and various jobs of warper in sectional warping.
5. Calculate the production and efficiency of warping machines.
6. Learn about warping machines maintenance and prepare maintenance schedule.
7. Attend repairs along the fitters.

**4. Sizing.**

1. Learn the methods of preparing sizing paste, note down the recipes and ingredients.
2. Learn the jobs of sizing machine.
3. Study the settings adjustments of sizing machinery.
4. Study the operations of various parts in a slasher sizing machine which is in your mill.
5. Learn the arrangement of creels for various sizing machines.
6. Study the operations of various automation devices in slashers like measuring and marking motion beam pressing motion etc.
7. Study the method of slasher driving arrangement and P.I.V. drive gear.
8. Study the importance of various controls in sizing machines related to temperature size level, moisture, stretch and tension in sizing machine of your mill.

9. Collect the data on modern equipment in sizing section, prepare feasibility for modernisation.
10. Learn about high pressure squeeze system and splitting.
11. Identify the problems in sizing process suggest the remedies.
12. Attend the repairs accompanying fitters.
13. Calculate size pick up %, Production and efficiency of sizing machinery.

**5. Looming.**

1. Learn the work of drawing – in.
2. Learn the work of denting.
3. Learn the work of knotting.
4. Study the operations and efficiency of automatic reaching in machine.
5. Study the functions of Healds and Reed.

**6. Primary Motions**

**a. Sheeding.**

1. Understand the mechanisms of shedding and note down the timings and settings.
2. Learn the mechanism of shedding motion.
3. Learn the mechanism of various positive and negative dobbies.
4. Give the settings of Keighly dobbies.
5. Understand the mechanism of various dobby available in mill.
6. Know about the types of Jacquard.
7. Understand the mechanism of SLSC, SLDC, DLSC and DLDC Jacquard.
8. Learn the work of jacquard harness and card cutting.
9. Learn the mechanism and settings of Jacquards available in mill.
10. Write the observations of various problems related to shedding suggest remedies.

**b. Picking.**

1. Learn the mechanism, setting and repairs of picking.
2. Understand the details of picking timing.
3. Understand the various mechanism related to multiple box motions available in mill.
4. Learn the settings of weft pattern chains, Eccle's Drop Box Motion, Zang Box Motion and Zang Pick-at-will Motion.

**c. Beat-Up.**

1. Learn the mechanism and settings of Beat-up motion of loom available in mill.

2. Understand the mechanism modification among the different looms in your mill.
3. Attend the repairs related to various primary motions.

**7. Secondary motions in Looms.**

**a. Let – Off Motion.**

1. Understand various types of let-off mechanisms.
2. Learn the mechanism, timing and note the settings available in mill.
3. Note down the difference between let-off motions available in mill.
4. Comprehend the mechanism of positive let-off motion in automatic looms.
5. Attend the repairs and know the problems related to let-off motion.
6. List out the common problems related to let-off motion and suggest remedies.

**b. Take – Up Motion.**

1. Identify the types of take-up motion in various looms of your mill.
2. Learn the mechanism, timings, settings and differences of take-up motions available in mill.
3. Know about the mechanism of slip catch with fulcrummed holder and slip catch with heavy end.
4. Attend the repairs related to take-up motions along with fitter.
5. Identify the common problems related to take-up motion, suggest remedies.

**8. Auxiliary Motions.**

**a. Warp Protectors.**

1. Identify various warp protector devices used in various looms. Note down their utility.
2. Understand the difference between loose reed motion and fast reed motion.
3. Note the difference in fast reed motion when compared to loose reed motion.
4. Learn the mechanism, settings and timings of fast reed motion and its brake.
5. Attend the repairs of various warp protecting devices with the maintenance staff.
6. List out the common problems related to warp protectors suggest remedies

7. Give the details of modern warp protecting devices in various shuttleless looms

**b. Weft Stop Motions.**

1. Identify the parts of loom related to various weft stop motions.
2. Learn the mechanism, settings and differences of different weft fork motion available in mill.
3. Understand the working of Brake Lever mechanism in conjunction with side weft Fork Motion
4. Observe the development of various weft stop motion devices used in various automatic and shuttleless looms.
5. Attend the repairs of loom related to weft stop motion with maintenance staff of your mill.
6. Note down the common problems related to various weft stop motions and suggest remedies.

**c. Back rest, lease rods and temples.**

1. Learn the settings and adjustments in the arrangement of back rest and lease rods for effective weaving.
2. Identify various types of temples used in different types of looms.
3. Learn the settings of temples in various looms.
4. Identify various Auxiliary devices used in shuttleless looms for quality weaving.

**9. Rules of Looms operation and maintenance.**

1. Note down the loom maintenance schedules of your unit and try to practice the effective preventive maintenance.
2. Record important loom repairs you have attended and how the repairs were done.
3. Give the details of productive and labour standards for various looms as per norms recommended by BITRA, ATIRA, NITRA & SITRA.

**10. Quality Control.**

1. Identify the defects on Fabric produced by different type of looms in a chart of kind of fault – Size of fault – Group of fabrics.
2. Give the evaluation of Fabrics according to conformity of Physical and Mechanical properties to standards.
3. Know the different instruments used and their working in quality control lab and evaluate results with BIS & ISO standard.
4. Know the preparation of different quality control charts in Q.C.D.

**11. Fancy Weaving Mechanisms.**

**In your unit if you are having these type of looms know about.**

1. Learn the mechanism of lappet weaving and lappet designing.
2. Learn the mechanism of swivel weaving swivel designing and know about swivel shuttle propulsion.
3. Learn the mechanism, designing and settings for Madras Muslin Designing.
4. Know about the features of Terry loom.
5. Learns the mechanisms and settings of Cam Driven three Pick Terry mechanism, dobby controlled terry mechanism, heading motion and fringing motion.

**12. Energy Management.**

**13. Safety Management.**

**14. ISO 9000 Certification Work.**

**15. Environmental Studies.**

15.1 Study the Air Pollution control methods and equipment.

- Cleaning of gaseous effluents, particulate matter emission control, cyclones settling chambers, electrostatic precipitators, scrubbers etc.
- Control of gaseous emissions.

15.2 Study the cost concepts and issues in Environmental protection.

- Pollution prevention costs, pollution costs, waste disposal cost, total damage costs and total costs of pollution control.
- Optimum pollution, marginal costs of control, benefits from controlling pollution, total and marginal benefits from pollution control.
- Efficiency in pollution control, efficient level of pollution efficient level of environmental quality, variation of these costs with environmental quality, limitations of cost benefit analysis.

15.3 Study the concepts of Environmental Management.

- Environmental Impact Assessment (EIA) : terminology and its objectives.
- Environmental Audit (EA) : definition, objectives, benefits, general anatomy of Rule 14 of environmental (protection) act



1986, parts of statutory environmental audit report (A to I) and its significance.

- Environmental law 1986 : scope, terms and components
- fundamental right to life, public interest litigation (PIL), duties of citizens and governments.

15.4 Understand the importance of cleaner production.

- Definitions, concept, benefits.
- Factors contributing to cleaner production.
- Case Studies.

**Note :** References to study the concepts of environmental studies given in Spinning Training Programme.

### **TEXTILE CHEMICAL PROCESSING**

If Student opts a Chemical Processing unit for inplant training for V or VI Semester for each semesters the areas in which he has to get training and prepare a Report.

1. Brushing and Shearing.
2. Singeing : Fabric and yarn Singeing.
3. Designing : Variue Desizing Chemical – Machines used – Production details.
4. Scouring : Working of Kiers – Chemicals used – Efficiency – Production and Quality features.
5. Bleaching : Batch wise Bleaching continuous Bleaching – Machines used their working, settings and mechanisms.  
Chemicals used – Hypochlorities – Peroxides – Quality and Production details.
6. Mercerising : Fibre, Yarn and Fabric Mercerising – Working of mercerizing machine lines – Mechanisms – Settings – Repairs – Quality and Production details.

7. Dyeing Machines : Various Dyeing machines used for Fibre, Yarn and Fabric Dyeing – their working – Control mechanisms – Developments – Production details and quality control settings suggesting and quality control settings suggesting remedies for frequent repairs and break downs.
8. Dyeing Process.
  - a. Know the various dyes used for various fabrics and preparation of recipe for above in your mill.
  - b. Dyeing defects and remedies.
  - c. Learning about Computer colour matching if available in your dye house.
9. Printing.
  - a. Working and mechanisms of various printing methods like roller – Multi roller – Screen – Rotary screen and other modern printing machines – Flow of material – control mechanisms – Quality control – Production details.
  - b. Learn about preparing pastes for various styles of Printing like Direct, discharge, Resist for mono and multi colour prints.
  - c. Learn the method of Transfer Printing preparation of Material – Stencil – Printing and after Treatment.
  - d. Give the recipes for Natural dyes revival in dyeing and printing process.
  - e. Attend the maintenance and repair works of dyeing and printing machinery.
10. Finishing.
  - a. Learn different finishings applied for different fabrics in your processing unit.
  - b. Learn the operations involve in various finishing machines and their maintenance.
  - c. Note down various chemicals and auxiliaries used in finishing and record recipe.

11. Pollution Control and effluent Treatment.
  - a. Understand the working and operations of various pollution control devices used in your process house.
  - b. Note down the efficiency and working of various effluent treatment plants installed in your process house.
  - c. Understand the working of various Re-cycling units for various solvents used in process house.
  - d. Give the details of guide lines followed to obtain ISO 9000 certification to your process house.
  
12. Energy Management.
13. Safety Norms.
14. Quality Control.
15. Environmental Studies.
  - 15.1 Study the Air Pollution control methods and equipment.
    - Cleaning of gaseous effluents, particulate matter emission control, cyclones settling chambers, electrostatic precipitators, scrubbers etc.
    - Control of gaseous emissions.
  - 15.2 Study the cost concepts and issues in Environmental protection.
    - Pollution prevention costs, pollution costs, waste disposal cost, total damage costs and total costs of pollution control.
    - Optimum pollution, marginal costs of control, benefits from controlling pollution, total and marginal benefits from pollution control.
    - Efficiency in pollution control, efficient level of pollution efficient level of environmental quality, variation of these costs with environmental quality, limitations of cost benefit analysis.
  - 15.3 Study the concepts of Environmental Management.
    - Environmental Impact Assessment (EIA) : terminology and its objectives.
    - Environmental Audit (EA) : definition, objectives, benefits, general anatomy of Rule 14 of environmental (protection) act

1986, parts of statutory environmental audit report (A to I) and its significance.

- Environmental law 1986 : scope, terms and components
- fundamental right to life, public interest litigation (PIL), duties of citizens and governments.

15.4 Understand the importance of cleaner production.

- Definitions, concept, benefits.
- Factors contributing to cleaner production.
- Case Studies.

**Note :** References to study the concepts of environmental studies given in Spinning Training Programme.

## **IN PLANT TRAINING**

### **For V/VI Semester in allotted industry**

#### IN MISCELLANEOUS TEXTILE INDUSTRIES.

If Students opts for Miscellaneous Textile Industries like Garment Manufacturing or Knitting and Non-Wovens the areas in which he has to work in each semester are as follows :

1. Learning the operations and working of various machines used in a Garment production unit or knitting or non-wovens.
2. Knowing production details.
3. Maintenance and Repairs.
4. Process control – Flow line details settings.
5. Working in inspection room – Identifying defects in out put – Suggesting remedies.
6. Knowing the details of Labour Organisation – Unit Management – Cost control and Energy Audit.
7. Textile Marketing and Merchandising Strategies, like retail, chain stores and campaigns – Theme and scope – Textile Expo's – Participations.
8. Exporting Documentation – Logistics of Material Transportation – Forex Regulations and procedures.
9. Scope for up gradation of Technology.
10. ISO 9000 Certification Procedures.

11. Energy Management.

12. Safety Norms.

13. Export and Import Policies.

14. Environmental Studies.

14.1 Study the Air Pollution control methods and equipment.

- Cleaning of gaseous effluents, particulate matter emission control, cyclones settling chambers, electrostatic precipitators, scrubbers etc.
- Control of gaseous emissions.

14.2 Study the cost concepts and issues in Environmental protection.

- Pollution prevention costs, pollution costs, waste disposal cost, total damage costs and total costs of pollution control.
- Optimum pollution, marginal costs of control, benefits from controlling pollution, total and marginal benefits from pollution control.
- Efficiency in pollution control, efficient level of pollution efficient level of environmental quality, variation of these costs with environmental quality, limitations of cost benefit analysis.

14.3 Study the concepts of Environmental Management.

- Environmental Impact Assessment (EIA) : terminology and its objectives.
- Environmental Audit (EA) : definition, objectives, benefits, general anatomy of Rule 14 of environmental (protection) act 1986, parts of statutory environmental audit report (A to I) and its significance.
- Environmental law 1986 : scope, terms and components fundamental right to life, public interest litigation (PIL), duties of citizens and governments.

14.4 Understand the importance of cleaner production.

- Definitions, concept, benefits.
- Factors contributing to cleaner production.
- Case Studies.

**Note :** References to study the concepts of environmental studies given in Spinning Training Programme.

**C-16-VI SEMESTER**  
**SCHEME OF INSTRUCTION AND EXAMINATION**  
**TT-601-INDUSTRIAL TRAINING**

S No	Subject	Duration	Scheme of Examination		
			Nature	Item	Max. Marks
1.	Industrial training in a Textile Industry or allied Industry	6 Months	Viva Voce & Log book	<u>At the Industry</u>	100
				1) First Assessment (At the end of 3 <sup>rd</sup> month)	
				2) Second Assessment (At the end of 6 <sup>th</sup> month )	100
				<u>At the Institution</u>	
				4 ) Log Book	30
				5) Training Report	30
			6) Seminar on training	40	
	Total for V semester				300

1.The Industrial training shall carry 300 marks and pass marks is 50%. A candidate failing to secure the minimum marks should complete it at his own expenses.

2. During Industrial training the candidate shall put a minimum of 90% attendance.

# **VII SEMESTER**

**DIPLOMA IN TEXTILE TECHNOLOGY  
SCHEME OF INSTRUCTIONS AND EXAMINATIONS**

**(VII SEMESTER)  
TIME SCHEDULE**

Subject Code	Name of the Subject	Instruction period / week		Total Period / sem	Scheme of Examination			
		Theory	Practical/ Tutorial		Duration (hours)	Sessional Marks	End Exam Marks	Total Marks
<b>THEORY:</b>								
TT-701	Textile Mill Management & Smart Technologies	5	-	75	3	20	80	100
TT-702	Fabric Structure & Design	4	-	60	3	20	80	100
TT-703	Advanced yarn manufacture&	6	-	90	3	20	80	100
TT-704	Advanced Fabric Manufacture	5	-	75	3	20	80	100
TT-705	Textile Testing & Quality Control– II	4	-	60	3	20	80	100
<b>PRACTICAL:</b>								
TT-706	Textile CAD	-	6	90	3	40	60	100
TT-707	Fabric Analysis Lab	-	3	45	3	40	60	100
TT-708	Life Skills	-	3	45	3	40	60	100
TT-709	Textile Testing Lab – II	-	6	90	3	40	60	100
<b>TOTAL</b>		24	18	630		260	640	900

Note: In Subject code :TT-701, Smart technologies topic is introduced for 20 periods. In this topic one essay question and one short answer question can be given



## TEXTILE MILL MANAGEMENT & SMART TECHNOLOGIES

**Subject Title** : Textile Mill Management & Smart Technologies

**Subject Code** : TT-701

**Periods/Week** : 5

**Period/Semester** : 75

### TIME SCHEDULE

S. No.	Major Topics	Periods	Weightage Of Marks	Short Answer Questions	Essay Type Questions
1.	Basics of Industrial Management	07	8	1	1/2
2.	Organisation structure & Organisational behaviour	12	16	2	1
3.	Production Management	09	13	1	1
4.	Materials Management	04	3	1	-
5	Marketing, Sales & Feasibility study	06	10	-	1
6	Maintenance management & Industrial Safety	09	13	1	1
7	Industrial Legislation	07	10		1
8	Entrepreneurship Development	06	8	1	1/2
9	New Trends in Management	10	13	1	1
10	Smart technologies	20	16	2	1
	Total	<b>90</b>	<b>110</b>	<b>10</b>	<b>08</b>

## **1. Basics of Industrial Management**

*On completion of the course the student will be able to*

### **1.0 Understand the principles of management as applied to industry.**

- 1.1 Define industry, commerce (Trade) and business.
- 1.2 Know the need for management.
- 1.3 Understand the evolution of management
- 1.4 Understand functions of Management.
- 1.5 Explain the principles of scientific management.
- 1.6 Explain the principles of management.
- 1.7 Differentiate between management and administration.
- 1.8 Understand the nature of management as a profession
- 1.9 Differentiate between supervisory, middle and Top level management
- 1.10 Explain the importance of managerial skills (Technical, Human, Conceptual)

## **2. Organisation Structure & organisational behaviour**

*Know types of ownerships, the organisation structure of an industry and the behaviour of an individual in an organisation.*

- 2.1 Understand the philosophy and need of organisation structure of an industry.
- 2.2 Understand the line, staff and Functional organisations
- 2.3 Understand the Authority and Responsibility Relationships
- 2.4 Understand the differences between Delegation and decentralization
- 2.5 Explain the factors of effective organisation.
- 2.6 State motivation theories.
- 2.7 State Maslow's Hierarchy of needs.
- 2.8 List out different leadership models.
- 2.9 Explain the trait theory of leadership.
- 2.10 Explain behavioural theory of Leadership.
- 2.11 Explain the process of decision making.
- 2.12 Assessing Human resource requirements
- 2.13 Know the concept of Job analysis, Job description and specifications
- 2.14 Understand the process of recruitment, selection, training and development
- 2.15 Understand types of business ownerships
- 2.16 Differentiate between the business ownerships
- 2.17 Know the objectives of Employee participation
- 2.18 Understand the meaning and definition social responsibilities
- 2.19 Corporate social responsibility
- 2.20 Communication
  - 2.20.1 Define communication and State the importance
  - 2.20.2 Mention the characteristics of communication
  - 2.20.3 List the types of communication
  - 2.20.4 Mention the barriers in communication
  - 2.20.5 State the principles of effective Communications
- 2.21 Explain the methods, evaluation and advantages of Employee Training
- 2.22 Identify characteristics of effective supervision

### **3. Production management**

*Understand the different aspects of production management.*

- 3.1 Identify the factors of Plant Location
- 3.2 Know the objectives of plant Layout
- 3.3 Understand the principles of plant Layouts
- 3.4 Explain the types of plant Layouts
- 3.5 Relate the production department with other departments.
- 3.6 State the need for planning and its advantages.
- 3.7 Explain the stages of Production, planning and control.
- 3.8 Know the basic methods demand forecasting
- 3.9 Explain routing methods.
- 3.10 Explain scheduling methods.
- 3.11 Explain dispatching.
- 3.12 Explain Break Even Analysis
- 3.13 Define supply chain Management, competitive strategy, Supply chain strategy
- 3.14 Draw PERT/CPM networks.
- 3.15 Identify the critical path

### **4. Materials Management**

*Understand the role of materials management industries.*

- 4.1 Explain the importance of materials management in Industry.
- 4.2 Know Functions of Materials Management
- 4.3 Derive expression for inventory control.
- 4.4 Explain ABC analysis.
- 4.5 Define safety stock.
- 4.6 Define reorder level.
- 4.7 Derive an expression for economic ordering quantity.
- 4.8 Know the functions of Stores Management.
- 4.9 Explain types of store layouts.
- 4.10 List out stores records.
- 4.11 Explain the Bin card.
- 4.12 Describe Cardex method.
- 4.13 Explain general purchasing procedures
- 4.14 Explain tendering, E-tendering and E-procurement procedures
- 4.15 List out purchase records.

### **5. Understand Marketing, Sales and Feasibility study**

- 5.1 Define the terms marketing and selling
- 5.2 State the difference between Sellers's market and buyer's market
- 5.3 Explain different functions of marketing
- 5.4 List various factors of deciding the price
- 5.5 Explain different pricing policies
- 5.6 Explain different types of marketing strategies
- 5.7 List the types of market conditions.
- 5.8 Define - monopoly, oligopoly and Perfect competition.
- 5.9 Explain different elements of cost
- 5.10 List direct and indirect expenses of cost element
- 5.11 Identify the input materials, i.e. Bill of materials
- 5.12 Explain Break even analysis
- 5.13 Solve the problems on break even analysis

- 5.14 Explain the favourable factors for establishing following sectors of textile mill – Spinning, Weaving, Chemical Processing, Knitting and Garment manufacturing
- 5.15 Role of advertising, media of advertising and selection of media

## **6. Maintenance Management & Industrial Safety**

### **Comprehend the Importance of Maintenance Management & Safety procedures**

- 6.1 Explain the importance of maintenance management in Industry.
- 6.2 Know the Objectives of maintenance management
- 6.3 Know the activities of maintenance management
- 6.4 Understand the importance of Preventive maintenance
- 6.5 Understand the need for scheduled maintenance
- 6.6 Differentiate between scheduled and preventive maintenance
- 6.7 Know the principles of 5 s for good house keeping
- 6.8 Explain the importance of safety at Work place.
- 6.9 List out the important provisions related to safety.
- 6.10 Explain hazard and accident.
- 6.11 List out different hazards in the Industry.
- 6.12 Explain the causes of accidents.
- 6.13 Explain the direct and indirect cost of accidents.
- 6.14 Understand the types of emission from process Industries, their effects on environment and control

## **7. Understand Industrial Legislation In Textiles Mills**

### **7.1 Industrial legislation**

- 7.1.1 Define the term industrial legislation
- 7.1.2 State the causes of industrial disputes
- 7.1.3 Define Trade Union.
- 7.1.4 State the objects / functions of trade union
- 7.1.5 List the Merits and demerits of Trade unions.
- 7.1.6 State the importance of collective bargaining
- 7.1.7 Explain the rights and responsibilities of Employer and Employee
- 7.1.8 Explain the welfare measures adopted in Textile industry.

### **7.2 Acts**

- 7.2.1 Mention State the salient features of Indian Factories Act.
- 7.2.2 List the provisions of safety in Factories act
- 7.2.3 List out the salient features of Minimum Wages Act.
- 7.2.4 List out the salient features of Industrial Disputes Act.
- 7.2.5 List out the salient features of Workmen's Compensation Act
- 7.2.6 List out the salient features of E. S .I. Act.

## **8. Entrepreneurship Development.**

*Understand the role of entrepreneur in economic development and in improving the quality of life.*

- 8.1 Define the word entrepreneur.
- 8.2 Explain the requirements of an entrepreneur.

- 8.3 Determine the role of entrepreneurs in promoting Small Scale Industries.
- 8.4 Describe the details of self-employment schemes.
- 8.5 Characteristic of successful entrepreneurs
- 8.6 Explain the method of site selection.
- 8.7 List the financial assistance programmes.
- 8.8 List out the organisations that help an entrepreneur
- 8.9 Know the use of EDP Programmes
- 8.10 Understand the concept of make in India, Zero defect and zero effect
- 8.11 Understand the importance for startups
- 8.12 Explain the conduct of demand surveys
- 8.13 Explain the conduct of a market survey
- 8.14 Evaluate Economic and Technical factors.
- 8.15 Prepare feasibility report study

## 9. New Trends in Management:

*Understand the new concepts adopted in modern management*

- 9.1 Know the differences between data and information
- 9.2 Understand the information as a resource
- 9.3 Explain the use of Information technology in the organizational functions
- 9.4 Know the applications of RFID
- 9.5 Understand the applications of RFID in material management
- 9.6 Explain the concept of quality.
- 9.7 List the quality systems and elements of quality systems.
- 9.8 State the principles of quality Assurance.
- 9.9 Understand the basic concepts of TQM
- 9.10 Know the Pillars of TQM
- 9.11 List the evolution of ISO standards.
- 9.12 Explain ISO standards and ISO 9000 series of quality systems.
- 9.13 List the beneficiaries of ISO 9000.
- 9.14 Explain the concepts of ISO 14000
- 9.15 Know the overview of PDCA cycle

## 10. Smart Technologies

- 10.1 Get an overview of IoT (internet of things)
  - 10.1.1 Define the term IoT
  - 10.1.2 Know how IoT work
  - 10.1.3 List the key features of IoT
  - 10.1.4 List the components of IoT : hardware, software, technology and protocols
  - 10.1.5 List the advantages and disadvantages of IoT
- 10.2 IoT Applications
  - 10.2.1 Smart Cities
  - 10.2.2 Smart Energy and the Smart Grid
  - 10.2.3 Smart Transportation and Mobility
  - 10.2.4 Smart Home, Smart Buildings and Infrastructure
  - 10.2.5 Smart Factory and Smart Manufacturing
  - 10.2.6 Smart Health
  - 10.2.7 Food and Water Tracking and Security
  - 10.2.8 Social Networks and IoT

## **Course Content**

### **1. Basics of Industrial Management**

**Introduction:** Industry, Commerce and Business; Definition of management; Characteristics of management; Functions of management - Planning, Organizing, Staffing, Directing, Co-ordination, Controlling, Motivating, Communication, Decision Making; Principles of scientific management: – F.W.Taylor, Principles of Management: Henry Fayol; Administration and management; Nature of management; levels of management; managerial skills;

### **2. Organisation Structure & organisational behaviour**

Organizing - Process of Organizing; Line/Staff and functional Organizations, Decentralization and Delegation, Effective Organizing; Communication, Motivational Theories; Leadership Models; Human resources development; Forms of Business ownerships: Types – Sole proprietorship, Partnership, Joint Stock Companies, Cooperative types of Organizations; Employee participation in management; Corporate Social responsibility- Characteristics of effective supervision - Training;

### **3. Production management**

Definition and importance; Plant location and layout; Types of production -job, batch and mass; production Planning and Control: Demand forecasting, routing, scheduling, dispatching and follow up; Break even analysis; Supply chain Management; Project scheduling; Application of CPM and PERT techniques; simple numerical problems;

#### **4. Materials Management**

Materials in industry, Basic inventory control model, ABC Analysis, Safety stock, re-order level, Economic ordering quantity, Stores Management: Stores layout, stores equipment, Stores records, purchasing procedures, e-tendering, e-procurement; purchase records, Bin card, Cardex

#### **5. Marketing, Sales and Feasibility study**

Marketing and selling -Difference between Sellers's -market and buyer's market -Different functions of marketing -Various factors of deciding the price -Different pricing policies-Different types of marketing strategies -Types of market conditions- Monopoly, oligopoly and Perfect competition- Market and demand surveys-Different elements of cost -Direct and indirect expenses of cost element -Identify the input materials, i.e. Bill of materials- Break even analysis-Solve the problems on break even analysis -Explain the favourable factors for establishing following sectors of textile mill – Spinning, Weaving, Chemical Processing, Knitting and Garment manufacturing -Role of advertising, media of advertising and selection of media.

#### **6. Maintenance Management & Industrial Safety**

Objectives and importance of plant maintenance, Different types of maintenance, Nature of maintenance problems, Range of maintenance activities, Schedules of preventive maintenance, Advantages of preventive maintenance, 5 S principles; Importance of Safety at work places; Causes of accidents-psychological, physiological and other industrial hazards; Domino sequence; methods of promoting safe practices; Pollution control in process industries;

**7. Industrial Legislation In Textiles Mills**

Industrial legislation -Term industrial legislation -Causes of industrial disputes -Trade Union.-Objects / -functions of trade union--Merits and demerits of Trade unions-Importance of collective bargaining -Rights and responsibilities of Employer and Employee-Welfare measures adopted in Textile industry-Acts-Salient features of Indian Factories Act-Salient features of Minimum Wages Act-Salient features of Industrial Disputes Act.-Salient features of Workmen's Compensation Act -List out the salient features of E. S .I. Act.

**8. Entrepreneurship Development.**

Definition of Entrepreneur; Role of Entrepreneur; Concept of Make In India, ZERO defect, Zero Effect, Concept of Start-up Company, Entrepreneurial Development: Role of SSI, MSME, DICs, Entrepreneurial development schemes; Institutional support, financial assistance programmes; Market survey and Demand survey; Preparation of Feasibility study reports

**9. New Trends in Management:**

Introduction to Management Information System (MIS); RFID application in materials management; Total Quality Management (TQM)- Concept of quality discussed by B. Crosby W. Edward, Deming, Joseph M. Juran, Kooru Ishikawa, Genichi Taguchi, Shigco Shingo. Quality systems – Definitions of the terms used in quality systems like, quality policy, quality management, quality systems, Stages of development of ISO 9000 series , ISO-14000, Deming's PDCA Cycle (Plan, Do, Check and Action). Japanese Quality Management, culture, Kaizen Strategy (continuous improvement).



## 10. Smart Technologies :

Overview of IoT - Define IoT, how IoT work, key features of IoT, components of IoT : hardware, software, technology and protocols, advantages and disadvantages of IoT - IoT Applications - Smart Cities, Smart Energy and the Smart Grid, Smart Transportation and Mobility, Smart Home, Smart Buildings and Infrastructure, Smart Factory and Smart Manufacturing, Smart Health, Food and Water Tracking and Security, Participatory Sensing, Social Networks and IoT.

### REFERENCE BOOKS

1. Industrial Engineering and Management -by O.P Khanna
2. Production Management- by Buffa.
3. Engineering Economics and Management Science - by Banga & Sharma.
4. Personnel Management by Flippo.
5. Production and Operations Management –S.N. Chary
6. [Converging\\_Technologies\\_for\\_Smart\\_Environments\\_and\\_Integrated\\_Ecosystems\\_I](#)  
[ERC\\_Book\\_Open\\_Access\\_2013](#) pages-54-76

## FABRIC STRUCTURE AND DESIGN

<b>Subject Title</b>	<b>:</b>	<b>FABRIC STRUCTURE AND DESIGN</b>
<b>Subject Code</b>	<b>:</b>	<b>TT -702</b>
<b>Periods per week</b>	<b>:</b>	<b>04</b>
<b>Periods per semester</b>	<b>:</b>	<b>60</b>

### TIME SCHEDULE

S.No.	Major Topics	Periods	Weightage Of marks	Short type	Essay Type
1	Introduction Fabric structure & Design	7	13	1	1
2	Plain weave & its derivatives	7	13	1	1
3	Twill weave and its derivatives	7	13	1	1
4	Compound weaves	7	13	1	1
5	Bedford cords and Welts & Piques	7	13	1	1
6	Extra thread and Backed cloths	7	13	1	1
7	Double clothes	7	13	1	1
8	Pile Fabrics	7	13	1	1
9	Some Commercial fabrics	4	6	2	
	<b>Total</b>	60	110	10	8

### **OBJECTIVES**

**Upon completion of the course student shall be able to**

#### **1.0 Understand the basics of Fabric Structure and Analysis**

- 1.1 Mention the characterizing elements of woven fabric
- 1.2 Explain the elements of woven fabric which characterize the fabric
- 1.3 Define basic terms - Design, draft, denting plan and lifting plan
- 1.4 Show the method of weave representation on a plain paper
- 1.5 Classify the weaves of woven fabric structure
- 1.6 Explain different types of drafts by using simple designs
- 1.7 State the general principle of constructing draft
- 1.8 State the importance of reed selection in weaving
- 1.9 Mention different approaches to ornamentation of fabrics
- 2.0 Explain different methods of ornamenting fabrics

#### **2 Understand Plain weave and its derivatives**

- 2.1 Draw Design, draft and lifting plan of plain weave.
- 2.2 List the characteristics of plain weave
- 2.3 Mention different ways of ornamenting plain weave without modifying weave
- 2.4 Explain construction, weaving arrangement, typical quality particulars, characteristics and applications of
  - 2.4.1 Warp Rib weaves.
  - 2.4.2 Weft Rib weaves.
  - 2.4.3 Matt weaves.
- 2.5 State the construction particulars and characteristics of Poplin and Repp fabrics
- 2.6 Give detailed classification of plain cloths based on construction, weight, threads set, weave, cover factor
- 2.7 Mention the quality particulars, characteristics and end use products of
  - 2.7.1 Approximately square plain cloth
  - 2.7.2 Warp faced plain cloth
  - 2.7.3 Weft faced plain cloth
  - 2.7.4 Voile fabrics

### **3 Understand Twill , Satin and Sateen weaves**

- 3.1 State the characteristics of twill weaves
- 3.2 Give the classification of twill weaves
- 3.3 Mention the end use products of twill weaves
- 3.4 Construct the design, draft and lifting plan for following continuous twills
  - 3.4.1 Weft faced
  - 3.4.2 Warp faced
  - 3.4.3 Balanced
- 3.5 Define the angle of twill and Direction of twill.
- 3.6 State the factors that determine the prominence of twill weaves
- 3.7 Explain the constructional procedure of following Modifications of twill weaves
  - 3.7.1 Re arranged twills
  - 3.7.2 Transposed twills
  - 3.7.3 Combined twills
  - 3.7.4 Steep and flat twills
  - 3.7.5 Pointed / wavy / zig zag twills
  - 3.7.6 Diamonds and diapers twills
  - 3.7.7 Broken twills.
  - 3.7.8 Skip twills
  - 3.7.9 Herringbone twills.
- 3.8 Explain the twist and twill interaction on appearance of fabric.
- 3.9 Explain the construction of weft sateen weaves
- 3.10 Explain the construction of warp satin weaves

### **4 Understand Compound Weaves**

- 4.1 Explain the stages of construction, characteristics, quality particulars and end use products of following weaves
  - 4.1.1 Honey comb
  - 4.1.2 Brighton honey comb
  - 4.1.3 Huck – a- back
  - 4.1.4 Mock leno
- 4.2 State the difference between ordinary honeycomb and Brighton hone comb
- 4.3 Explain the stages of construction, characteristics, typical quality particulars and end use products of crepe weaves based on
  - 4.3.1 Sateen base
  - 4.3.2 Reversing small motif
  - 4.3.3 By superimposing
  - 4.3.4 Combining float weave with plain weave
- 4.4 List different methods of producing crepe surface

### **5 Understand Bedford cords , Welts and Piques**

- 5.1 Bedford cords
  - 5.1.1 Scope / end uses of Bedford cords
  - 5.1.2 Classification of Bedford cords
  - 5.1.3 Standard quality particulars of bed ford cords
  - 5.1.4 Explain the construction, weaving arrangement and loom equipment needed for
    - 5.1.4.1 Simple Bedford cords (Plain and Twill)
    - 5.1.4.2 Wadded Bedford cords (Plain and twill)
- 5.2 Welts and Piques
  - 5.2.1 Mention the Scope / end uses of Welts and Piques
  - 5.2.2 Give the Classification of Welts and Piques
  - 5.2.3 State the Standard quality particulars of Welts and Piques

- 5.2.4 Explain the Construction, weaving arrangement and loom equipments needed for
  - 5.2.4.1 Simple Piques
  - 5.2.4.2 Wadded Piques
- 5.2.5 Explain the differences between Bedford cords and Piques

## **6 Understand Extra Thread figuring and Backed fabrics**

- 6.1 Mention different methods of increasing weight of fabrics
- 6.2 Explain different methods of increasing weight of fabrics
- 6.3 Extra thread figuring
  - 6.3.1 State the principle of extra thread figuring
  - 6.3.2 Mention different methods of producing extra thread fabrics
  - 6.3.3 Mention the loom equipments needed for extra thread fabrics
  - 6.3.4 Mention different methods of disposing surplus extra threads
  - 6.3.5 Explain the constructional details, standard quality particulars and end use products of extra warp figured fabrics
  - 6.3.6 Explain the constructional details, standard quality particulars and end use products of extra weft figured fabrics
  - 6.3.7 Explain the differences between extra warp and extra weft figuring
- 6.4 Backed fabrics
  - 6.4.1 Explain the steps in construction of warp backed fabrics
  - 6.4.2 State the advantages and disadvantages of warp backed fabrics
  - 6.4.3 Explain the steps in construction of weft backed fabrics
  - 6.4.4 Explain the differences between warp backed and weft backed cloths
- 6.5 Explain the differences between backed fabrics and extra thread figured fabrics

## **7 Understand Double cloths**

- 7.1 Give the classification of double cloths.
- 7.2 Explain the principles of producing different classes of double cloths
- 7.3 Mention the criteria for selection of face and back threads
- 7.4 Explain the method of construction of simple or self stitched double cloths
- 7.5 Explain the method of construction of centre stitched double cloths
- 7.6 Explain the method of construction of wadded double cloths
- 7.7 Explain the method of construction of inter changeable double cloths
- 7.8 Explain the differences between backed fabrics and double cloths
- 7.9 State the applications of double cloths

## **8 Understand Pile fabrics**

- 8.1 State the characteristics of pile fabrics
- 8.2 Give the classification of pile fabrics
- 8.3 Warp pile (Terry) fabrics
  - 8.3.1 Define terry pile fabric
  - 8.3.2 Mention different approaches to production of terry pile fabrics
  - 8.3.3 Explain the method of producing terry fabric by using terry motion on a loom
  - 8.3.4 Explain the different stages in technology of terry towel production
  - 8.3.5 Classify terry towels
  - 8.3.6 Mention the fibers suitable for terry towels
  - 8.3.7 State the characteristics of different yarns used in terry towels
  - 8.3.8 Mention the post weaving operations of terry towels
  - 8.3.9 State the characteristics of terry towel fabrics
- 8.4 Weft pile fabrics (Velveteens)
  - 8.4.1 Mention the types of velveteens
  - 8.4.2 Explain the steps involved in construction of All over or plain velveteens
  - 8.4.3 State the factors that determine the length and density of pile in velveteen

- 8.4.4 State the characteristics, quality particulars and end uses of
  - 8.4.4.1 Plain velveteens
  - 8.4.4.2 Weft plushes
  - 8.4.4.3 Corded velveteens

## **9 Understand Some Commercial Fabrics**

Mention the quality particulars and characteristics of following fabrics of commercial use - Jean / Denim, Drill, Duck, Gabardine, Blankets, Bag cloth, Blazer cloth, Casement, Chiffon, Chine, Corduroy, Cotton georgette, cotton suiting, Crepe fabric, Damask, Dhooties, Long cloth, Muslin, Poplin, Quilts, Voile, Zephyr fabric, Rugs, Shirting,

## **COURSE CONTENT**

### **1.0 Basics of Fabric Structure and Analysis**

Characterizing elements of woven fabric -elements of woven fabric which characterize the fabric -basic terms - Design, draft, denting plan and lifting plan- method of weave representation on a plain paper -Classification of the weaves of woven fabric structure -different types of drafts by using simple designs-general principle of constructing draft -importance of reed selection in weaving-different approaches to ornamentation of fabrics-different methods of ornamenting fabrics

### **2.0 Plain weave and its derivatives**

Design, draft and lifting plan of plain weave.-characteristics of plain weave -different ways of ornamenting plain weave without modifying weave -construction, weaving arrangement, typical quality particulars, characteristics and -applications of Warp Rib weaves.-Weft Rib weaves.-Matt weaves.-construction particulars and characteristics of Poplin and Repp fabrics-detailed classification of plain cloths based on construction, weight, threads set, weave, cover factor--quality particulars, characteristics and end use products of -Approximately square plain cloth -Warp faced plain cloth -Weft faced plain cloth -Voile fabrics

### **3.0 Twill , Satin and Sateen weaves**

Characteristics of twill weaves -classification of twill weaves -end use products of twill weaves -Construction of the design, draft and lifting plan for following continuous twills -Weft faced-Warp faced -Balanced -angle of twill and Direction of twill.-factors that determine the prominence of twill weaves-constructional --procedure of following Modifications of twill weaves -Re arranged twills -Transposed twills--Combined twills -Steep and flat twills -Pointed / wavy / zig zag twills -Diamonds and diapers -twills - Broken twills.-Skip twills -Herringbone twills.-twill and twill interaction on appearance of fabric.-construction of weft sateen weaves -construction of warp satin weaves

### **4.0 Compound Weaves**

Stages of construction, characteristics, quality particulars and end use -roducts of following weaves -Honey comb -Brighton honey comb -Huck – a- back-Mock leno - difference between ordinary honeycomb and Brighton hone comb -stages of construction, -haracteristics, typical quality particulars and end use products of crepe weaves based on -Sateen base-Reversing small motif -By superimposing - Combining float weave with plain weave--methods of producing crepe surface

### **5.0 Bedford cords , Welts and Piques**

Bedford cords -Scope / end uses of Bedford cords -Classification of Bedford cords-Standard quality particulars of bed ford cords -construction, weaving arrangement and loom equipment needed for -Simple Bedford cords (Plain and Twill)-Wadded Bedford cords (Plain and twill)-Welts and Piques -Scope / end uses of Welts and Piques -Classification of Welts and Piques-Standard quality particulars of Welts and Piques-Construction, weaving arrangement and loom equipments needed for -- Simple Piques-Wadded Piques-differences between Bedford cords and Piques

### **6.0 Extra Thread figuring and Backed fabrics**

Different methods of increasing weight of fabrics -different methods of increasing weight of fabrics-Extra thread figuring -principle of extra thread figuring -different methods of producing extra thread fabrics-the loom equipments needed for extra thread fabrics -different methods of disposing surplus extra threads -constructional details, standard quality particulars and end use products of extra warp figured fabrics-constructional details, standard quality particulars and end use products of extra weft figured fabrics-differences between extra warp and extra weft figuring -

Backed fabrics -steps in construction of warp backed fabrics-State the advantages and disadvantages of warp backed fabrics-steps in construction of weft backed fabrics -differences between warp backed and weft backed cloths-differences between backed fabrics and extra thread figured fabrics

### **7.0 Double cloths**

Classification of double cloths.-principles of producing different classes of double cloths -criteria for selection of face and back threads -method of construction of simple -self stitched double cloths--method of construction of centre stitched double cloths -method of construction of wadded double cloths -method of construction of inter changeable double cloths -differences between backed fabrics and double cloths -applications of double cloths

### **8.0 Pile fabrics**

Characteristics of pile fabrics -classification of pile fabrics -Warp pile (Terry) fabrics- Definition of terry pile fabric-different approaches to production of terry pile fabrics - method of producing terry fabric by using terry motion on a loom -different stages in technology -f terry towel production -Classification of terry towels -fibers suitable for terry towels -characteristics of different yarns used in terry towels-post weaving operations of terry towels-characteristics of terry towel fabrics --Weft pile fabrics (Velveteens) -types of velveteens-steps involved in construction of All over or plain velveteens-factors that determine the length and density of pile in velveteen-characteristics, quality particulars and end uses of -Plain velveteens -Weft plushes - Corded velveteens .

### **9.0 Some Commercial Fabrics**

Quality particulars and characteristics of following fabrics of commercial use

Jean / Denim, Drill, Duck, Gabardine, Blankets, Bag cloth, Blazer cloth, Casement, Chiffon, Chine, Corduroy, Cotton georgette, cotton suiting, Crepe fabric, Damask, Dhooties, Long cloth, Muslin, Poplin, Quilts, Voile, Zephyr fabric, Rugs, Shirting,

## REFERENCE BOOKS

1. Fabric Structure and Design – Gokarneshan.N
2. Fabric Structure and Design - J. Hayavadana
3. Watson's Textile design and Color - Grosicki .
4. Watson's Advanced Textile design - Grosicki .
5. Grammar of Textile Design - Nisbet



## ADVANCED YARN MANUFACTURE

Subject Title	:	ADVANCED YARN MANUFACTURE
Subject Code	:	TT – 703
Periods per week	:	06
Periods per semester	:	90

### TIME SCHEDULE

S. No.	Major Topics	No. of Periods	Weightage of Marks	Short Answer Type	Essay Type
1	Special yarns	10	16	2	1
2	Texturisation	9	13	1	1
3	Introduction to New spinning Systems	18	26	2	2
4	Rotor spinning	18	26	2	2
5	False twist and Twist-less spinning	10	16	2	1
6	Spinning of Manmade fibres and their blends	10	13	1	1
	<i>Total</i>	75	110	10	8

### OBJECTIVES

Upon completion of the subject, student shall be able to

#### 1.0 Understand Special yarns

- 1.1 Classify different methods of producing fancy yarns
- 1.2 Give the classification of fancy yarns.
- 1.3 Mention different methods of producing melange yarns
- 1.4 State the properties of melange yarns
- 1.5 Give the classification of sewing threads
- 1.6 Mention the basic requirements of sewing threads
- 1.7 Mention the essential properties of sewing threads
- 1.8 Explain the manufacturing sequence of melange yarns
- 1.9 Explain the essential properties of sewing threads
- 1.10 Explain the manufacturing sequence of Sewing thread
- 1.11 Explain the principle of producing compact yarn
- 1.12 Explain the principle of producing slub yarns
- 1.13 Explain the principle of producing Snarl and loop yarn
- 1.14 Define the following fancy yarns - Spiral yarn / cork screw yarn, Diamond yarn, Core spun yarn, Cloud yarn, Eccentric yarn, Tape yarn, Network yarn, Bulk yarn and Marl yarn

#### 2.0 Understand Texturising

- 2.1 State the objects of texturising
- 2.2 Mention different methods of texturing
- 2.3 State the advantages of textured yarns
- 2.4 Mention different types of textured yarns
- 2.5 Explain the method of false twist texturing
- 2.6 Explain the method of Draw texturing
- 2.7 Explain the method of Air Jet texturing
- 2.8 Explain the method of Gear crimp texturing

### **3.0 Understand basics of New spinning systems**

- 3.1 Mention the advantages of ring spinning
- 3.2 State the limitations of ring spinning
- 3.3 Classify of New spinning systems
- 3.4 State the principle of yarn formation in open end spinning
- 3.5 State the advantages and disadvantages of open end spinning system
- 3.6 State the operating principle of open end friction spinning
- 3.7 State the general characteristics of open end spun yarns
- 3.8 Classify friction spinning systems
- 3.9 State the general characteristics of friction spun yarns
- 3.10 State the end uses of open end spun yarns
- 3.11 State the advantages and disadvantages of friction spinning
- 3.12 Mention the range of counts that can be produced by various new spinning systems.
- 3.13 Explain the advantages and disadvantages of Ring spinning system
- 3.14 Explain the advantages and disadvantages of New spinning systems
- 3.15 Tabulate the comparative yarn characteristics Ring spun, Rotor spun, Friction spun and Air jet false twist yarn.
- 3.16 Twist spinning, Rubbing Technique and Mechanical wrapping
  - 3.16.1 Explain the principle and process of Parafil system of wrap spinning
- 3.17 Open end spinning systems
  - 3.17.1 Explain the principle and method of Dref-II friction spinning system

### **4.0 Open end - Rotor Spinning**

- 4.1 Explain the principle of yarn formation in rotor spinning
- 4.2 Explain the requirements of raw material characteristics for rotor spinning
- 4.3 State the influence of fibre fineness on the process and yarn characteristics
- 4.4 State the influence of fibre length on the process and yarn characteristics
- 4.5 State the influence of trash and fibre cleanliness on the process and yarn characteristics
- 4.6 Explain the working of opening unit of rotor.
- 4.7 Explain the parameters of rotor that influence the yarn quality and productivity
- 4.8 Explain the process of Yarn formation in rotor spinning
- 4.9 Explain the yarn withdrawal and winding in rotor spinning
- 4.10 State the characteristics and properties of rotor yarn
- 4.11 State the advantages and disadvantages of rotor spun yarn.
- 4.12 Compare the yarn characteristics of Rotor spun yarn and Ring spun yarn

### **5.0 False twist and Twist less spinning systems**

- 5.1 State the principle of false twist insertion
- 5.2 Explain the formation of yarn by using false twist principle
- 5.3 Explain the principle of Dref-III spinning system of mechanical wrapping
- 5.4 Explain the principle of Murata Air Jet spinning system of aerodynamic wrapping by using false twist
- 5.5 Explain the principles of Twilo water based adhesive spinning system.
- 5.6 Explain the principles of Bobtex resin based adhesive spinning system.
- 5.7 Explain the Periloc spinning process based on felting technique.
- 5.8 State the requirements of raw material for false twist spinning
- 5.9 State the characteristics of Air jet spun yarns
- 5.10 State the yarn characteristics of self twist spun yarns
- 5.11 State the yarn characteristics of adhesive yarns
- 5.12 Mention the drawbacks of twist-less yarns

## **6.0 Spinning of manmade fibres**

- 6.1 Mention the problems that arise in mechanical processing of manmade fibres
- 6.2 Mention the general properties of manmade fibres
- 6.3 Explain the considerations in short staple spinning of manmade fibres
- 6.4 Explain the process guidelines for Polyester – Cotton spinning.
- 6.5 Explain the process guidelines for Polyester – Viscose spinning.
- 6.6 Explain the process guidelines for Polyester - Wool fibres spinning.
- 6.7 Discuss the problems in Ring spinning while processing synthetic fibres.
- 6.8 Mention the problems associated with manmade fibres in the following sections
  - 6.8.1 Blow room
  - 6.8.2 Carding
  - 6.8.3 Draw frame

## **COURSE CONTENT**

### **1. Special yarns**

Different methods of producing fancy yarns -Classification of fancy yarns. - different methods of producing melange yarns - Properties of melange yarns - Classification of sewing threads - Basic requirements of sewing threads - Essential properties of sewing threads -Manufacturing sequence of melange yarns -Properties of sewing threads -Manufacturing sequence of Sewing thread -Principle of producing compact yarn -Principle of producing slub yarns -Principle of producing Snarl and loop yarn -Define the following fancy yarns - Spiral yarn / cork screw yarn, Diamond yarn, Core spun yarn, Cloud yarn, Eccentric yarn, Tape yarn, Network yarn, Bulk yarn and Marl yarn

### **2. Texturing**

Objects of texturing- Different methods of texturing -Advantages of textured – yarn -Different types of textured yarns -Draw texturing- Air Jet texturing -Gear crimp –texturing

### **3. Introduction to New spinning systems**

Advantages of ring spinning-limitations of ring -pinning -New spinning systems--Principle of yarn formation in open end spinning--advantages and disadvantages -Principle of open end friction spinning -Characteristics of open end spun yarns -Friction spinning systems-General characteristics of friction spun yarns--End uses of open end spun yarns-Advantages and disadvantages of friction spinning-Range of counts that can be produced by various new spinning systems.-Advantages and disadvantages of Ring spinning system -advantages and disadvantages of New spinning systems-Comparative yarn characteristics Ring spun, Rotor spun, Friction spun and Air jet false twist yarn.-Twist spinning, Rubbing Technique and Mechanical wrapping -Principle and process of Parafil system of wrap spinning-Open end spinning systems -Principle and method of Dref-II friction spinning system

### **4. Open end - Rotor Spinning**

Principle of yarn formation in rotor spinning -Requirements of raw material characteristics for rotor spinning -Influence of fibre fineness on the process and yarn characteristics -Influence of fibre length on the process and yarn characteristics -Influence of trash and fibre cleanliness on the process and

yarn characteristics -Working of opening unit of rotor-Parameters of rotor that influence the yarn quality and productivity-Process of Yarn formation in rotor spinning -Yarn withdrawal and winding in rotor spinning-Characteristics and properties of rotor yarn-Advantages and disadvantages of rotor spun yarn.- Compare the yarn characteristics of Rotor spun yarn and Ring spun yarn

#### **5. False twist and Twist less spinning systems**

Principle of false twist insertion -Formation of yarn by using false twist principle-Principle of Dref-III spinning system of mechanical wrapping - Principle of Murata Air Jet spinning system of aerodynamic wrapping by using false twist-Principles of Twilo water based adhesive spinning system-Principles of Bobtex resin based adhesive spinning system.-Periloc spinning process based on felting technique. -Requirements of raw material for false twist spinning -Characteristics of Air jet spun yarns -Yarn characteristics of self twist spun yarns -Yarn characteristics of adhesive yarns -Drawbacks of twist-less yarns

#### **6. Spinning of manmade fibres**

Problems that arise in processing of manmade fibers -General properties of manmade fibers -Considerations in short staple spinning of manmade fibers-Process guidelines for Polyester – Cotton spinning.-Process guidelines for Polyester – Viscose spinning.-Process guidelines for Polyester - Wool fibers spinning. -Problems in Ring spinning while processing synthetic fibers.- Problems associated with manmade fibers in the following sections -Blow room -Carding -Draw frame .

### **REFERENCE BOOKS**

1. Spun Yarn Technology – Eric Oxtuby.
2. New Spinning Systems – Klein, The Textile Institute
3. A Guide to Crimping and Texturizing – Talele & MVS Rao.  
Non Conventional Spinning – NCUTE, IIT, DELH

## ADVANCED FABRIC MANUFACTURE

**Course Title** : **ADVANCED FABRIC MANUFACTURE**  
**Course Code** : **TT – 704**  
**Periods per week** : **05**  
**Periods per semester** : **75**

### Time schedule

S.No	Major Topics	Periods	Weight age of Marks	short	Essay
1	Weaving of Synthetic Yarns and their blends	08	13	1	1
2	Circular and Multi Phase Weaving	12	13	1	1
3	Knitting	15	26	2	2
4	Non-Woven Technology	20	26	2	2
5	Other Fabrication methods	5	8	1	½
6	Composite Fabrics	5	8	1	½
7	Technical Textiles	10	16	2	1
	<b>Total</b>	<b>75</b>	<b>110</b>	10	8

### OBJECTIVES

On completion of this course, student should be able to comprehend the following

#### 1.0 Weaving of Synthetic Yarns and Blends

- 1.1 Discuss the considerations in weaving preparatory of Polyester blended fabrics
- 1.2 Discuss the considerations in weaving of Polyester blended fabrics
- 1.3 Discuss the considerations in weaving preparatory of multi filaments yarns
- 1.4 Discuss the considerations in weaving of multi filaments yarns
- 1.5 Tabulate construction of common polyester blended fabrics

## **2.0 Circular, Multi phase and Tri axial Weaving Methods**

- 2.1 Define Multi phase weaving
- 2.2 State the advantages and disadvantages of multi phase weaving
- 2.3 Explain the method of fabric manufacture on warp way multi phase loom
- 2.4 Explain method of fabric manufacture on Weft way multi phase weaving
- 2.5 State the principle of circular weaving
- 2.6 Explain the passage of material through vertical shed formation type circular weaving machine
- 2.7 Explain the passage of material through horizontal shed formation type circular weaving machine
- 2.8 Mention the merits and demerits of circular weaving machine.
- 2.9 State the principle of tri axial weaving
- 2.10 Mention the Scope of tri axial fabrics
- 2.11 List the characteristics and properties of tri axial fabrics
- 2.12 Explain the principle of manufacturing Narrow fabrics on a narrow loom (Needle loom)
- 2.13 Mention some end products of narrow fabrics

## **3.0 KNITTING**

- 3.1 Introduction to Knitting Technology
  - 3.1.1 Mention different methods of fabric manufacture
  - 3.1.2 Compare the properties of knitted structures with woven fabrics
  - 3.1.3 Define - Knitting, Knitting machine, Weft knitting, warp knitting
  - 3.1.4 Define the general terms used in Knitting - Course, wale, stitch density, technically upright, technical face, technical back, Loop, Open loop, closed loop, needle loop, sinker loop, float, under lap, stitch length, face stitch, back stitch
  - 3.1.5 Functional elements used of a (weft) knitting machine
  - 3.1.6 Mention the types of knitting needles
  - 3.1.7 Sketch and Label the parts of the three types of needles
  - 3.1.8 State the functions of – knitting cam, Creel, stripers, Fabric spreader
  - 3.1.9 Explain loop forming sequence (knitting action) of latch, bearded and compound needles
- 3.2 Weft knitting
  - 3.2.1 Understand Basic Weft knit structures
  - 3.2.2 Classify weft knit structures

- 3.2.3 Represent weft knit structures symbolically
- 3.2.4 Explain the characteristics of single jersey structures (plain structures)
- 3.2.5 Explain symbolic representation, features and properties of rib structures
- 3.2.6 Explain symbolic representation, features and properties of interlock structures
- 3.2.7 Explain symbolic representation, features and properties of purl structures
- 3.3 Warp Knitting
  - 3.3.1 State the principle of producing basic Warp knit fabric
  - 3.3.2 Explain the knitting cycles of tricot machine
  - 3.3.3 Explain the knitting cycles of Raschel machine

## **4.0 Non woven technology**

### **4.1 Introduction to Non woven technology**

- 4.1.1 Definition of a non woven fabric
- 4.1.2 Explain the structure and general characteristics of nonwovens
- 4.1.3 Explain the applications and Scope of non woven fabrics
- 4.1.4 State the Limitations of non woven fabrics
- 4.1.5 Explain the Stages involved in production of non woven
- 4.1.6 Classify Non Woven Fabrics based on
- 4.1.7 Technique of web preparation
- 4.1.8 Direction of fibers in the web
- 4.1.9 Method of bonding

### **4.2 Production of fibrous layer (Web)**

- 4.2.1 Classify different methods of web formation
- 4.2.2 Explain following methods of web formation and the basic principles involved in
- 4.2.3 Mechanical systems
- 4.2.4 Pneumatic systems
- 4.2.5 Hydraulic systems / wet laying/ drift deposition
- 4.2.6 Electro static systems

### **4.3 Mechanical bonding process**

- 4.3.1 State the requirements of fibers for mechanical bonding
- 4.3.2 Explain the principle of following systems of mechanical bonding
- 4.3.3 Single fiber inter bonding

- 4.3.4 Needling punching technique
- 4.3.5 Stitch bonding without binding threads
- 4.3.6 Stitch bonding with binding threads

#### 4.4 **Adhesive Bonding**

- 4.4.1 List some adhesives chemicals used for chemical bonding
- 4.4.2 Mention the requirements of binder for adhesive bonding
- 4.4.3 Explain following techniques of adhesive bonding
- 4.4.4 Saturation bonding
- 4.4.5 Spray bonding
- 4.4.6 Print bonding
- 4.4.7 Powder bonding

#### 4.5 **Thermal Bonding and Extrusion Bonding**

- 4.5.1 Mention different methods of thermal bonding
- 4.5.2 List different forms of thermal binders used
- 4.5.3 Explain the process of hot calendar thermal bonding
- 4.5.4 Explain the process of Through Air bonding
- 4.5.5 Explain the following Extrusion nonwovens
- 4.5.6 Spun bonding and spun laced techniques
- 4.5.7 Melt blown techniques

### 5.0 **Other fabrication methods**

#### 5.1 Fabrics from films

- 5.1.1 List the end uses of fabrics made from polymer films and solutions
- 5.1.2 Discuss the overview of Fabrics made from films and solutions in terms of material, manufacture, characteristics

#### 5.2 Fabrics made from yarns

- 5.2.1 List some products of fabrics made from yarns
- 5.2.2 Define the term braid
- 5.2.3 State the characteristics of braid
- 5.2.4 Discuss the overview of Lace fabric in terms of material, manufacture, characteristics.

#### 5.3 Fabrics made from animal products

- 5.3.1 Discuss the overview of Leather fabrics in terms of material, manufacture, characteristics



- 5.3.2 Discuss the overview of Fur fabrics in terms of material, manufacture, characteristics
- 5.3.3 List the end uses of fabrics made from animals

## **6.0 Composite Fabrics**

- 6.1 Composite fabrics
- 6.2 Mention different types of composite fabrics
- 6.3 Coated fabrics
  - 6.3.1 Define coated fabric
  - 6.3.2 Mention the end uses of coated fabrics
  - 6.3.3 Discuss the overview of coated fabrics in terms of material, manufacture, characteristics
- 6.4 Flocked fabric
  - 6.4.1 State the principle of producing flocked fabric
  - 6.4.2 Mention the end uses of flocked fabrics
  - 6.4.3 Explain the method of electrostatic flocking
  - 6.4.4 Explain the method of mechanical flocking
- 6.5 State the principle of producing porometric fabric
- 6.6 State the principle of producing Suedelike fabric
- 6.7 State the principle of producing Tufted pile fabric
- 6.8 Laminated fabric
  - 6.8.1 Define laminated fabric
  - 6.8.2 State the general characteristics of coated fabrics.
  - 6.8.3 Mention the end uses of laminated fabrics
  - 6.8.4 Outline the adhesive bonding methods of producing laminated fabrics.
  - 6.8.5 State the advantages and disadvantages of laminated fabrics
- 6.9 Quilted fabrics
  - 6.9.1 Discuss the overview of Quilted fabrics in terms of material, manufacture, characteristics
  - 6.9.2 Mention the end uses of quilted fabrics

## **7.0 TECHNICAL TEXTILES**

- 7.1 Define the term "Technical textiles".
- 7.2 Classify the Technical Textiles based on end use application
- 7.3 State the difference between Technical Textiles and Apparel Textiles.
- 7.4 Explain the scope and utility of Technical Textiles

- 7.5 Mention the sources of materials for producing Technical Textiles.
- 7.6 State the importance of filtration in the industries
- 7.7 Mention different types of industrial filters
- 7.8 State the advantages of using textiles for filtration
- 7.9 Explain the mechanism of particle collection by fabric filters in dry filtration process
- 7.10 List the factors influencing filtration quality
- 7.11 State the characteristics of materials for use in medical applications
- 7.12 State the difference between Biodegradability and Bioabsorbability
- 7.13 Explain the applications of Medical Textiles

## **COURSE CONTENT**

- 1.0 Weaving of Synthetic Yarns and Blends -considerations in weaving preparatory of Polyester -blended fabrics - the considerations in weaving of Polyester blended fabrics -considerations in weaving preparatory of multi filaments yarns - considerations in weaving of multi filaments yarns  
  
construction of common polyester blended fabrics
- 2.0 Circular, Multi phase and Tri axial Weaving Methods- Multi phase weaving- advantages and disadvantages of multi phase weaving-method of fabric manufacture on warp way multi phase loom - method of fabric manufacture on Weft way multi phase weaving -principle of circular weaving -passage of material through vertical shed formation type circular weaving machine-passage of material through horizontal shed formation type circular weaving machine-merits and demerits of circular weaving machine.-the principle of tri axial weaving - Scope of tri axial fabrics-characteristics and properties of tri axial fabrics-principle of manufacturing Narrow fabrics on a narrow loom (Needle loom)-end products of narrow fabrics
- 3.0 Introduction to Knitting Technology- different methods of fabric manufacture- properties of knitted structures with woven fabrics-Knitting, Knitting machine, Weft knitting, warp knitting-general terms used in Knitting - Course, wale, stitch density, technically upright, technical face, technical back, Loop, Open loop, closed loop, needle loop, sinker loop, float, under lap, stitch length, face stitch,

back stitch-Functional elements used of a (weft) knitting machine-types of knitting needles - the parts of the three types of needles -functions of – knitting cam, Creel, strippers, Fabric spreader-loop forming sequence (knitting action) of latch, bearded and compound needles- Weft knitting - Basic Weft knit structures Classify weft knit structures-weft knit structures symbolically -characteristics of single jersey structures (plain structures)-symbolic representation, features and properties of rib structures-symbolic representation, features and properties of interlock structures-features and properties of purl structures-Warp Knitting the principle of producing basic Warp knit fabric -knitting cycles of tricot machine-knitting cycles of Raschel machine.

- 4.0 Non woven technology - Non woven fabric- Structure and general characteristics of nonwovens- Applications and Scope of non woven fabrics- Limitations of non woven fabrics-Compare the Non woven & Knitted fabrics-Compare the Non Woven & Woven Fabrics- Stages involved in production of non woven - Non Woven Fabrics based on -Technique of web preparation-Direction of fibers in the web--Method of bonding- Requirements of fibers for nonwoven- Suitable fibers used for nonwovens.

Production of fibrous layer (Web)- Different methods of web formation - Methods of web formation and the basic principles involved in -Mechanical systems- Pneumatic systems-Hydraulic systems / wet laying/ drift deposition-Electro static systems- direct polymer to web systems-Fiber extrusion from spinnerets to screen-Extrusion of polymer solution in electrostatic field-Fibrous layer made of filament entanglement.

Mechanical bonding process- Requirements of fibers for mechanical bonding - Principle of following systems of mechanical bonding-Single fiber inter bonding- Needling punching technique-Stitch bonding without binding threads-Stitch bonding with binding threads- General characteristics of needle punched non woven fabrics- Applications (end use products) of needle punched fabrics- Adhesive Bonding- Adhesives chemicals used for chemical bonding - Requirements of binder for adhesive bonding - Techniques of adhesive bonding -Saturation bonding -Spray bonding -Print bonding -Powder bonding - Applications (end uses) of adhesive bonded nonwovens.

Thermal Bonding and Extrusion Bonding- Methods of thermal bonding - characteristics of thermal binders - Different forms of thermal binders used - Hot

calendar thermal bonding- Air bonding -Characteristics of thermal bonded non woven- Applications of thermal bonded nonwovens- Extrusion nonwovens-Spun bonding and spun laced techniques-Melt blown techniques- Applications of spun bonded and spun laced nonwovens.

- 5.0 Other fabrication methods -Fabrics from films -end uses of fabrics made from polymer films and solutions-Fabrics made from films and solutions in terms of material, manufacture, characteristics-Fabrics made from yarns -products of fabrics made from yarns -Definition of the term braid -characteristics of braid -overview of Lace fabric in terms of material, -manufacture, characteristics.- Fabrics made from animal products -overview of Leather fabrics in terms of material, manufacture, characteristics-overview of Fur fabrics in terms of material, manufacture, characteristics-end uses of fabrics made from animals
- 6.0 Composite Fabrics--Composite fabrics -different types of composite fabrics-Coated fabrics -Definition of coated fabric -end uses of coated fabrics -overview of coated fabrics in terms of material, manufacture, characteristics-Flocked fabric -principle of producing flocked fabric-end uses of flocked fabrics-method of electrostatic flocking -method of mechanical flocking -principle of producing porometric fabric --principle of producing Suedelike fabric--principle of -producing Tufted pile fabric -Laminated fabric-Definition of laminated fabric-general characteristics of coated fabrics-end uses of laminated fabrics-adhesive bonding methods of producing laminated fabrics. -advantages and disadvantages of laminated fabrics-Quilted fabrics -overview of Quilted fabrics in terms of material, manufacture, characteristics-the end uses of quilted fabrics
- 7.0 Technical Textiles - based on end use application -difference between Technical Textiles and Apparel Textiles-scope and utility of Technical Textiles-the sources of materials for producing Technical Textiles-importance of filtration in the industries- Mention different types of industrial filters -the advantages of using textiles for filtration mechanism of particle collection by fabric filters in dry filtration process-- factors influencing filtration quality-characteristics of materials for use in medical applications-difference between Biodegradability and Bio-absorbability - the applications of Medical Textiles

## REFERENCE BOOKS

1. Modern yarn preparation and weaving machinery by ORMEROD.
2. Weaving mechanism Vol. II by Prof. N.N.BANERJEE.
3. Shuttle less Weaving – NCUTE, IIT, DELHI.
4. Weaving – Talukdar, azgonakar & Sri ramulu.
5. Technical Textiles – NCUTE, IIT, DELHI.
6. Medical Textiles – S.Adanur, Technomic Publishing Company.
7. A goal for Geo-Textiles – J.N.Mandal.
8. Non-wovens \_ Industrial Textiles – P.Bottcher.
9. Knitting Technology – David J Spencer, Woodhead Publishing Ltd, Cambridge, England
10. Knitting Technology – Prof D B ajgaonkar, Universal Publishing Corpn, Bombay
11. Knitting – Fundamentals, Machines and Structures and Developments – N anbumani, New Age International Structures
12. Nonwovens Manufacture – N N Banerjee

## TEXTILE TESTING & STATISTICAL QUALITY CONTROL – II

Subject Title	:	Textile Testing & Quality Control – II
Subject Code	:	TT – 705
Periods per week	:	04
Periods per semester	:	60

### TIME SCHEDULE

S. No.	Major Topics	No. of Periods	Weightage Of Marks	Short Answer Type	Essay Type
<b>Textile Testing</b>					
1.	Testing of Fabric handle	7	13	1	1
2	Testing of tensile properties	7	13	1	1
3	Testing of Fabric Comfort	9	16	2	1
4	Testing of Fabric Serviceability	9	16	2	1
<b>Statistical Quality Control</b>					
5	Control Charts	7	13	1	1
6	Significance testing	7	13	1	1
7	Correlation	7	13	1	1
8	Theoretical distribution & Applications of Statistics in Textile Industry	7	13	1	1
<b>TOTAL</b>		60	110	10	8

### OBJECTIVES

Upon completion of the course student shall be able to

#### 1 Understand Testing of Fabric Handle

- 1.1 Measurement of fabric dimensions
  - 1.1.1 Mention different principles of measuring fabric length
  - 1.1.2 State the principles of measuring fabric width, weight / unit area of woven fabric, threads/inch, yarn crimp
- 1.2 Explain the method of measuring fabric Stiffness
- 1.3 Explain the method of measuring fabric Drape
- 1.4 Explain the method of measuring fabric Crease recovery

#### 2 Understand Testing of Fabric Tensile properties

- 2.1 Measurement of fabric strength
  - 2.1.1 Define Grab test, Ravelled strip test and Cut strip test
  - 2.1.2 Explain the method of measuring fabric Tensile strength
  - 2.1.3 Explain the method of measuring fabric Tear strength
  - 2.1.4 Explain the method of measuring fabric bursting strength

### **3 Understand Testing of Fabric Comfort and thermal properties**

- 3.1 Testing of comfort properties
  - 3.1.1 Explain the method of measuring air permeability of the fabric
  - 3.1.2 Explain the method of measuring Water repellency by spray test
  - 3.1.3 Explain the method of measuring Water repellency by Drop test
  - 3.1.4 State the principle of measuring water repellency by Bundesmann test
- 3.2 Measurement of thermal properties
  - 3.2.1 Define the terms thermal insulation property of the fabric
  - 3.2.2 Define thermal conductivity of the fabric
  - 3.2.3 Define the term flammability of the fabric
  - 3.2.4 State the factors that contribute to thermal properties of fabric
  - 3.2.5 Explain the measurement of thermal insulation value of the fabric
  - 3.2.6 Explain the principle of measuring flammability of the fabric by ATLAS automatic flammability tester
  - 3.2.7 State the principle of vertical flame tester
  - 3.2.8 State the principle of Oxygen index test

### **4 Understand Measurement of Serviceability properties**

- 4.1 State the importance of choice of instrument and choice of Abradant
- 4.2 Explain the working principle of Flat Abrasion tester
- 4.3 Explain the working principle of Flex Abrasion tester
- 4.4 Explain the working principle of Martindale Abrasion and pilling tester
- 4.5 State the importance of pilling in fabric quality
- 4.6 Mention the fabric pilling rating factors
- 4.7 Explain the measurement of fabric pilling on ICI pilling box
- 4.8 State the principle of measuring fabric pilling by image analysis

### **5 Understand Control Charts**

- 5.1 Explain the statistical basis of control charts
- 5.2 Define Control limits and specification limits
- 5.3 Define Chance causes and assignable causes
- 5.4 Enumerate the advantages of using control charts
- 5.5 Mention the control charts for variables and attributes
- 5.6 Tabulate various types control charts and specify the control line, Upper control limit and lower control limit
- 5.7 Solve the problems to Construct Control charts for
  - 5.7.1 Averages
  - 5.7.2 Ranges
  - 5.7.3 Fraction or percent defective
  - 5.7.4 Number defective

### **6 Understand Test of Significance**

- 6.1 Solve the problems on significance testing of
  - 6.1.1 Single mean for small and large samples
  - 6.1.2 Difference between two means of small and large samples
  - 6.1.3 Single standard deviation
  - 6.1.4 Difference between standard deviations of two samples
- 6.2 Solve the problems on number of tests to be conducted to give mean to a given accuracy

## **7 Understand Correlation**

- 7.1 Define the correlation
- 7.2 Define Negative correlation and positive correlation
- 7.3 Examples for Negative correlation and positive correlation
- 7.4 Define Linear and Non linear correlation
- 7.5 Mention the Methods of studying correlation
- 7.6 State the uses of correlation
- 7.7 Solve the problems to calculate Karl Pearson coefficient of correlation

## **8 Understand Theoretical Distribution & Application of statistical tools in textile industry**

- 8.1 State the characteristics of normal distribution curve
- 8.2 Solve simple problems related to proportion of values lying between the two given limits
- 8.3 Express the area under the normal curve in terms of standard deviation
- 8.4 Define Binomial distribution and give examples
- 8.5 Define Poisson distribution and give examples
- 8.6 State the applications of Poisson distribution
- 8.7 Explain the applications of statistical tools in various process stages of textile production
- 8.8 Describe the method of snap study followed in Textile industry

## **COURSE CONTENT**

### **1. Testing of Fabric Handle**

Measurement of fabric dimensions - Principles of measuring fabric length -Principles of measuring fabric width, weight / unit area of woven fabric, threads/inch, yarn crimp -Method of measuring fabric Stiffness -Method of measuring fabric Drape-Method of measuring fabric Crease recovery

### **2. Testing of Fabric Tensile properties**

Measurement of fabric strength -Define Grab test, Ravelled strip test and Cut strip test -Method of measuring fabric Tensile strength -Method of measuring fabric Tear strength-Method of measuring fabric bursting strength

### **3. Testing of Fabric Comfort and thermal properties**

Testing of comfort properties -Method of measuring air permeability of the fabric- Method of measuring Water repellency by spray test -Method of measuring Water repellency by Drop test-Principle of measuring water repellency by Bundesmann test -Measurement of thermal properties -Terms thermal insulation property of the fabric- Thermal conductivity of the fabric -Define the term flammability of the fabric -Factors



that contribute to thermal properties of fabric -Measurement of thermal insulation value of the fabric-Principle of measuring flammability of the fabric by ATLAS automatic flammability tester-Principle of vertical flame tester -Principle of Oxygen index test

**4. Measurement of Serviceability properties**

Importance of choice of instrument and choice of Abradant -Working principle of Flat Abrasion tester--Working principle of Flex Abrasion tester -Working principle of Martindale Abrasion and pilling tester -Importance of pilling in fabric quality -Fabric pilling rating factors -Measurement of fabric pilling on ICI pilling box-Principle of measuring fabric pilling by image analysis

**5. Control Charts**

Statistical basis of control charts-Define Control limits and specification limits-Define Chance causes and assignable causes-Advantages of using control charts-Control charts for variables and attributes -various types control charts and specify the control line, Upper control limit and lower control limit -Problems to Construct Control charts for -Averages -Ranges -Fraction -r percent defective -Number defective

**6. Test of Significance**

Problems on significance testing of -Single mean for small and large samples - Difference between two means of small and large samples -Single standard deviation -Difference between standard deviations of two samples -Problems on number of tests to be -conducted to give mean to a given accuracy

**7. Correlation**

Define the correlation-Define Negative correlation and positive correlation-Examples for Negative correlation and positive correlation-Define Linear and Non linear correlation-Methods of studying correlation-uses of correlation-Problems to calculate Karl Pearson coefficient of -correlation

- 8. Theoretical Distribution & Application of statistical tools in textile industry**  
 Characteristics -of normal distribution curve-Problems related to proportion of values lying between the two given limits-Area under the normal curve in terms of standard deviation-Define Binomial distribution and give examples -Poisson distribution and give examples -State the applications of Poisson distribution -Applications of statistical tools in various process stages of textile production -Method of snap study followed in Textile industry

### REFERENCE BOOKS

- |  |                     |                               |
|--|---------------------|-------------------------------|
| 1. Principles of Textile Testing   | --                  | J.E.Booth                     |
| 2. Textile Testing   | --                  | Angappan                      |
| 3. Textile Testing   | --                  | SITRA                         |
| 4. Testing & Quality Management  | --                  | Kothari.V.K.                  |
| 5. An outline of Statistical methods for use in the textile Industry -A Brearley & D.R. Cox. |                     |                               |
| 6. Principles of Textiles Testing.   | --                  | J.E. Booth.                   |
| 7. Statistics  | --                  | R.S.N. Pillai & V. Bagavathi. |
| 8. Textile Testing and Quality Control   | —                   | Grover & Hamby.               |
| 9. Statistical Methods for Textile Technology  | --T.Murphy, Tipper, | KM.Mores.                     |
| 10. Methods of Statistics  | --                  | SITRA,Coimbatore.             |
| 11. Practical Statistics for Textile Industry Vol. I & II                                    | --                  | GAV LEAF.                     |

## TEXTILE CAD

**Student Title** : **Textile CAD**  
**Student Code** : **TT – 706**  
**Periods per week** : **06**  
**Periods per semester** : **90**

### TIME SCHEDULE

S. No.	Major Topics	No. of Periods
A	Computer Applications in Textiles	12
B	Design Dobby Software	12
C	Design Jacquard software	12
D	Design Studio software	12
E	Pattern making Software	12
	<b>Total</b>	<b>90</b>

\* A minimum of 28 experiments need to be conducted in a semester

### LIST OF EXPERIMENTS

#### A. Computer Applications in Textiles

- 1) Basics of Computer
- 2) Practice on MS word
- 3) Practice on Excel
- 4) MS Power point

#### B. Design Dobby Software

- 5) Understanding the software
- 6) Production of design – 1
- 7) Production of design – 2

#### C. Design Jacquard software

- 9) Understanding the software
- 10) Production of design – 1
- 11) Production of design – 2

#### D. Design studio software

- 13) Understanding the software
- 14) Production of design – 1
- 15) Production of design – 2

#### E. Pattern making software

- 17) Understanding the software
- 18) Production of pattern – 1
- 19) Production of pattern - 2

**Competencies and Key competencies to be achieved by the student**

S.No.	Name of the Experiment	Objectives	Key competencies
1	Basics of computer	<ol style="list-style-type: none"> <li>1. Identification of basic elements of CPU, Monitor, Key board, Mouse, Printer, Scanner, Modem</li> <li>2. Connecting the monitor, mouse and key board to CPU</li> <li>3. Connecting printer</li> <li>4. Connecting scanner</li> <li>5. Working on computer with</li> <li>6. Scanning a document</li> <li>7. Printing a document</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify key parts of CPU</li> <li>2. Connecting the computer elements</li> <li>3. Able to scan a document</li> <li>4. Able print a document</li> </ol>
2 – 4	Practice on MS word / Excel / Power point	<ol style="list-style-type: none"> <li>1. Practice the tools</li> <li>2. Prepare the document</li> <li>3. Edit the document</li> <li>4. Formatting the document</li> <li>5. Modify the document</li> <li>6. Print the document</li> </ol>	<ol style="list-style-type: none"> <li>1. Prepare the document</li> <li>2. Edit the document</li> <li>3. Formatting the document</li> <li>4. Modify the document</li> <li>5. Print the document</li> </ol>
5-20	Practice on software and producing a sample design	<ol style="list-style-type: none"> <li>1. Install the software</li> <li>2. Open the software</li> <li>3. Practice the software</li> <li>4. Familiarize with various tools</li> <li>5. Practice the tools</li> <li>6. Produce the design</li> </ol>	<ol style="list-style-type: none"> <li>1. Practice the software</li> <li>2. Familiarize with various tools</li> <li>3. Produce the design</li> </ol>

## FABRIC ANALYSIS LAB

**Subject Title** : **Fabric analysis lab**  
**Subject code** : **TT -707**  
**Periods per week** : **03**  
**Periods per semester** : **45**

### TIME SCHEDULE

S. No.	List of experiments	No. of Periods
A.	Plain Weave and its Derivatives	12
B	Twill Weave and Derivatives	12
C	Towelling weaves	9
D	Compound Weaves	9
E	Other structures	3
	<b>TOTAL</b>	<b>45</b>

A minimum of 15 experiments need to be conducted in semester

### LIST OF EXPERIMENTS

#### **A. Plain weave and its derivatives**

- 1) Analysis of a given plain woven fabric
- 2) Analysis of a given warp rib woven fabric
- 3) Analysis of a given weft rib woven fabric
- 4) Analysis of a given matt woven fabric

#### **B. Twill weave and its derivatives**

- 5) Analysis of a given regular twill woven fabric
- 6) Analysis of a given wavy twill woven fabric
- 7) Analysis of a given herringbone twill woven fabric
- 8) Analysis of a given sateen / satin woven fabric

#### **C. Towelling fabrics**

- 9) Analysis of Honey comb woven towelling fabric
- 10) Analysis of Mock leno woven toweling fabric
- 11) Analysis of Huck a Back woven toweling fabric

#### **D. Compound weaves**

- 12) Analysis of crepe fabric
- 13) Analysis of Extra warp threaded fabric
- 14) Analysis of Extra weft threaded fabric

#### **E. Other structures**

- 15) Analysis of Bedford cord fabric
- 16) Analysis of double cloth
- 17) Analysis of pile fabric

**Competencies and Key competencies to be achieved by the student**

S.No.	Name of the Experiment	Objectives	Key competencies
1	Analysis of a given plain woven fabric	<ol style="list-style-type: none"> <li>6. Observe the fabric to know the commercial name and its use</li> <li>7. Identify the warp and weft in the fabric</li> <li>8. Calculate the crimp % of warp and weft</li> <li>9. Identify the repeat unit of the given pattern</li> <li>10. Practice the use of pick finding glass</li> <li>11. Observe the thread density (EPI and PPI) using pick finding glass</li> <li>12. Observe the interlacement pattern and reproduce it on the point paper</li> <li>13. Identify no of healds and draw the draft</li> <li>14. Draw the lifting plan on a point paper</li> <li>15. Draw the denting order</li> <li>16. Conclude the constructional details of given fabric in order to reproduce it</li> </ol>	<ol style="list-style-type: none"> <li>5. Calculate the crimp % of warp and weft</li> <li>6. Identify the repeat unit, EPI and PPI of the given pattern</li> <li>7. Draw the design on the point paper</li> <li>8. Draw the lifting plan and denting plan on a point paper</li> <li>9. Conclude the constructional details of given fabric in order to reproduce it</li> </ol>

## LIFE SKILLS

**Subject Title** : Life Skills  
**Subject Code** : TT-708  
**Periods/ Week** : 03  
**Periods/Semester** : 45

### TIME SCHEDULE

SI No.	UNITS	No. of periods Allotted		
		Explan ation	Activities	Total
1.	ATTITUDE	1	3	4
2.	ADAPTABILITY	1	3	4
3.	GOAL SETTING	1	3	4
4.	MOTIVATION	1	3	4
5.	TIME MANAGEMENT	1	3	4
6.	CRITICAL THINKING	2	3	5
7.	CREATIVITY	1	3	4
8.	PROBLEM SOLVING	1	3	4
9.	TEAM WORK	1	3	4
10.	LEADERSHIP	1	3	4
11.	STRESS MANAGEMENT	1	3	4
TOTAL		12	33	45

**Note: No Written Examination; The total 45 hours are to be considered as Theory hours.**

**Marks:** Internal – 40; External – 60

## **OBJECTIVES:**

*Upon the completion of this course, the student shall be able to*

### **1.0 Understand the concept of Attitude**

- 1.1 Define 'Attitude'
- 1.2 Explain the importance of Attitude
- 1.3 Distinguish between Positive and Negative Attitudes
- 1.4 Life Response: Need for change of Attitude
- 1.5 Positive Attitude: Key to success in Personal and Professional Lives

### **2.0 Understand the concept of Adaptability**

- 2.1 Define the term 'Adaptability'
- 2.2 Explain the concept of Adaptability
- 2.3 Advantages of Adaptability
- 2.4 Disadvantages of Lack of Adaptability
- 2.5 Need for positive response to change

### **3.0 Understand the concept of Goal setting**

- 3.1 Define the terms 'Goal' and 'Goal Setting'
- 3.2 Explain the significance of Goal setting & Long and Short term goals
- 3.3 Explain the following concepts
  - a) Wish
  - b) Dream
  - c) Goal
- 3.4 Explain the reasons for and consequences of not setting goals
- 3.5 The SMART features in Goal setting

### **4.0 Understand the concept of Motivation**

- 4.1 Define 'Motivation' ; Inspiration Vs Motivation
- 4.2 Importance of motivation in Goal setting
- 4.3 Distinguish between Internal (Self) Motivation and External Motivation



4.4 De-motivating Factors and how to overcome them

4.5 Motivating oneself and others

## **5.0 Understand Time Management skills**

5.1 Define 'Time Management'.

5.2 Comprehend the significance of Time Management.

5.3 Explain the Time Quadrant

5.4 Common Time wasters and how to overcome them.

5.5 How to meet deadlines and targets within time

## **6.0 Understand Critical Thinking**

6.1 Define "Critical Thinking",

6.2 Understand the importance of Critical Thinking

6.3 Distinguish between facts and opinions (assumptions)

6.4 Inculcating different perspectives

6.5 Developing Reasoning abilities and form sound judgments

## **7.0 Understand Creativity**

7.1 Understand the importance of and need for creative ideas

7.2 Distinguish between Linear Thinking and Lateral Thinking

7.3 Distinctive qualities of creative people

7.4 Unusual or creative use of familiar objects

7.5 Creative ways of solving problems

## **8.0 Understand Problem Solving**

8.1. Define the concept of Problem solving

8.2 Viewing the problems as challenges

8.3 Different steps in solving a problem

8.4 Selecting the best solution to solve a problem

8.5 Lateral thinking in Problem solving

## **9.0 Understand Team Work**

9.1 Define Team work

9.2 Develop Team skills

9.3 Advantages of team work

9.4 Understand responsibilities as a team player

9.5 Problems of working in a team and possible solutions

## **10.0 Understand Leadership**

10.1 Define Leadership

10.2 Identify Leadership qualities

10.3 Analyze one's strengths and limitations as a leader

10.4 Types of Leadership: Autocratic and Democratic

10.5 Leadership by example

## **11.0 Understand Stress Management**

11.1 Define Stress

11.2 Explain the causes of stress

11.3 Learn Stress Management skills

11.4 Need for positive thinking and self esteem

11.5 Practice Stress Management strategies

### **Course Material:**

- 1) Life skills (Enhancing English and Employability skills used in C-09 & C-14 Curriculum) Published by Orient Blackswan Prescribed by SBTET AP

## TEXTILE TESTING LAB PRACTICE - II

Subject Title : Textile Testing Lab Practice - II  
Subject Code : TT - 709  
Periods per week : 06  
Periods per semester: 90

### TIME SCHEDULE

S. No.	List of Experiments	No. of Periods
1	Testing of fabric dimensions and handle	24
2	Testing tensile properties of fabric	18
3	Testing of comfort and thermal properties of fabric	24
4	Testing of fabric serviceability properties	24
	<b>Total</b>	<b>90</b>

\* A minimum of 20 experiments need to be conducted in semester

#### **1 Testing of Fabric Dimensions and Handle**

- 1.1 Measurement of fabric dimensions - width, weight / unit area of woven fabric (GSM)
- 1.2 Measurement of fabric thickness using thickness gauge
- 1.3 Measurement of threads density (EPI and PPI)
- 1.4 Measurement of yarn crimp (warp and weft)
- 1.5 Explain the method of measuring fabric Stiffness
- 1.6 Explain the method of measuring fabric Drape
- 1.7 Explain the method of measuring fabric Crease recovery

#### **2 Testing of Fabric Tensile properties**

- 2.1 Explain the method of measuring fabric Tensile strength
- 2.2 Explain the method of measuring fabric Tear strength
- 2.3 Explain the method of measuring fabric bursting strength

#### **3 Testing of Fabric Comfort and thermal properties**

- 3.1 Measurement of Air permeability of the fabric
- 3.2 Measurement of Water repellency by spray test
- 3.3 Measurement of Water repellency by Drop test
- 3.4 Measurement of water repellency by Bundesmann tester
- 3.5 Explain the measurement of thermal insulation value of the fabric
- 3.6 Explain the principle of measuring flammability of the fabric by ATLAS automatic flammability tester

#### **4 Measurement of Serviceability properties**

- 4.1 Measurement of fabric abrasion using Flat Abrasion tester
- 4.2 Flex Abrasion tester
- 4.3 Martindale Abrasion and pilling tester
- 4.4 Measurement of fabric pilling on ICI pilling box
- 4.5 Measurement of fabric pilling by Image analysis
- 4.6 Computer aided color matching instrument

### Competencies and Key competencies to be achieved by the student

S. No.	Name of the Experiment	Objectives	Key competencies
1	Measurement of fabric dimensions (length, width and GSM)	<ol style="list-style-type: none"> <li>1. Identify the selvedge, warp and weft</li> <li>2. Take the correct measurement of length and width</li> <li>3. Measure the weight per square meter</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the selvedge, warp and weft</li> <li>2. Take the correct measurement of length and width</li> <li>3. Measure the weight per square meter</li> </ol>
2	Measurement of fabric thickness	<ol style="list-style-type: none"> <li>1. Identify the thickness gauge and its parts</li> <li>2. Observe the units of measurement and least count</li> <li>3. Practice the usage of thickness gauge</li> <li>4. Take the thickness readings</li> <li>5. Calculate the average results</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the thickness gauge and its parts</li> <li>2. Measure the thickness of given fabric</li> <li>3. Take the thickness readings</li> </ol>
3	Measurement of thread density (using pick finding glass / fabric densi meter)	<ol style="list-style-type: none"> <li>1. Identify the fabric densi meter / pick finding glass</li> <li>2. Observing and counting the threads per unit length</li> <li>3. Observe the scale on densimeter to know the correct thread density</li> <li>4. Record the value of thread density</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the fabric densi meter / pick finding glass</li> <li>2. Find the thread density of given fabric</li> <li>3. Record the value of thread density</li> </ol>
4	Measurement of yarn crimp (warp and weft)	<ol style="list-style-type: none"> <li>1. Identify the crimp tester and its parts</li> <li>2. Load the warp / weft yarn on the machine</li> <li>3. Calculate the tension used for different counts of yarn</li> <li>4. Calculate the crimp %</li> <li>5. Compare the crimp % of warp and weft</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the crimp tester and its parts</li> <li>2. Load the warp / weft yarn on the machine</li> <li>3. Calculate the crimp %</li> <li>4. Compare the crimp % of warp and weft</li> </ol>
5	Measurement of fabric stiffness and bending rigidity	<ol style="list-style-type: none"> <li>1. Identify the instrument used for stiffness testing and its parts</li> <li>2. Operate the stiffness tester</li> <li>3. Take the reading of bending length</li> <li>4. Calculate bending rigidity</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for stiffness testing and its parts</li> <li>2. Take the reading of bending length</li> <li>3. Calculate bending rigidity</li> </ol>
6	Measurement of fabric drape	<ol style="list-style-type: none"> <li>1. Identify the instrument used for fabric drape testing and its parts</li> <li>2. Operate the drape tester</li> <li>3. Observe the draping phenomenon of fabric</li> <li>4. Draw the curve based on drape</li> <li>5. Calculate drape coefficient</li> <li>6. Compare the drape coefficient of two different fabrics</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for fabric drape testing and its parts</li> <li>2. Operate the drape tester and Draw the curve based on drape</li> <li>3. Calculate drape coefficient</li> <li>4. Compare the drape coefficient of two different fabrics</li> </ol>

7	Measurement of fabric crease recovery	<ol style="list-style-type: none"> <li>1. Identify the instrument used for measuring crease recovery of the fabric and its parts</li> <li>2. Adjust the scale to zero</li> <li>3. Fold the fabric sample and apply the force to crease the fabric</li> <li>4. Taking the readings on crease recovery instrument</li> <li>5. Compare the crease recovery of two different fabrics</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for measuring crease recovery of the fabric and its parts</li> <li>2. Perform creasing under given weight and time</li> <li>3. Taking the readings on crease recovery instrument</li> <li>4. Compare the crease recovery of two different fabrics</li> </ol>
8	Measurement of fabric tensile strength	<ol style="list-style-type: none"> <li>1. Identify the instrument used for measuring tensile strength of the fabric</li> <li>2. Operate on the tensile testing machine</li> <li>3. Observe the breakage phenomenon to know jaw breaks</li> <li>4. Take the readings of strength and elongation readings</li> <li>5. Express the average results of tensile strength</li> <li>6. Compare the tensile strength in warp and weft directions</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for measuring tensile strength of the fabric</li> <li>2. Operate on the tensile testing machine</li> <li>3. Determine the average tensile strength</li> </ol>
9	Measurement of fabric tearing strength	<ol style="list-style-type: none"> <li>1. Identify the instrument used for measuring tearing strength of the fabric</li> <li>2. Operate on the tearing strength testing machine</li> <li>3. Observe the breakage phenomenon</li> <li>4. Record the tearing strength values</li> <li>5. Determine the average tearing strength</li> <li>6. Compare the tearing strengths of two different fabrics</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for measuring tearing strength of the fabric</li> <li>2. Operate on the tearing strength testing machine</li> <li>3. Determine the average tearing strength</li> <li>4. Compare the tearing strengths of two different fabrics</li> </ol>
10	Measurement of fabric bursting strength	<ol style="list-style-type: none"> <li>1. Identify the instrument used for measuring tearing strength of the fabric</li> <li>2. Operate on bursting strength testing machine</li> <li>3. Observe the phenomenon of bursting</li> <li>4. Take the readings on the gauge</li> <li>5. Determine the average bursting strength</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for measuring tearing strength of the fabric</li> <li>2. Operate on bursting strength testing machine</li> <li>3. Determine the average bursting strength</li> </ol>

11	Measurement of Air permeability of the fabric	<ol style="list-style-type: none"> <li>1. Identify the instrument used for testing air permeability of the fabric</li> <li>2. Identify the parts of instrument</li> <li>3. Load the textile material on to the machine</li> <li>4. Observe the working of machine</li> <li>5. Operate on air permeability tester</li> <li>6. Determine the average air permeability value of given fabric</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument and its parts</li> <li>2. Operate the air permeability tester</li> <li>3. Determine the average air permeability value of given fabric</li> </ol>
12-14	Measurement of Water repellency by spray test / Drop test / Bundesman tester	<ol style="list-style-type: none"> <li>1. Identify different methods of measuring water repellency of the fabric</li> <li>2. Identify the instrument and its parts</li> <li>3. Observe procedure of spray test / drop test / Bundesman test</li> <li>4. Operate the instrument</li> <li>5. Take the readings</li> <li>6. Compare the air permeability of two given fabric</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument and its parts</li> <li>2. Operate the instrument</li> <li>3. Compare the air permeability of two given fabric</li> </ol>
15	Measurement of thermal insulation value of the fabric	<ol style="list-style-type: none"> <li>1. Identify the instrument and its parts</li> <li>2. Operate the machine</li> <li>3. Take the reading</li> <li>4. Compare the thermal insulation values of two fabrics</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument and its parts</li> <li>2. Operate the machine</li> <li>3. Compare the thermal insulation values of two fabrics</li> </ol>
16	Measurement of flammability of the fabric by using flammability tester	<ol style="list-style-type: none"> <li>1. Identify the instrument and its parts</li> <li>2. Operate the machine</li> <li>3. Take the reading</li> <li>4. Compare the flammability values of two fabrics</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument and its parts</li> <li>2. Operate the machine</li> <li>3. Compare the flammability values of two fabrics</li> </ol>
17-18	Measurement of fabric abrasion using Flat / Flex Abrasion tester	<ol style="list-style-type: none"> <li>1. Identify different methods of measuring fabric abrasion</li> <li>2. Identify the instrument and its parts</li> <li>3. Operate on flat / flex abrasion tester</li> <li>4. Take the readings</li> <li>5. Compare the flat / flex abrasion values of two given fabrics</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument and its parts</li> <li>2. Operate on flat / flex abrasion tester</li> <li>3. Compare the flat / flex abrasion values of two given fabrics</li> </ol>

19-21	<p>Measurement of fabric pilling using Martendale tester / ICI pilling box / Image analysis</p>	<ol style="list-style-type: none"> <li>1. Identify different methods of measuring fabric pilling</li> <li>2. Identify the instrument used for measuring fabric abrasion and its parts</li> <li>3. Observe the phenomenon of fabric pilling</li> <li>4. Operate on pilling tester</li> <li>5. Record the readings of pilling values</li> <li>6. Compare the pilling of two different fabrics</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument used for measuring fabric abrasion and its parts</li> <li>2. Operate on pilling tester</li> <li>3. Compare the pilling of two different fabrics</li> </ol>
22	<p>Computer aided color matching instrument</p>	<ol style="list-style-type: none"> <li>1. Identify the instrument and its parts</li> <li>2. Identify different controls</li> <li>3. Operate on the instrument</li> <li>4. Compare the fabric color with the standard / target</li> <li>5. Conclude the results</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the instrument and its parts</li> <li>2. Identify different controls</li> <li>3. Operate on the instrument</li> <li>4. Compare the fabric color with the standard / target</li> </ol>